Hickory Underground Water Conservation District No. 1

Groundwater Management Plan

2024-2029

District Mission

The Hickory Underground Water Conservation District No. 1 ("District") strives to conserve, preserve, prevent waste, protect, and recharge the underground waters of all aquifers within its legal boundaries, as far as practicable, to minimize the draw-down of the water table and the reduction of artesian pressure within the District Boundaries.

Time Period

This plan becomes effective upon approval by the Executive Administrator of the Texas Water Development Board and remains in effect for a period of five years. The plan may be revised at any time, or after years when the plan will be reviewed, revised, or amended and is approved as administratively complete by the Texas Water Development Board.

History

At the request of area citizens, the Texas Water Development Board entered an order on December 29, 1975, delineating a subdivision of the Hickory Aquifer Underground Water Reservoir in Concho, Kimble, Llano, Mason, McCulloch, Menard, and San Saba Counties. In November 1981, a petition was submitted to the Texas Water Commission calling for the creation of the Hickory Underground Water Conservation District No. 1 ("District"). At a hearing on June 9, 1982, before the Texas Water Commission, the petition was granted, and the District was created.

The confirmation election required by the state statute was held August 14, 1982; the District was officially established with a 94% approval of voters in those areas of Concho, Kimble, Mason, McCulloch, Menard, and San Saba Counties within the District boundaries.

On August 12, 1999, the petition of creation was amended by the TNRCC (now Texas Commission on Environmental Quality) to include all aquifers within the legal boundaries and management jurisdiction of the District.

On January 11, 2003, landowners of Mason County petitioned the District to annex the remainder of Mason County not currently in the District, and on May 3, 2003, in a special election held at the Mason County Courthouse, the remainder of Mason County was annexed into the District with an approval of 88% of the voters.

Regional Cooperation and Coordination

Regional Water Planning Groups

In 1998 the District was apportioned into two Regional Water Planning Groups established pursuant to §16.053 of the Texas Water Code. Concho, Kimble, Mason, McCulloch, and Menard Counties are located in Region F and San Saba County is in the Lower Colorado Regional Water Planning Group (Region K). The District's Regional planning responsibilities are within a 46-county area, stretching from Matagorda Bay to the Pecos River in West Texas.

Groundwater Management Area 7

In 2003 the Texas Water Development Board designated the boundaries of 16 groundwater management areas in Texas. The District lies entirely within Groundwater Management Area 7, which encompasses 34 counties and 20 groundwater conservation districts within an area of approximately 42,000 square miles. The groundwater management area was designated for the Edwards-Trinity Aquifer, but also includes all or portions of the minor Lipan-Kickapoo, Hickory, Ellen burger-San Saba, and Dockum aquifers, as well as a small portion of the Ogallala aquifer.

The District participates in the mandatory joint planning process mandated by 36.108 of the Texas Water Code and actively worked with the other 19 GMA 7 Districts to develop Desired Future Conditions (DFCs) for all relevant aquifers in the GMA.

West Texas Regional Groundwater Alliance

The District is a member of the West Texas Regional Groundwater Alliance (WTRGA). The regional alliance consists of seventeen (17) locally created and locally funded Districts that encompass almost 8.75 million acres or 13,000 square miles of West Texas. This West Texas region is as diverse as the State of Texas, making it necessary for each member district to develop its own unique priority management goals and rules to best serve the needs of its constituents. In 1988, four (4) groundwater districts (Coke County UWCD, Glasscock GCD, Irion County WCD, and Sterling County UWCD) signed the original Cooperative Agreement. Since then, the number of groundwater conservation districts in the area has more than quadrupled. The current member districts are:

Coke County UWCD	Crockett County GCD	Glasscock GCD
Hickory UWCD	Irion County WCD	Lipan-Kickapoo WCD
Plateau UWC&SD	Santa Rita UWCD	Sterling County UWCD
Sutton County UWCD	Menard County UWD	Lone Wolf GCD
Hill Country UWCD	Jeff Davis County UWCD	Middle Pecos GCD
Permian Basin UWCD	Wes-Tex GCD	

The WTRGA was crec:!ted to implement common objectives of coordinating and facilitating the conservation, preservation, and beneficial use of water and related sources. Local districts monitor the water-related activities of farming and ranching, oil and gas, industrial entities, and municipalities.

District Location and Extent

The District is located near the geographical center of Texas and is comprised of approximately 1,683,000 acres in portions of Concho, Kimble, McCulloch, Menard, and San Saba Counties and all of Mason County. In 2003 the District gained approximately 433,000 acres with the annexation of the remainder of Mason County that had not been included when the District was initially created.

Principal industries in the District are listed in the table below[1]. The District's economy is based to a large degree on agriculture with 12% of acreage in the District being cropland. Principal municipalities in or near the district boundaries are Brady, San Saba, Mason, and Eden.

County	Economy
Concho	Livestock production, government enterprises, tourism, hunting, fishing
Kimble	Livestock production, tourism, hunting, fishing, cedar oil and wood
Mason	Agriculture, hunting, tourism
McCulloch	Agribusiness, tourism, manufacturing, mining
Menard	Agribusiness, hunting, tourism, minor oil, and gas production
San Saba	Government enterprises, retail pecan industry, tourism, hunting

Topography

The District is within the Colorado River basin and is bisected by the Llano and San Saba Rivers, as well as numerous other creeks, Drainage is typically from west to east.

There are two major geologic features within the District. The Llano Uplift (Central Basin) is in the eastern southern portions of the District. This feature is made up of ancient Cambrian Age rocks ranging in age from 1.0 to 1.2 billion years old and comprised of granite and older metamorphic rocks. The northern and western parts of the District are in the Edwards Plateau Region and are made up of Cretaceous Age limestone, dolomite, and marble.

The District elevation ranges from 1,100 to 2,300 feet above sea level.

Statement of Guiding Principles

The District is created and organized under the terms and provisions of Article XVI, Section 59 of the Constitution of Texas, and Chapter 36 (formerly Chapter 52) of the Texas Water Code, Vernon's Texas Civil Statues, and the District's actions are authorized by, and consistent with this constitutional and statutory provision, including all amendments and additions. The District is created for the purpose of conserving, preserving, recharging, controlling subsidence, protecting, and preventing waste and as far as practicable to minimize the draw-down of the water table and reduction of artesian pressure in all aquifers within the District boundaries. In order to carry out its constitutional and statutory purposes, the District has all the powers authorized by Article XVI, Section 59, of the Texas Constitution and Chapter 36 of the Texas Water Code, Vernon's Civil Statues together all amendments and additions.

The District's purpose and powers are implemented through promulgation and enforcement of the District's Rules which are adopted and revised under the authority of Subchapter E, Chapter 36, Texas Water Code, and are incorporated herein as part of the District's Management Plan. A copy of the District's Rules is available on the District's website at

https://hickoryuwcd.org/Rules.html and in Appendix C.

Groundwater Resources of the District

Hickory Aquifer[2&3]

The Hickory Aquifer is the primary source of the District's groundwater, which is used for irrigation, public water supply, industrial, stock, and domestic needs of the people and entities served.

The Hickory Aquifer occurs in parts of the counties in the Llano Uplift region of Central Texas. Discontinuous outcrops of the Hickory Sandstone overlie, or flank exposed Precambrian rocks that form the central core of the uplift. The down-dip artesian portion of the aquifer encircles the uplist and extends to maximum depths approaching 4,000 feet. Most of the water pumped from the aquifer is used for irrigation. The largest capacity wells, however, have been completed for municipal water supply and industrial purposes in the Mason, Eden, and Brady area.

The Hickory Sandstone Member of the Cambrian Riley Formation is composed of some of the oldest sedimentary rocks found in Texas. In most of the northern and western portions of the aquifer, the Hickory can be differentiated into lower, middle, and upper units, which reach a maximum thickness of 480 feet in southwestern McCulloch County. In the southern and eastern extent of the aquifer, the Hickory consists of only two units. Extensive block faulting has compartmentalized the Hickory Aquifer, thus restricting hydrologic connection from one area to another.

Edwards-Trinity Aquifer[3]

The Edwards-Trinity Plateau Aquifer underlies the Edwards Plateau east of the Pecos River and the Stockton Plateau west of the Pecos River, supplying water to all or parts of 41 counties.

The aquifer consists of saturated sediments of lower Cretaceous age Trinity Group formations. The natural chemical quality of water ranges from fresh to slightly saline. The water is typically hard and may vary widely in concentrations of dissolved solids and bicarbonate. The salinity of the groundwater tends to increase toward the west.

Wells yields are typically low in the easter portion of the Edwards-Trinity, consequently there is little pumpage from the aquifer within the District.

Ellenburger-San Saba Aquifer[3]

The Ellenburger-San Saba Aquifer underlies 4,000 square miles in parts of 15 counties in the Llano Uplift area of Central Texas. Discontinuous outcrops of the aquifer generally encircle older rocks in the core of the Uplift. The remaining down-dip portion contains fresh to slightly saline water to depths of approximately 3,000 feet below land surface.

Water produced from the aquifer has dissolved solids ranging from 200 to 3,000 mg/l, but usually less than 1,000 mg/l. The quality of water deteriorates rapidly away from the outcrop area. Approximately 20 miles or more down-dip from the outcrop, the water is typically unsuitable for most uses.

Most of the deep municipal wells, which supply the City of Brady, produce an unknown amount of water from the Ellen burger-San Saba sequence of rocks. A substantial portion of the water supply for the City of San Saba is believed to be from the Ellenburger-San Saba and Marble Falls Aquifers.

Marble Falls Aquifer[3]

The Marble Falls Aquifer occurs primarily in the portions of McCulloch and San Saba Counties within the District. Smaller amounts of water are also used for rural domestic supplies, watering of livestock, and irrigation. Only small portions of Mason and Kimble Counties are affected by this aquifer.

The Marble Falls Aquifer occurs in several outcrops, primarily along the northern and eastern flanks of the Llano Uplift Region of Central Texas. Groundwater occurs in fractures, solution cavities, and channels in the limestone of the Marble Falls Formation of the Pennsylvanian Bend Group. The maximum thickness is 600 feet. Numerous large springs issue from the aquifer and provide a significant part of the base-flow to the San Saba River in McCulloch and San Saba Counties and to the Colorado Rivers in San Saba and Lampasas Counties.

Existing data for the Marble Falls Aquifer show that it contains mostly fresh water in outcrop areas and becomes mineralized a short distance down-dip from the outcrop areas. However, very few data exist to evaluate the brackish water that is present.

Most Marble Falls Aquifer wells produce fresh groundwater in the outcrop, while groundwater becomes highly mineralized within a relatively short distance of the down-dip. However, because the areal extent of the Marble Falls Aquifer is relatively limited, and because much of the existing data indicate that the aquifer has a limited groundwater availability, the Marble Falls Aquifer must be considered a very limited source of brackish groundwater. Due to the presumed deep nature where brackish groundwater would be located, and the low productivity of the aquifer, relative costs are expected to be moderate to high.

Modeled Available Groundwater in District Aquifers[4]

The District actively participates in joint planning with 19 other groundwater conservation districts (GCDs) in Groundwater Management Area 7 (GMA 7) pursuant to Section 36.108 of the Texas Water Code. The estimates of Modeled Available Groundwater (MAG) for each GCD in GMA 7 are based on the Desired Future Conditions (DFCs) adopted by GMA 7's member districts on August 19, 2021.

The models used in determining the MAGs and the parameters and assumptions relied upon for the aquifers of the District are described in GAM Run 21-012 Modeled Available Groundwater for the Aquifers in Groundwater Management Area 7 dated August 12, 2022, attached as Appendix B.

Edwards Trinity Plateau Aquifer

There are limited supplies of groundwater from the Edwards-Trinity (Plateau) Aquifer within the boundaries of the District. Any such wells in the District are used almost exclusively for domestic and livestock purposes. Therefore, GMA 7 districts declared the Edwards-Trinity (Plateau) Aquifer is not relevant for joint planning purposes in the District and did not adopt a DFC for the 2020-2070 planning period. Consequently, MAGs are not estimated for the aquifer within the District. A map showing the area of the aquifer is on page 31 of the GAM Run 21-012 MAG in Appendix B.

Ellenburger-San Saba Aquifer[4]

Total MAG for the Ellenburger-San Saba Aquifer within the District is 12,887 acre-feet/year for reach decade of the 2020-2070 period. See page 41-42 GAM Run 21-012 MAG for total Modeled Available Groundwater and the MAGs for the Ellenburger-San Saba Aquifer located in each county, or portion thereof, within the District. A map showing the area of the aquifer is on page 41 of GAM Run 21-012 MAG in Appendix B.

Hickory Aquifer4

Total MAG for the Hickory Aquifer is 44,483 acre-feet/year for each decade of the 2020-2070 period. See page 45 of Appendix B for the total MAG and the MAGs for the aquifer in each county, or portion thereof, located within the District. A map of the area of the aquifer is on page 44 of Appendix B.

Marble Falls Aquifer[4]

The Marble Falls Aquifer was declared irrelevant for joint planning purposes within the boundaries of GMA 7. No DFCs were adopted for this aquifer, nor MAGs calculated.

Methodology for Calculating District Water Usage, Surface Water Supply, and Demand

District Water Usage, Surface Water Supply and Demand numbers for counties are allocated to the District in proportion to the percentage of the area of the respective counties within the District as follows: Concho 11.44%; Kimble 2.55%; Mason 100%; McCulloch 79.92%; Menard 13.51%; and San Saba 55.88% Refer to Estimated Historical Groundwater Use and 2022 State Water Plan Datasets for Hickory Underground Water Conservation District No. 1 in Appendix A.10

Estimate of the Annual Volume of Recharge, the Annual Volume of Water that Discharges from the Aquifer, and the Annual Volume of Flow between Aquifers in the District

For greater depth, please see attached GAM Run 23-019 in the Appendix Dor online at https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR23-019.pdf

Projected Water Demands

2022 Adopted State Water Plan[7]

The projected water demands for each water user group in the respective counties for each decade of the planning period are detailed in the 2022 Statewide Water Plan Demands by County (https://2022.texasstatewaterplan.org/statewide) Refer to Estimated Historical Groundwater Use and 2022 State Water Plan Datasets for Hickory Underground Water Conservation District No. 1 in Appendix A. [10]

The City of San Angelo was issued a permit to pump water out ofthe Hickory Aquifer within the District boundaries in 1997. The City is amping up the well field and treatment expansions, hoping to increase production up to nine million gallons per day in 2026 (approximately 10,000 acre-feet/year). According to the City's permit, they can pump 10,000 acre-feet a year from 2026 until 2035 and 12,000 acre-feet annually starting in 2036[8]. These amounts are an important piece of the District's planning for future water demand.

Surface Water Resources of the Hickory UWCD No. 1

The San Saba and Llano Rivers bisect the District; however, only a small amount is used for anything other than livestock or domestic use. Refer to Estimated Historical Groundwater Use and 2022 State Water Plan Datasets for Hickory Underground Water Conservation District No. 1 in Appendix A. [10]

Projected Water Supply Needs[7]

Refer to Estimated Historical Groundwater Use and 2022 State Water Plan Datasets for Hickory Underground Water Conservation District No. 1 in Appendix A. [10]

Projected needs listed in the Estimated Historical Groundwater Use and 2022 State Water Plan Datasets for Hickory Underground Water Conservation District No. 1 indicate that from 2020 until 2070, the need throughout the District will remain steady. Municipal needs listed in Appendix A, pages 14 and 15 include Junction and Menard which are out of District. Municipal needs within the District are in Mason {Mason County) and Brady (McCulloch County), with a slight decrease in Mason from 2020 to 2070, from 700 acre-feet to 676. In Brady the need increases over the same time period from 1,391 acre-feet in 2020 to 1,414 in 2070. The District

works with municipalities, requiring a State approved water conservation plan and drought management plan as well as annual water use reports.

In addition to these projected needs, the City of San Angelo plans to utilize the San Angelo wellfield at full capacity, pumping 10,000 acre-feet/year starting in 2026 and jumping to 12,000 acre-feet annually in 2036[8]. These figures appear to be well within available supplies, but Federal Drinking Water Standards relating to the levels of radionuclides in much of the Hickory water supply will significantly diminish the availability of groundwater for public water supply purposed. According to the Texas Commission on Environmental Quality, public water supplies in Brady, Eden, and other smaller systems, as well as the water being transported to the City of San Angelo may be impacted by Federal Standards. The City of San Angelo is expanding their treatment facilities to accommodate this issue.

Projected Water Management Strategies in the 2022 Adopted State Water Plan[7]

Refer to Estimated Historical Groundwater Use and 2022 State Water Plan Datasets for Hickory Underground Water Conservation District No. 1 in Appendix A.10

Projected water management strategies listed in the TWDB estimated historical water use/2022 State Water Plan data packet, and located within the District are: Municipal Water Conservation (Eden, Millersview-Doole WSC, Mason, Brady, San Saba, and Richland SUD), Irrigation Conservation (Concho County, Kimble County, Mason County, McCulloch County, Menard County, and San Saba County), Water Audit and Leaks (Millersview-Doole WSC), Subordination (San Angelo System, OH Ivie Non System, and Brady Creek Reservoir), Mining Conservation (Mason County and McCulloch County), Advanced Water Treatment (Mason and Brady) and Drought Management (North San Saba WSC, Richland SUD, and San Saba County).

The Projected Water Management Strategies found on pages 17 through 21 emphasize Demand Reduction. The District works with municipalities requiring water conservation plans and drought management plans in order to reduce demand. The District has developed a series of tracking methodologies and goals documented in this management plan toward the same end.

Actions, Procedures, Performance, and Avoidance for Plan Implementation

The District will implement the provisions of this plan and will utilize the provisions of this plan as a guidepost for determining the direction or priority for District operations and activities. Operations of the District, all agreements entered into by the District, and any additional planning efforts in which the District may participate will be consistent with the provisions of this plan.

The District has adopted rules relating to the permitting of wells and production of groundwater and continues to review and revise those rules in accordance with the best scientific evidence available and pursuant to changes in state laws and regulations. The rules adopted by the

District shall be pursuant to TWC§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 copy of the District's Rules is available on the District's website at

https://hickoryuwcd.org/Rules.html and in Appendix C

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

The District will seek cooperation in the implementation of this plan and the management of groundwater supplies within the District. All activities will be undertaken in cooperation and coordinated with the appropriate state, regional, or local management entity.

Tracking Methodology

The District Manager will provide a report of staff activities to the Board of Directors quarterly at board meetings to ensure management objectives and goals are being achieved.

Management Goals, Objectives, and Performance Standards

Goal 1.0 To provide the most efficient use of groundwater.

Management Objective

1.1 Annually the District will provide educational materials identifying conservation measures for the efficient use of water. Annually, two (2) District newsletter issues will be published that contain water conservation information. Handout packets with conservation literature will be provided at the annual McCulloch County Soil and Water Conservation Field Day or one other water related function.

Performance Standard

1.1a Number of newsletters published annually containing water conservation information.

1.1b Number of events annually where conservation material was provided

Management Objective

1.2 To monitor groundwater availability over the five-year management period, the District will identify and monitor 50 wells for water levels and obtain annual water levels on the monitored wells.

Performance Standard

1.2 Number of monitored wells measured annually.

Goal 2.0 To control and prevent the waste of groundwater.

Management Objective

2.1 Once each year the District will lend flowmeters to assist at least one irrigator within the District to evaluate irrigation systems and reduce waste.

Performance Standard

2.1 The number of District irrigators who receive loans of flowmeters to assist in evaluating their irrigation systems.

Goal 3.0 Addressing natural resource issues that impact the use and availability of groundwater and are impacted by the use of groundwater.

Management Objective

3.1 Every year the District will conduct water quality tests on at least twenty (20) wells within the District boundaries.

Performance Standard

3.1 The number of wells tested each year for water quality.

Goal 4.0 Addressing drought conditions.

Management Objective

4.1a Monitor the Palmer Drought Severity Index (PDSI) quarterly and more frequently during abnormally dry conditions, notifying all District public water suppliers of severe drought when they occur

4.1b Notify area residents through the District newsletter of severe drought conditions when they occur and advise them that they may find useful information on the current drought status at the TWDB Water Data for Texas drought link at https://waterdatafortexas.org/drought

Performance Standards

4.1a Report the current drought status of the District to the Board of Directors quarterly at District Board meetings

4.1b Annually report to the Board of Directors the number of times area residents are notified of severe drought conditions in the District newsletter and number of times that letters are sent to public water suppliers warning of severe drought conditions.

Goal S.0a Addressing conservation.

Management Objective

5.1 At least annually the District will provide literature promoting water conservation in a public education presentation.

Performance Standards

5.1a Report to Board of Directors annually the number of times water conservation information was distributed to area residents or in public informational or educational meetings

Goal 5.0b Addressing rainwater harvesting.

Management Objective

5.2 The District will display rainwater harvesting manuals at the District office and at least once annually provides notices in the District newsletter that these manuals are available free of charge.

Performance Standards

5.2a Report to the Board of Directors annually on the number of times notice was published in the District newsletter about the availability of rainwater harvesting manuals in the District office.

Management Objective

5.3 Include information on rainwater harvesting in one public education presentation annually.

Performance Standards

5.3a Report to the Board of Directors annually the number of educational presentations that included rainwater harvesting information

Goal 6.0 Addressing the Desired Future Conditions of the District aquifers.

Management Objective

6.1 Monitor three (3) water levels annually in the Hickory aquifer outcrop and one (1) level annually in the Ellen burger-San Saba outcrop are of the District to determine whether the drawdown objectives ofthe District's DFCs are being

met. These wells have been chosen as benchmarks because they are not being used/pumped and we have long-standing reliable historical records for them.

Performance Standards

6.1 Annual report to the Board of Directors on monitor wells measured annually to determine whether drawdown objectives are being met.

36.1071 (a) Management Goals Not Applicable to the District

Goal 1.0 Controlling and Preventing Subsidence [9]

Following District review of the TWDB report Identification of the Vulnerability of the Major and Minor Aquifers of Texas with Subsidence with Regard to Groundwater Pumping, the District concluded that this goal was not applicable to the operation of the District. According to the report conducted by LRE Water, LLC, "Results of the assessment suggest that the Ellenburger-San Saba Aquifer has a low to medium-low risk for future subsidence due to pumping (page 4-141) "The same study concluded that both the Hickory Aquifer and the Marble Falls have low risks for future subsidence due to pumping (page 4-149 and 4-178). The report may be accessed at https://www.twdb.texas.gov/groundwater/models/research/subsidence/subsidence.asp

Goal 2.0 Addressing recharge enhancement.

The Texas Water Development Board, at the request of the District, completed a study of the area within the District to evaluate the possibility of beneficial artificial recharge of this area of the Hickory Aquifer. Evaluation of the Hickory Aquifer and Its Relationship to Katemcy Creek and Its Major Tributaries for Beneficial Recharge, McCulloch and Mason Counties, Texas, is available at the District office. The study along with subsequent studies does not support an economically feasible recharge program. This goal is not applicable to the operations of the District.

Goal 3.0 Addressing precipitation enhancement.

The District has investigated participation in the West Texas Weather Modification Program which performs cloud-seeding operations out of San Angelo, Texas, but had determined it is not economically feasible. This goal is not applicable to the operations of the District.

Goal 4.0 Addressing conjunctive surface water management issues.

The City of Brady has halted plans to utilize Brady Lake Reservoir; therefore, this goal is no longer necessary.. This goal is not applicable to the operations of the District.

Goal 5.0 Brush Control

The District recognizes the benefits of brush control through increased spring flows and the enhancement of native turf which limits runoff. However, most brush control projects within the District are carried out and funded through the experts at Natural Resources Conservation Service (NRCS) and ample educational material and programs on brush control are provided by the Texas Agrilife Extension Service. This management goal is not applicable to the operations of the District.

Sources

1 2022-2023 Texas Almanac, 71st Edition, Texas State Historical Association https://www.tshaonline.org/publications/texas-almanac-2022-2023

2 Aquifers of Texas, Report 380, TWDB, 2011 https://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R380_AquifersotTexas.pdf

3 Hickory Aquifer. Minor, TWDB website, https://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R345/Minors/hickory.pdf

4 GAM Run 21-012 Modeled Available Groundwater for the Aquifers in Groundwater Management Area 7, August 12, 2022 https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-012_MAG.pdf

5 2020 Historical Water Use Estimates, TWDB, https://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/index.asp

6 GAM Run 23-019, TWDB, August 16, 2023 https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR23-019.pdf

7 2022 Statewide Water Plan, Download Data https://2022.texasstatewaterplan.org/statewide

8 Hickory Aquifer Overview, City of San Angelo Water Utilities, https://www.cosatx.us/departments-services/water-utilities/hickory

9 Vulnerability of Texas Aquifers to Pumping-Induced Subsidence https://www.twdb.texas.gov/groundwater/models/research/subsidence/subsidence.asp

10 Estimated Historical Groundwater Use and 2022 State Water Plan Datasets; Hickory UWCD #1 by Stephen Allen, TWDB, Groundwater Division October 31, 2023

APPENDIX A

Estimated Historical Groundwater Use and 2022 State Water Plan Datasets: Hickory Underground Water Conservation District

Estimated Historical Groundwater Use And 2022 State Water Plan Datasets:

Hickory Underground Water Conservation District # 1

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October 31, 2023

GROUNDWATER MANAGEMENT PLAN DATA:

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

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

The five reports included in this part are:

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

Part 2 of the 2-part package is the groundwater availability model (GAM) report for the District (checklist items 3 through 5). The District should have received, or 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 10/31/2023. Although it does not happen frequently, either of these datasets are subject to change pending the availability of more accurate WUS data or an amendment to the 2022 SWP. District personnel must review these datasets and correct any discrepancies 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).

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

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

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

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

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

Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

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

CONCHO COUNTY

11.44% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	54	0	0	0	710	33	797
	SW	13	0	0	0	28	33	74
2018	GW	53	0	0	0	749	33	835
	SW	10	0	0	0	26	33	69
2017	GW	37	0	0	0	569	32	638
	SW	17	0	0	0	24	32	73
2016	GW	56	0	0	0	504	20	580
	SW	5	0	0	0	25	20	50
2015	GW	60	0	0	0	473	20	553
	SW	4	0	0	0	41	20	65
2014	GW	54	0	0	0	509	19	582
	SW	5	0	0	0	36	19	60
2013	GW	54	0	0	0	564	18	636
	SW	5	0	0	0	28	18	51
2012	GW	47	0	0	0	539	22	608
	SW	4	0	0	0	21	22	47
2011	GW	63	0	0	0	264	25	352
	SW	11	0	0	0	23	25	59
2010	GW	45	0	12	0	738	26	821
	SW	11	0	2	0	82	26	121
2009	GW	45	0	9	0	138	28	220
	SW	11	0	1	0	160	28	200
2008	GW	52	0	5	0	1,106	28	1,191
	SW	4	0	1	0	12	28	45
2007	GW	57	0	0	0	585	40	682
	SW	8	0	0	0	14	40	62
2006	GW	73	0	0	0	873	33	979
	SW	8	0	0	0	11	33	52
2005	GW	82	0	0	0	337	27	446
	SW	11	0	0	0	70	27	108
2004	GW	61	0	0	0	208	41	310
	SW	11	0	0	0	143	10	164

KIMBLE COUNTY

2.55% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	1	0	9	0	8	6	24
	SW	14	13	0	0	67	3	97
2018	GW	1	0	0	0	7	6	14
	SW	14	13	0	0	62	3	92
2017	GW	1	0	0	0	7	6	14
	SW	14	13	0	0	52	3	82
2016	GW	1	0	0	0	9	5	15
	SW	13	14	0	0	52	2	81
2015	GW	3	0	0	0	3	5	11
	SW	13	16	0	0	58	2	89
2014	GW	4	0	0	0	8	4	16
	SW	13	14	0	0	55	2	84
2013	GW	6	0	4	0	5	4	19
	SW	13	15	0	0	58	2	88
2012	GW	6	0	0	0	10	5	21
	SW	15	15	0	0	58	2	90
2011	GW	7	0	0	0	8	8	23
	SW	16	15	0	0	61	4	96
2010	GW	6	0	0	0	14	8	28
	SW	16	13	0	0	62	3	94
2009	GW	6	0	0	0	20	6	32
	SW	16	12	0	0	57	3	88
2008	GW	6	0	0	0	5	6	17
	SW	15	0	0	0	70	3	88
2007	GW	5	0	0	0	12	7	24
	SW	15	0	0	0	28	3	46
2006	GW	6	0	0	0	1	7	14
	SW	16	2	0	0	77	3	98
2005	GW	6	0	0	0	4	7	17
	SW	16	2	0	0	60	3	81
2004	GW	5	0	0	0	2	8	15
	SW	16	2	0	0	56	2	76

MASON COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	673	0	176	0	4,839	526	6,214
	SW	0	0	0	0	6	176	182
2018	GW	722	0	176	0	3,943	526	5,367
	SW	0	0	0	0	16	176	192
2017	GW	700	0	177	0	4,508	506	5,891
	SW	0	0	0	0	30	168	198
2016	GW	639	0	187	0	4,791	515	6,132
	SW	0	0	0	0	103	172	275
2015	GW	670	0	116	0	4,888	506	6,180
	SW	0	0	0	0	83	168	251
2014	GW	737	0	266	0	5,126	489	6,618
	SW	0	0	0	0	99	163	262
2013	GW	776	0	311	0	4,695	474	6,256
	SW	0	0	0	0	69	158	227
2012	GW	777	0	313	0	5,203	608	6,901
	SW	0	0	0	0	70	203	273
2011	GW	952	0	0	0	5,644	680	7,276
	SW	0	0	0	0	2	227	229
2010	GW	814	0	275	0	3,853	426	5,368
	SW	0	0	285	0	69	142	496
2009	GW	812	0	275	0	6,725	650	8,462
	SW	0	0	285	0	69	216	570
2008	GW	748	0	275	0	5,445	738	7,206
	SW	0	0	285	0	74	246	605
2007	GW	583	0	0	0	3,311	742	4,636
	SW	0	0	0	0	0	248	248
2006	GW	825	0	0	0	6,775	936	8,536
	SW	0	0	0	0	55	312	367
2005	GW	704	0	0	0	8,375	756	9,835
	SW	0	0	0	0	38	252	290
2004	GW	573	0	0	0	9,562	524	10,659
	SW	0	0	0	0	115	524	639

MCCULLOCH COUNTY

72.92% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	938	0	64	0	1,111	348	2,461
	SW	28	0	0	0	227	87	342
2018	GW	979	385	1,449	0	1,243	348	4,404
	SW	24	0	0	0	219	87	330
2017	GW	955	385	1,438	0	1,154	335	4,267
	SW	36	0	0	0	233	84	353
2016	GW	940	53	3,681	0	637	290	5,601
	SW	13	0	0	0	215	73	301
2015	GW	1,038	28	3,128	0	1,475	289	5,958
	SW	11	0	0	0	136	72	219
2014	GW	1,118	28	2,772	0	1,456	273	5,647
	SW	9	0	0	0	171	69	249
2013	GW	1,103	29	2,045	0	1,331	267	4,775
	SW	10	0	0	0	154	67	231
2012	GW	1,189	53	2,230	0	1,504	308	5,284
	SW	12	0	0	0	116	77	205
2011	GW	1,329	1	2,033	0	1,781	365	5,509
	SW	21	0	0	0	95	91	207
2010	GW	745	1	3,709	0	1,770	686	6,911
	SW	436	0	2,015	0	95	171	2,717
2009	GW	747	1	2,510	0	2,451	416	6,125
	SW	428	0	1,999	0	163	104	2,694
2008	GW	754	1	3,572	0	560	384	5,271
	SW	591	0	1,983	0	0	96	2,670
2007	GW	1,461	20	1,654	0	1,308	376	4,819
	SW	26	0	0	0	61	94	181
2006	GW	1,517	25	1,779	0	2,146	359	5,826
	SW	28	0	0	0	389	90	507
2005	GW	1,482	25	542	0	2,297	398	4,744
	SW	22	0	0	0	349	100	471
2004	GW	1,442	28	535	0	2,297	363	4,665
	SW	23	0	0	0	364	90	477

MENARD COUNTY

13.51% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	2	0	0	0	61	38	101
	SW	33	0	0	0	258	7	298
2018	GW	4	0	0	0	58	38	100
	SW	34	0	0	0	458	7	499
2017	GW	4	0	0	0	88	36	128
	SW	35	0	0	0	213	6	254
2016	GW	4	0	0	0	52	35	91
	SW	34	0	0	0	453	6	493
2015	GW	6	0	0	0	69	34	109
	SW	32	0	0	0	496	6	534
2014	GW	10	0	0	0	54	33	97
	SW	34	0	0	0	553	6	593
2013	GW	12	0	0	0	63	33	108
	SW	35	0	0	0	638	6	679
2012	GW	13	0	0	0	136	30	179
	SW	39	0	0	0	131	5	175
2011	GW	14	0	0	0	45	35	94
	SW	49	0	0	0	574	6	629
2010	GW	12	0	28	0	115	37	192
	SW	40	0	7	0	165	6	218
2009	GW	47	0	14	0	110	45	216
	SW	0	0	4	0	106	8	118
2008	GW	41	0	0	0	0	40	81
	SW	0	0	0	0	138	7	145
2007	GW	34	0	0	0	143	47	224
	SW	0	0	0	0	141	8	149
2006	GW	39	0	0	0	211	46	296
	SW	0	0	0	0	132	8	140
2005	GW	35	0	0	0	29	44	108
	SW	0	0	0	0	190	8	198
2004	GW	35	0	0	0	19	43	97
	SW	0	0	0	0	153	11	164

SAN SABA COUNTY

55.88% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	884	9	0	0	2,649	222	3,764
	SW	128	0	0	0	2,016	332	2,476
2018	GW	741	2	0	0	2,186	222	3,151
	SW	21	1	0	0	3,316	332	3,670
2017	GW	915	2	0	0	2,173	216	3,306
	SW	85	1	0	0	2,018	324	2,428
2016	GW	849	2	0	0	1,297	171	2,319
	SW	83	1	0	0	3,022	256	3,362
2015	GW	873	2	0	0	1,798	168	2,841
	SW	75	1	0	0	2,120	252	2,448
2014	GW	785	2	0	0	2,248	161	3,196
	SW	137	1	0	0	2,208	243	2,589
2013	GW	957	2	0	0	1,617	157	2,733
	SW	78	1	0	0	2,258	235	2,572
2012	GW	1,228	5	0	0	2,012	165	3,410
	SW	0	1	0	0	2,176	248	2,425
2011	GW	1,149	3	0	0	1,703	193	3,048
	SW	0	0	0	0	2,711	290	3,001
2010	GW	748	3	224	0	800	193	1,968
	SW	0	0	231	0	2,380	291	2,902
2009	GW	741	1	221	0	1,748	205	2,916
	SW	0	0	226	0	2,425	307	2,958
2008	GW	734	1	218	0	139	205	1,297
	SW	0	0	221	0	2,264	307	2,792
2007	GW	656	1	0	0	801	284	1,742
	SW	0	0	0	0	1,789	425	2,214
2006	GW	742	1	0	0	500	205	1,448
	SW	0	0	0	0	2,891	307	3,198
2005	GW	677	1	1	0	597	235	1,511
	SW	0	0	0	0	2,806	353	3,159
2004	GW	3,292	1	4	0	607	496	4,400
	SW	0	0	0	0	2,236	124	2,360

Projected Surface Water Supplies
TWDB 2022 State Water Plan Data

CONCHO COUNTY

11.44% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
F	County-Other, Concho	Colorado	Colorado Run-of-River	4	4	4	4	4	4
F	Irrigation, Concho	Colorado	Colorado Run-of-River	24	24	24	24	24	24
F	Livestock, Concho	Colorado	Colorado Livestock Local Supply	26	26	26	26	26	26
F	Millersview-Doole WSC	Colorado	OH Ivie Lake/Reservoir Non-System Portion	84	90	88	86	83	75
	Sum of Projected Surface Water Supplies (acre-feet)			**138**	**144**	**142**	**140**	**137**	**129**

KIMBLE COUNTY

2.55% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
F	Irrigation, Kimble	Colorado	Colorado Run-of-River	28	28	28	28	28	28
F	Junction	Colorado	Colorado Run-of-River	0	0	0	0	0	0
F	Livestock, Kimble	Colorado	Colorado Livestock Local Supply	4	4	4	4	4	4
F	Manufacturing, Kimble	Colorado	Colorado Run-of-River	0	0	0	0	0	0
F	Mining, Kimble	Colorado	Colorado Run-of-River	0	0	0	0	0	0
	Sum of Projected Surface Water Supplies (acre-feet)			**32**	**32**	**32**	**32**	**32**	**32**

MASON COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
F	Livestock, Mason	Colorado	Colorado Livestock Local Supply	227	227	227	227	227	227
	Sum of Projected Surface Water Supplies (acre-feet)			**227**	**227**	**227**	**227**	**227**	**227**

Projected Surface Water Supplies
TWDB 2022 State Water Plan Data

MCCULLOCH COUNTY

72.92% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
F	Brady	Colorado	Brady Creek Lake/Reservoir	0	0	0	0	0	0
F	Irrigation, McCulloch	Colorado	Colorado Run-of-River	50	50	50	50	50	50
F	Livestock, McCulloch	Colorado	Colorado Livestock Local Supply	171	171	171	171	171	171
F	Millersview-Doole WSC	Colorado	OH Ivie Lake/Reservoir Non-System Portion	132	145	143	142	138	124
	Sum of Projected Surface Water Supplies (acre-feet)			**353**	**366**	**364**	**363**	**359**	**345**

MENARD COUNTY

13.51% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
F	Irrigation, Menard	Colorado	Colorado Run-of-River	264	264	264	264	264	264
F	Livestock, Menard	Colorado	Colorado Livestock Local Supply	6	6	6	6	6	6
F	Menard	Colorado	Colorado Run-of-River	139	139	139	139	139	139
	Sum of Projected Surface Water Supplies (acre-feet)			**409**	**409**	**409**	**409**	**409**	**409**

SAN SABA COUNTY

55.88% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
K	Corix Utilities Texas Inc	Colorado	Highland Lakes Lake/Reservoir System	15	15	15	15	15	15
K	County-Other, San Saba	Colorado	Highland Lakes Lake/Reservoir System	11	11	11	11	11	11
K	Irrigation, San Saba	Colorado	Colorado Run-of-River	1,844	1,844	1,844	1,844	1,844	1,844
K	Livestock, San Saba	Colorado	Colorado Livestock Local Supply	503	503	503	503	503	503
K	San Saba	Colorado	Colorado Run-of-River	0	0	0	0	0	0
	Sum of Projected Surface Water Supplies (acre-feet)			**2,373**	**2,373**	**2,373**	**2,373**	**2,373**	**2,373**

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.

CONCHO COUNTY

11.44% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
F	County-Other, Concho	Colorado	13	13	12	12	12	12
F	Eden	Colorado	206	210	207	205	204	204
F	Irrigation, Concho	Colorado	561	561	561	561	561	561
F	Livestock, Concho	Colorado	44	44	44	44	44	44
F	Millersview-Doole WSC	Colorado	94	93	90	89	89	89
F	Mining, Concho	Colorado	55	54	48	42	37	32
	Sum of Projected Water Demands (acre-feet)		**973**	**975**	**962**	**953**	**947**	**942**

KIMBLE COUNTY

2.55% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
F	County-Other, Kimble	Colorado	6	6	6	6	6	6
F	Irrigation, Kimble	Colorado	68	68	68	68	68	68
F	Junction	Colorado	626	620	609	605	604	604
F	Livestock, Kimble	Colorado	8	8	8	8	8	8
F	Manufacturing, Kimble	Colorado	15	18	18	18	18	18
F	Mining, Kimble	Colorado	0	0	0	0	0	0
	Sum of Projected Water Demands (acre-feet)		**723**	**720**	**709**	**705**	**704**	**704**

MASON COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
F	County-Other, Mason	Colorado	231	224	218	215	214	214
F	Irrigation, Mason	Colorado	4,966	4,966	4,966	4,966	4,966	4,966
F	Livestock, Mason	Colorado	714	714	714	714	714	714
F	Mason	Colorado	700	690	682	677	676	676
F	Mining, Mason	Colorado	1,023	941	708	568	460	372
	Sum of Projected Water Demands (acre-feet)		**7,634**	**7,535**	**7,288**	**7,140**	**7,030**	**6,942**

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.

MCCULLOCH COUNTY

72.92% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
F	Brady	Colorado	1,391	1,420	1,402	1,410	1,412	1,414
F	County-Other, McCulloch	Colorado	96	98	98	98	98	98
F	Irrigation, McCulloch	Colorado	1,695	1,695	1,695	1,695	1,695	1,695
F	Livestock, McCulloch	Colorado	475	475	475	475	475	475
F	Manufacturing, McCulloch	Colorado	381	444	444	444	444	444
F	Millersview-Doole WSC	Colorado	148	150	147	146	147	147
F	Mining, McCulloch	Colorado	6,510	6,087	4,843	4,103	3,526	3,063
F	Richland SUD	Colorado	234	240	238	239	239	240
	Sum of Projected Water Demands (acre-feet)		**10,930**	**10,609**	**9,342**	**8,610**	**8,036**	**7,576**

MENARD COUNTY

13.51% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
F	County-Other, Menard	Colorado	12	12	12	11	11	11
F	Irrigation, Menard	Colorado	495	495	495	495	495	495
F	Livestock, Menard	Colorado	40	40	40	40	40	40
F	Menard	Colorado	350	342	336	335	335	335
F	Mining, Menard	Colorado	147	145	129	112	97	84
	Sum of Projected Water Demands (acre-feet)		**1,044**	**1,034**	**1,012**	**993**	**978**	**965**

SAN SABA COUNTY

55.88% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
K	Corix Utilities Texas Inc	Colorado	15	15	15	15	15	15
K	County-Other, San Saba	Colorado	122	123	121	119	121	124
K	Irrigation, San Saba	Colorado	4,023	4,023	4,023	4,023	4,023	4,023
K	Livestock, San Saba	Colorado	435	435	435	435	435	435
K	Manufacturing, San Saba	Colorado	6	7	7	7	7	7
K	Mining, San Saba	Colorado	608	611	528	503	483	468
K	North San Saba WSC	Colorado	185	191	190	187	191	195
K	Richland SUD	Colorado	224	231	229	224	229	235

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.

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
K	San Saba	Colorado	1,175	1,216	1,212	1,186	1,213	1,241
	Sum of Projected Water Demands (acre-feet)		**6,793**	**6,852**	**6,760**	**6,699**	**6,717**	**6,743**

Projected Water Supply Needs
TWDB 2022 State Water Plan Data

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

CONCHO COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
F	County-Other, Concho	Colorado	0	0	0	0	0	0
F	Eden	Colorado	25	25	25	25	25	25
F	Irrigation, Concho	Colorado	0	0	0	0	0	0
F	Livestock, Concho	Colorado	0	0	0	0	0	0
F	Millersview-Doole WSC	Colorado	21	27	27	26	22	14
F	Mining, Concho	Colorado	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**0**	**0**	**0**	**0**	**0**

KIMBLE COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
F	County-Other, Kimble	Colorado	0	0	0	0	0	0
F	Irrigation, Kimble	Colorado	-1,103	-1,103	-1,103	-1,103	-1,103	-1,103
F	Junction	Colorado	-626	-620	-609	-605	-604	-604
F	Livestock, Kimble	Colorado	0	0	0	0	0	0
F	Manufacturing, Kimble	Colorado	-603	-704	-704	-704	-704	-704
F	Mining, Kimble	Colorado	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**-2,332**	**-2,427**	**-2,416**	**-2,412**	**-2,411**	**-2,411**

MASON COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
F	County-Other, Mason	Colorado	0	0	0	0	0	0
F	Irrigation, Mason	Colorado	0	0	0	0	0	0
F	Livestock, Mason	Colorado	0	0	0	0	0	0
F	Mason	Colorado	-700	-690	-682	-677	-676	-676
F	Mining, Mason	Colorado	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**-700**	**-690**	**-682**	**-677**	**-676**	**-676**

Projected Water Supply Needs
TWDB 2022 State Water Plan Data

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

MCCULLOCH COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
F	Brady	Colorado	-1,391	-1,420	-1,402	-1,410	-1,412	-1,414
F	County-Other, McCulloch	Colorado	0	0	0	0	0	0
F	Irrigation, McCulloch	Colorado	0	0	0	0	0	0
F	Livestock, McCulloch	Colorado	0	0	0	0	0	0
F	Manufacturing, McCulloch	Colorado	0	0	0	0	0	0
F	Millersview-Doole WSC	Colorado	32	43	44	43	38	23
F	Mining, McCulloch	Colorado	1	1	1	1	0	1
F	Richland SUD	Colorado	78	72	74	77	73	70
	Sum of Projected Water Supply Needs (acre-feet)		**-1,391**	**-1,420**	**-1,402**	**-1,410**	**-1,412**	**-1,414**

MENARD COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
F	County-Other, Menard	Colorado	0	0	0	0	0	0
F	Irrigation, Menard	Colorado	0	0	0	0	0	0
F	Livestock, Menard	Colorado	0	0	0	0	0	0
F	Menard	Colorado	-211	-203	-197	-196	-196	-196
F	Mining, Menard	Colorado	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**-211**	**-203**	**-197**	**-196**	**-196**	**-196**

SAN SABA COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
K	Corix Utilities Texas Inc	Colorado	0	0	0	0	0	0
K	County-Other, San Saba	Colorado	26	24	27	31	27	22
K	Irrigation, San Saba	Colorado	23	23	23	23	23	23
K	Livestock, San Saba	Colorado	439	439	439	439	439	439
K	Manufacturing, San Saba	Colorado	2	0	0	0	0	0
K	Mining, San Saba	Colorado	451	446	595	639	675	701
K	North San Saba WSC	Colorado	10	4	5	8	4	0
K	Richland SUD	Colorado	76	69	71	72	71	67

Projected Water Supply Needs
TWDB 2022 State Water Plan Data

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

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
K	San Saba	Colorado	71	30	34	60	33	5
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**0**	**0**	**0**	**0**	**0**

Projected Water Management Strategies
TWDB 2022 State Water Plan Data

CONCHO COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
County-Other, Concho, Colorado (F)							
Municipal Conservation - Concho County Other	DEMAND REDUCTION [Concho]	3	3	3	3	3	3
Subordination - San Angelo System	San Angelo Lakes Lake/Reservoir System [Reservoir]	3	3	3	3	3	3
		6	**6**	**6**	**6**	**6**	**6**
Eden, Colorado (F)							
Municipal Conservation - Eden	DEMAND REDUCTION [Concho]	4	4	4	4	4	4
		4	**4**	**4**	**4**	**4**	**4**
Irrigation, Concho, Colorado (F)							
Irrigation Conservation - Concho County	DEMAND REDUCTION [Concho]	245	490	539	539	539	539
		245	**490**	**539**	**539**	**539**	**539**
Millersview-Doole WSC, Colorado (F)							
Municipal Conservation - Millersview-Doole WSC	DEMAND REDUCTION [Concho]	2	2	2	2	2	2
Subordination - OH Ivie Non System Portion	OH Ivie Lake/Reservoir Non-System Portion [Reservoir]	8	0	0	0	1	9
Water Audits And Leak - Millersview-Doole WSC	DEMAND REDUCTION [Concho]	10	10	9	9	9	9
		20	**12**	**11**	**11**	**12**	**20**
Mining, Concho, Colorado (F)							
Mining Conservation - Concho County	DEMAND REDUCTION [Concho]	20	20	18	15	13	12
		20	**20**	**18**	**15**	**13**	**12**
Sum of Projected Water Management Strategies (acre-feet)		**295**	**532**	**578**	**575**	**574**	**581**

KIMBLE COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Irrigation, Kimble, Colorado (F)							
Irrigation Conservation - Kimble County	DEMAND REDUCTION [Kimble]	133	266	319	319	319	319

Projected Water Management Strategies
TWDB 2022 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
		133	**266**	**319**	**319**	**319**	**319**
Junction, Colorado (F)							
Develop Additional Edwards-Trinity Plateau Aquifer Supplies - Junction	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers [Kimble]	370	370	370	370	370	370
Municipal Conservation - Junction	DEMAND REDUCTION [Kimble]	8	8	8	8	8	8
Subordination - Kimble County RoR	Colorado Run-of-River [Kimble]	250	250	250	250	250	250
		628	**628**	**628**	**628**	**628**	**628**
Manufacturing, Kimble, Colorado (F)							
Develop Additional Ellenburger San Saba Aquifer Supplies - Kimble County Manufacturing	Ellenburger-San Saba Aquifer [Kimble]	500	500	500	500	500	500
Subordination - Kimble County RoR	Colorado Run-of-River [Kimble]	228	228	228	228	228	228
		728	**728**	**728**	**728**	**728**	**728**
Mining, Kimble, Colorado (F)							
Mining Conservation - Kimble County	DEMAND REDUCTION [Kimble]	1	1	1	1	1	1
		1	**1**	**1**	**1**	**1**	**1**
Sum of Projected Water Management Strategies (acre-feet)		**1,490**	**1,623**	**1,676**	**1,676**	**1,676**	**1,676**

MASON COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Irrigation, Mason, Colorado (F)							
Irrigation Conservation - Mason County	DEMAND REDUCTION [Mason]	248	497	745	745	745	745
		248	**497**	**745**	**745**	**745**	**745**
Mason, Colorado (F)							
Additional Water Treatment - Mason	Hickory Aquifer [Mason]	700	690	682	677	676	676
Municipal Conservation - Mason	DEMAND REDUCTION [Mason]	7	7	7	7	7	7
		707	**697**	**689**	**684**	**683**	**683**

Projected Water Management Strategies
TWDB 2022 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Mining, Mason, Colorado (F)							
Mining Conservation - Mason County	DEMAND REDUCTION [Mason]	43	40	30	24	19	16
		43	**40**	**30**	**24**	**19**	**16**
Sum of Projected Water Management Strategies (acre-feet)		**998**	**1,234**	**1,464**	**1,453**	**1,447**	**1,444**

MCCULLOCH COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Brady, Colorado (F)							
Advanced Groundwater Treatment - Brady	Hickory Aquifer [McCulloch]	1,195	1,195	1,195	1,195	1,195	1,195
Municipal Conservation - Brady	DEMAND REDUCTION [McCulloch]	18	18	19	19	19	19
Subordination - Brady Creek Reservoir	Brady Creek Lake/Reservoir [Reservoir]	841	841	841	841	841	841
		2,054	**2,054**	**2,055**	**2,055**	**2,055**	**2,055**
County-Other, McCulloch, Colorado (F)							
Advanced Groundwater Treatment - Brady	Hickory Aquifer [McCulloch]	5	5	5	5	5	5
		5	**5**	**5**	**5**	**5**	**5**
Irrigation, McCulloch, Colorado (F)							
Irrigation Conservation - McCulloch County	DEMAND REDUCTION [McCulloch]	116	232	349	349	349	349
		116	**232**	**349**	**349**	**349**	**349**
Millersview-Doole WSC, Colorado (F)							
Municipal Conservation - Millersview-Doole WSC	DEMAND REDUCTION [McCulloch]	3	3	3	3	3	4
Subordination - OH Ivie Non System Portion	OH Ivie Lake/Reservoir Non-System Portion [Reservoir]	13	0	0	0	2	14
Water Audits And Leak - Millersview-Doole WSC	DEMAND REDUCTION [McCulloch]	16	16	16	16	16	16
		32	**19**	**19**	**19**	**21**	**34**
Mining, McCulloch, Colorado (F)							
Mining Conservation - McCulloch County	DEMAND REDUCTION [McCulloch]	375	351	279	236	203	176
		375	**351**	**279**	**236**	**203**	**176**

Projected Water Management Strategies
TWDB 2022 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Richland SUD, Colorado (F)							
Municipal Conservation - Richland SUD	DEMAND REDUCTION [McCulloch]	3	3	3	3	3	3
		3	**3**	**3**	**3**	**3**	**3**
Sum of Projected Water Management Strategies (acre-feet)		**2,585**	**2,664**	**2,710**	**2,667**	**2,636**	**2,622**

MENARD COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Irrigation, Menard, Colorado (F)							
Irrigation Conservation - Menard County	DEMAND REDUCTION [Menard]	183	366	549	549	549	549
Subordination - Menard County Irrigation	Colorado Run-of-River [Menard]	537	537	537	537	537	537
		720	**903**	**1,086**	**1,086**	**1,086**	**1,086**
Menard, Colorado (F)							
Municipal Conservation - Menard	DEMAND REDUCTION [Menard]	5	5	5	5	5	5
Subordination - Menard County Irrigation	Colorado Run-of-River [Menard]	1,000	1,000	1,000	1,000	1,000	1,000
		1,005	**1,005**	**1,005**	**1,005**	**1,005**	**1,005**
Mining, Menard, Colorado (F)							
Mining Conservation - Menard County	DEMAND REDUCTION [Menard]	46	45	40	35	30	26
		46	**45**	**40**	**35**	**30**	**26**
Sum of Projected Water Management Strategies (acre-feet)		**1,771**	**1,953**	**2,131**	**2,126**	**2,121**	**2,117**

SAN SABA COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Corix Utilities Texas Inc, Colorado (K)							
Drought Management	DEMAND REDUCTION [San Saba]	3	3	3	3	3	3
		3	**3**	**3**	**3**	**3**	**3**

Projected Water Management Strategies
TWDB 2022 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
County-Other, San Saba, Colorado (K)							
Drought Management	DEMAND REDUCTION [San Saba]	44	44	43	43	43	44
		44	**44**	**43**	**43**	**43**	**44**
Irrigation, San Saba, Colorado (K)							
Irrigation Conservation - Drip Irrigation - San Saba County	DEMAND REDUCTION [San Saba]	626	626	626	626	626	626
		626	**626**	**626**	**626**	**626**	**626**
North San Saba WSC, Colorado (K)							
Drought Management	DEMAND REDUCTION [San Saba]	34	32	29	25	23	22
Municipal Conservation - North San Saba WSC	DEMAND REDUCTION [San Saba]	17	32	46	60	74	85
		51	**64**	**75**	**85**	**97**	**107**
Richland SUD, Colorado (K)							
Drought Management	DEMAND REDUCTION [San Saba]	41	38	35	31	32	33
Municipal Conservation - Richland SUD	DEMAND REDUCTION [San Saba]	20	39	55	69	70	72
		61	**77**	**90**	**100**	**102**	**105**
San Saba, Colorado (K)							
Drought Management	DEMAND REDUCTION [San Saba]	214	202	182	162	149	137
Municipal Conservation - San Saba	DEMAND REDUCTION [San Saba]	106	208	300	378	469	556
		320	**410**	**482**	**540**	**618**	**693**
Sum of Projected Water Management Strategies (acre-feet)		**1,105**	**1,224**	**1,319**	**1,397**	**1,489**	**1,578**

APPENDIX B

GAM Run 21-012 Modeled Available Groundwater for the Aquifers in Groundwater Management Area 7, August 12, 2022

GAM Run 21-012 MAG: Modeled Available Groundwater for the Aquifers in Groundwater Management Area 7

Ian C. Jones, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
512-463-6641
August 12, 2022

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GAM Run 21-012 MAG: Modeled Available Groundwater for the Aquifers in Groundwater Management Area 7

Ian C. Jones, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
512-463-6641
August 12, 2022

EXECUTIVE SUMMARY:

The Texas Water Development Board (TWDB) has prepared estimates of the modeled available groundwater for the relevant aquifers of Groundwater Management Area 7—the Capitan Reef Complex, Dockum, Edwards-Trinity (Plateau), Ellenburger-San Saba, Hickory, Ogallala, Pecos Valley, Rustler, and Trinity aquifers. The estimates are based on the desired future conditions for these aquifers adopted by the groundwater conservation districts in Groundwater Management Area 7 on August 19, 2021. The explanatory reports and other materials submitted to the TWDB were determined to be administratively complete on February 23, 2022.

The modeled available groundwater values are summarized by decade for the groundwater conservation districts (Tables 1, 3, 5, 7, 9, 11, 13) and for use in the regional water planning process (Tables 2, 4, 6, 8, 10, 12, 14). The modeled available groundwater estimates for each decade from 2020 through 2070 are:

- 26,164 acre-feet per year in the Capitan Reef Complex Aquifer,
- 2,324 acre-feet per year in the Dockum Aquifer,
- 6,570 to 7,925 acre-feet per year in the Ogallala Aquifer,
- 479,063 acre-feet per year in the undifferentiated Edwards-Trinity (Plateau), Pecos Valley, and Trinity aquifers,
- 22,616 acre-feet per year in the Ellenburger-San Saba Aquifer,
- 49,936 acre-feet per year in the Hickory Aquifer, and
- 7,040 acre-feet per year in the Rustler Aquifer.

The modeled available groundwater estimates were extracted from results of model runs using the groundwater availability models for the Capitan Reef Complex Aquifer [Version

1.01] (Jones, 2016) for the Capitan Reef Complex Aquifer; the High Plains Aquifer System [Version 1.01] (Deeds and Jigmond, 2015) for the Dockum and Ogallala aquifers; the minor aquifers of the Llano Uplift Area [Version 1.01] (Shi and others, 2016) for the Ellenburger-San Saba and Hickory aquifers, and the Rustler Aquifer [Version 1.01] (Ewing and others, 2012) for the Rustler Aquifer. In addition, the alternative 1-layer model for the Edwards-Trinity (Plateau), Pecos Valley, and Trinity aquifers (Hutchison and others, 2011a) was used for the Edwards-Trinity (Plateau), Pecos Valley, and Trinity aquifers, except for Kinney and Val Verde counties. In these two counties, the alternative Kinney County model (Hutchison and others, 2011b) and the model associated with a hydrogeological study for Val Verde County and the City of Del Rio (EcoKai and Hutchison, 2014), respectively, were used to estimate modeled available groundwater.

REQUESTOR:

Ms. Meredith Allen, coordinator of Groundwater Management Area 7 districts.

DESCRIPTION OF REQUEST:

In an email dated August 28, 2021, Dr. William Hutchison on behalf of Groundwater Management Area 7 provided the TWDB with the desired future conditions for the Capitan, Dockum, Ellenburger-San Saba, Hickory, Ogallala, and Rustler aquifers, as well as for the undifferentiated Edwards-Trinity (Plateau), Pecos Valley and Trinity aquifers, in Groundwater Management Area 7. Groundwater Management Area 7 provided additional clarifications through an email to the TWDB on November 12, 2021, for the assumptions and model files to be used to calculate modeled available groundwater.

The final adopted desired future conditions as stated in signed resolutions for the aquifers in Groundwater Management Area 7 are as follows:

Capitan Reef Complex Aquifer *(Resolution #08-19-2021-2)*

a) Total net drawdown of the Capitan Reef Complex Aquifer not to exceed 56 feet in Pecos County (Middle Pecos GCD) in 2070 as compared with 2006 aquifer levels. **(Reference: Scenario 4, GMA 7 Technical Memorandum 16-03)*

b) The Capitan Reef Complex Aquifer is not relevant for joint planning purposes in all other areas of GMA 7.

Dockum and Ogallala aquifers *(Resolution #08-19-2021-5)*

Ogallala Aquifer:

a) Total net drawdown of the Ogallala Aquifer not to exceed **6 feet in Glasscock County** in 2070 as compared with 2010 aquifer levels.

Dockum Aquifer:

b) Total net drawdown of the Dockum Aquifer not to exceed **52 feet in Pecos County** in 2070 as compared with 2010 aquifer levels.

c) Total net drawdown of the Dockum Aquifer not to exceed **14 feet in Reagan County** in 2070 as compared with 2010 aquifer levels.

**(Reference items a) through c): Scenario 17, GMA 7 Technical Memorandum 16-01)*

d) The Ogallala and Dockum Aquifers are not relevant for joint planning purposes in all other areas of GMA 7.

Edwards-Trinity (Plateau), Pecos Valley, and Trinity aquifers *(Resolution #08-19-2021-3)*

a) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **0 feet in Coke County** in 2070 as compared with 2010 aquifer levels.
b) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **10 feet in Crockett County** in 2070 as compared with 2010 aquifer levels.
c) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **4 feet in Ector County** in 2070 as compared with 2010 aquifer levels.
d) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **2 feet in Edwards County** in 2070 as compared with 2010 aquifer levels.
e) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **5 feet in Gillespie County** in 2070 as compared with 2010 aquifer levels.
f) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **42 feet in Glasscock County** in 2070 as compared with 2010 aquifer levels.
g) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **10 feet in Irion County** in 2070 as compared with 2010 aquifer levels.
h) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **1 foot in Kimble County** in 2070 as compared with 2010 aquifer levels.
i) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **1 foot in Menard County** in 2070 as compared with 2010 aquifer levels.
j) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **12 feet in Midland County** in 2070 as compared with 2010 aquifer levels.
k) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **14 feet in Pecos County** in 2070 as compared with 2010 aquifer levels.
l) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **42 feet in Reagan County** in 2070 as compared with 2010 aquifer levels.
m) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **4 feet in Real County** in 2070 as compared with 2010 aquifer levels.
n) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **8 feet in Schleicher County** in 2070 as compared with 2010 aquifer levels.
o) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **7 feet in Sterling County** in 2070 as compared with 2010 aquifer levels.
p) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **6 feet in Sutton County** in 2070 as compared with 2010 aquifer levels.
q) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **0 feet in Taylor County** in 2070 as compared with 2010 aquifer levels.
r) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **2 feet in Terrell County** in 2070 as compared with 2010 aquifer levels.
s) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **20 feet in Upton County** in 2070 as compared with 2010 aquifer levels.
t) Total net drawdown of the Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers not to exceed **2 feet in Uvalde County** in 2070 as compared with 2010 aquifer levels.

*(Reference items *a)* through *t)*: GMA 7 Technical Memorandum 18-01)

Edwards-Trinity (Plateau), Pecos Valley, and Trinity aquifers *(continued)*

u) Total net drawdown in **Kinney County** in 2070, as compared with 2010 aquifer levels, shall be consistent with maintenance of an annual average flow of 23.9 cfs and an annual median flow of **23.9 cfs at Las Moras Springs.**
**(Reference: Groundwater Flow Model of the Kinney County Area by W.R. Hutchison and others. 2011).*

v) Total net drawdown in **Val Verde County** in 2070, as compared with 2010 aquifer levels, shall be consistent with maintenance of an average annual flow of **73-75 mgd at San Felipe Springs.**
**(Reference: EcoKai, 2014)*

w) The Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers are not relevant for joint planning purposes in all other areas of GMA 7.

Minor Aquifers of the Llano Uplift Area *(Resolution #08-19-2021-4)*

Ellenburger-San Saba Aquifer:

a) Total net drawdown of the Ellenburger-San Saba Aquifer not to exceed **8 feet in Gillespie County** in 2070 as compared with 2010 aquifer levels.

b) Total net drawdown of the Ellenburger-San Saba Aquifer not to exceed **18 foot in Kimble County** in 2070 as compared with 2010 aquifer levels.

c) Total net drawdown of the Ellenburger-San Saba Aquifer not to exceed **14 foot in Mason County** in 2070 as compared with 2010 aquifer levels.

d) Total net drawdown of the Ellenburger-San Saba Aquifer not to exceed **29 feet in McCulloch County** in 2070 as compared with 2010 aquifer levels.

e) Total net drawdown of the Ellenburger-San Saba Aquifer not to exceed **46 feet in Menard County** in 2070 as compared with 2010 aquifer levels.

f) Total net drawdown of the Ellenburger-San Saba Aquifer not to exceed **5 feet in San Saba County** in 2070 as compared with 2010 aquifer levels.

Hickory Aquifer:

g) Total net drawdown of the Hickory Aquifer not to exceed **53 feet in Concho County** in 2070 as compared with 2010 aquifer levels.

h) Total net drawdown of the Hickory Aquifer not to exceed **9 feet in Gillespie County** in 2070 as compared with 2010 aquifer levels.

i) Total net drawdown of the Hickory Aquifer not to exceed **18 feet in Kimble County** in 2070 as compared with 2010 aquifer levels.

j) Total net drawdown of the Hickory Aquifer not to exceed **17 feet in Mason County** in 2070 as compared with 2010 aquifer levels.

Minor Aquifers of the Llano Uplift Area *(continued)*

k) Total net drawdown of the Hickory Aquifer not to exceed **29 feet in McColloch County** in 2070 as compared with 2010 aquifer levels.
l) Total net drawdown of the Hickory Aquifer not to exceed **46 feet in Menard County** in 2070 as compared with 2010 aquifer levels.
m) Total net drawdown of the Hickory Aquifer not to exceed **6 feet in San Saba County** in 2070 as compared with 2010 aquifer levels.
**(Reference items a) through m): Scenario 3, GMA 7 Technical Memorandum 16-02)*
n) The Llano Uplift Region (Ellenburger-San Saba, Hickory, Marble Falls) Aquifers are not relevant for joint planning purposes in all other areas of GMA 7.

Rustler Aquifer *(Resolution #08-19-2021-6)*

a) Total net drawdown of the Rustler Aquifer not to exceed **94 feet in Pecos County** in 2070 as compared with 2010 aquifer levels.
**(Reference: Scenario 4, GMA 7 Technical Memorandum 15-05)*
b) The Rustler Aquifer not relevant for joint planning purposes in all other areas of GMA 7.

In addition to the non-relevant statements provided above in the individual resolutions, Groundwater Management Area 7 also provided additional non-relevant documentation dated August 27, 2021 and January 20, 2022 as part of their submittal to TWDB. The following aquifers or parts of aquifers are non-relevant for the purposes of joint planning:

- The entirety of the Blaine, Cross Timbers, Igneous, Lipan, Marble Falls, and Seymour aquifers.
- The Capitan Reef Complex Aquifer outside of the boundaries of the Middle Pecos Groundwater Conservation District.
- The Edwards-Trinity (Plateau) Aquifer in Concho, Mason, McCulloch, Nolan, and Tom Green counties.
- The Ellenburger-San Saba Aquifer in Coleman, Concho, and Mason counties.
- The Hickory Aquifer in Coleman and Llano counties.
- The Dockum Aquifer outside of Reagan and Pecos counties.
- The Ogallala Aquifer outside of Glasscock County.

CLARIFICATIONS:

In response to a request for clarifications from the TWDB in 2021, the Groundwater Management Area 7 Chair, Ms. Meredith Allen, and Groundwater Management Area 7 consultant, Dr. William R. Hutchison, provided the following clarifications regarding the definition of the desired future conditions. These clarifications were necessary for verifying that the desired future conditions of the aquifers were attainable and for confirming approval of the TWDB methodology to calculate modeled available groundwater volumes in Groundwater Management Area 7:

Capitan Reef Complex Aquifer

- The calculated modeled available groundwater values are based on the official TWDB aquifer boundary.
- The modeled available groundwater calculations are based on the desired future conditions with a one-foot tolerance (that is, modeled drawdown verifications within one foot of the desired future conditions are acceptable).
- Drawdown calculations used to define the desired future conditions value take into consideration the occurrence of "dry" cells, where water levels are below the base of the aquifer.

Dockum Aquifer

- The calculated modeled available groundwater values are based on the spatial extent of the Dockum Formation, as represented in the groundwater availability model for the High Plains Aquifer System, rather than the official TWDB aquifer boundary.
- Modeled available groundwater analysis excludes model pass-through cells.
- The modeled available groundwater calculations are based on the desired future conditions with a one-foot tolerance (that is, modeled drawdown verifications within one foot of the desired future conditions are acceptable).

Ogallala Aquifer

- The calculated modeled available groundwater values are based on the official TWDB aquifer boundary and use the same model assumptions used in Groundwater Management Area 7 Technical Memorandum 16-01 (Hutchison, 2016c).
- Drawdown calculations used to define the desired future conditions do not take into consideration the occurrence of "dry" cells, where water levels are below the base of the aquifer.

- The modeled available groundwater calculations are based on the desired future conditions with a one-foot tolerance (that is, modeled drawdown verifications within one foot of the desired future conditions are acceptable).

Edwards-Trinity (Plateau), Pecos Valley, and Trinity aquifers

- The calculated modeled available groundwater values are based on the official TWDB aquifer boundaries.
- The modeled available groundwater calculations are based on the desired future conditions with a one-foot tolerance (that is, modeled drawdown verifications within one foot of the desired future conditions value are acceptable).
- Drawdown calculations used to define the desired future conditions include drawdowns for cells with water levels below the base elevation of the cell ("dry" cells).

Kinney County

- The modeled available groundwater values, model assumptions, and simulated springflow are from GAM Run 10-043 MAG Version 2 (Shi, 2012).

Val Verde County

- There is no associated drawdown as a desired future condition. The desired future condition is based solely on simulated spring flow conditions at San Felipe Spring of 73 to 75 million gallons per day. Pumping scenarios—50,000 acre-feet per year—in three well field locations and monthly hydrologic conditions for the historic period 1969 to 2012 meet the desired future conditions set by Groundwater Management Area 7 (EcoKai and Hutchison, 2014; Hutchison 2021).

Minor Aquifers of the Llano Uplift Area

- The calculated modeled available groundwater values are based on the full spatial extent of the Ellenburger-San Saba and Hickory formations in the groundwater availability model for the aquifers of the Llano Uplift Area rather than the official TWDB aquifer boundaries and use the same model assumptions used in Groundwater Management Area 7 Technical Memorandum 16-02 (Hutchison 2016b).
- The modeled available groundwater calculations are based on the desired future conditions with a one-foot tolerance (that is, modeled drawdown verifications within one foot of the desired future conditions value are acceptable).

- The drawdown calculations used to define desired future conditions did not include "dry" cells, where water levels are below the base of the aquifer.

Rustler Aquifer

- The model used to define desired future conditions and calculate modeled available groundwater assumes that the initial model heads represent the heads at the end of 2008 (the baseline for calculating desired future conditions drawdown values).
- Calculated modeled available groundwater values are based on the full spatial extent of the Rustler Formation, as represented in the groundwater availability model for the Rustler Aquifer, rather than the official TWDB aquifer boundary.
- The predictive model used to define desired future conditions and calculate modeled available groundwater uses the same model assumptions used in Groundwater Management Area 7 Technical Memorandum 15-05 (Hutchison, 2016d).
- The modeled available groundwater calculations are based on the desired future conditions with a one-foot tolerance (that is, modeled drawdown verifications within one foot of the desired future conditions value are acceptable).

METHODS:

As defined in Chapter 36 of the Texas Water Code (TWC, 2011), "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits 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.

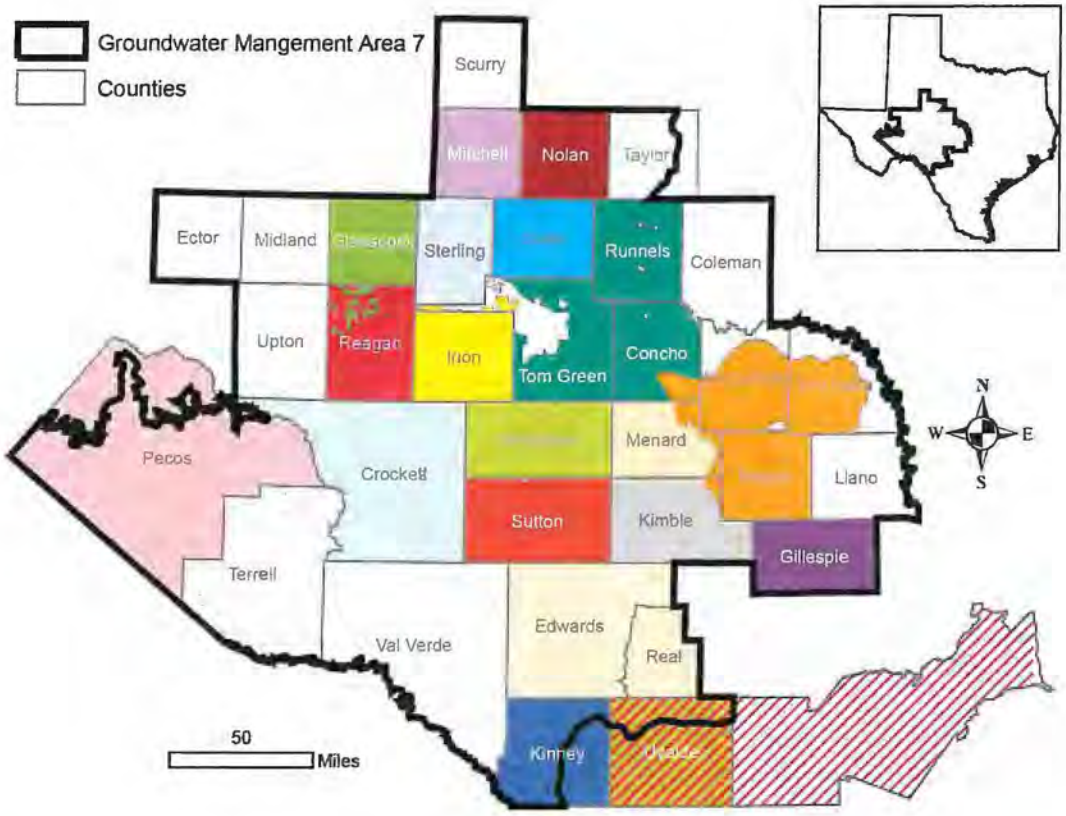
For relevant aquifers with desired future conditions based on water-level drawdown, water levels simulated at the end of the predictive simulations were compared to the water levels in the baseline year. These baseline years are 2005 in the groundwater availability model for the Capitan Reef Complex Aquifer and the alternative model for the Edwards-Trinity (Plateau) and Pecos Valley aquifers, 2012 in the groundwater availability model for the High Plains Aquifer System, 2010 in the groundwater availability model for the minor aquifers of the Llano Uplift Area, and 2008 in the groundwater availability model for the Rustler Aquifer. The predictive model runs used average pumping rates from the historical period for the respective model except in the aquifer or area of interest. In those areas, pumping rates are varied until they produce drawdowns consistent with the adopted desired future conditions. In most cases, these model runs were supplied by Groundwater Management Area 7 for review by TWDB staff before they were used to calculate the modeled available groundwater. Pumping rates or modeled available groundwater are reported in 10-year intervals.

Water-level drawdown averages were calculated for the relevant portions of each aquifer. Drawdown for model cells that became dry during the simulation—when the water level dropped below the base of the cell—were excluded from the averaging. In Groundwater Management Area 7, dry cells only occur during the predictive period in the Ogallala Aquifer of Glasscock County. Consequently, estimates of modeled available groundwater decrease over time as continued simulated pumping predicts the development of increasing numbers of dry model cells in areas of the Ogallala Aquifer in Glasscock County. The calculated water-level drawdown averages for all aquifers were compared with the desired future conditions to verify that the pumping scenario achieved the desired future conditions.

In Kinney and Val Verde counties, the desired future conditions are based on discharge from selected springs. In these cases, spring discharge was estimated based on simulated average spring discharge over a historical period, maintaining all historical hydrologic conditions—such as recharge and river stage—except pumping. In other words, we

assume that past average hydrologic conditions—the range of fluctuation—will continue in the future. In the cases of Kinney and Val Verde counties, simulated spring discharge was based on hydrologic variations that took place over the periods 1950 through 2005 and 1968 through 2013, respectively. The desired future condition for the Edwards-Trinity (Plateau) Aquifer in Kinney County is similar to the one adopted in 2010 and the associated modeled available groundwater is based on a specific model run—GAM Run 10-043 (Shi, 2012).

Modeled available groundwater values for the Ellenburger-San Saba and Hickory aquifers were determined by extracting pumping rates by decade from the model results using ZONBUDUSG Version 1.01 (Panday and others, 2013). For the remaining relevant aquifers in Groundwater Management Area 7 modeled available groundwater values were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Decadal modeled available groundwater for the relevant aquifers is reported by groundwater conservation district and county (Figure 1; Tables 1, 3, 5, 7, 9, 11, 13), and by county, regional water planning area, and river basin (Figures 2 and 3; Tables 2, 4, 6, 8, 10, 12, 14).



Groundwater Conservation Districts

- Coke County UWCD
- Crockett County GCD
- Edwards Aquifer Authority
- Glasscock GCD
- Hickory UWCD No. 1
- Hill Country UWCD
- Irion County WCD
- Kimble County GCD
- Kinney County GCD
- Lipan-Kickapoo WCD
- Lone Wolf GCD
- Menard County UWD
- Middle Pecos GCD
- Plateau UWC and Supply District
- Real-Edwards Conservation and Reclamation District
- Santa Rita UWCD
- Sterling County UWCD
- Sutton County UWCD
- Terrell County GCD
- Uvalde County UWCD
- Wes-Tex GCD

FIGURE 1. MAP SHOWING THE GROUNDWATER CONSERVATION DISTRICTS (GCD) IN GROUNDWATER MANAGEMENT AREA 7. NOTE: THE BOUNDARIES OF THE EDWARDS AQUIFER AUTHORITY OVERLAP WITH THE UVALDE COUNTY UNDERGROUND WATER CONSERVATION DISTRICT (UWCD).

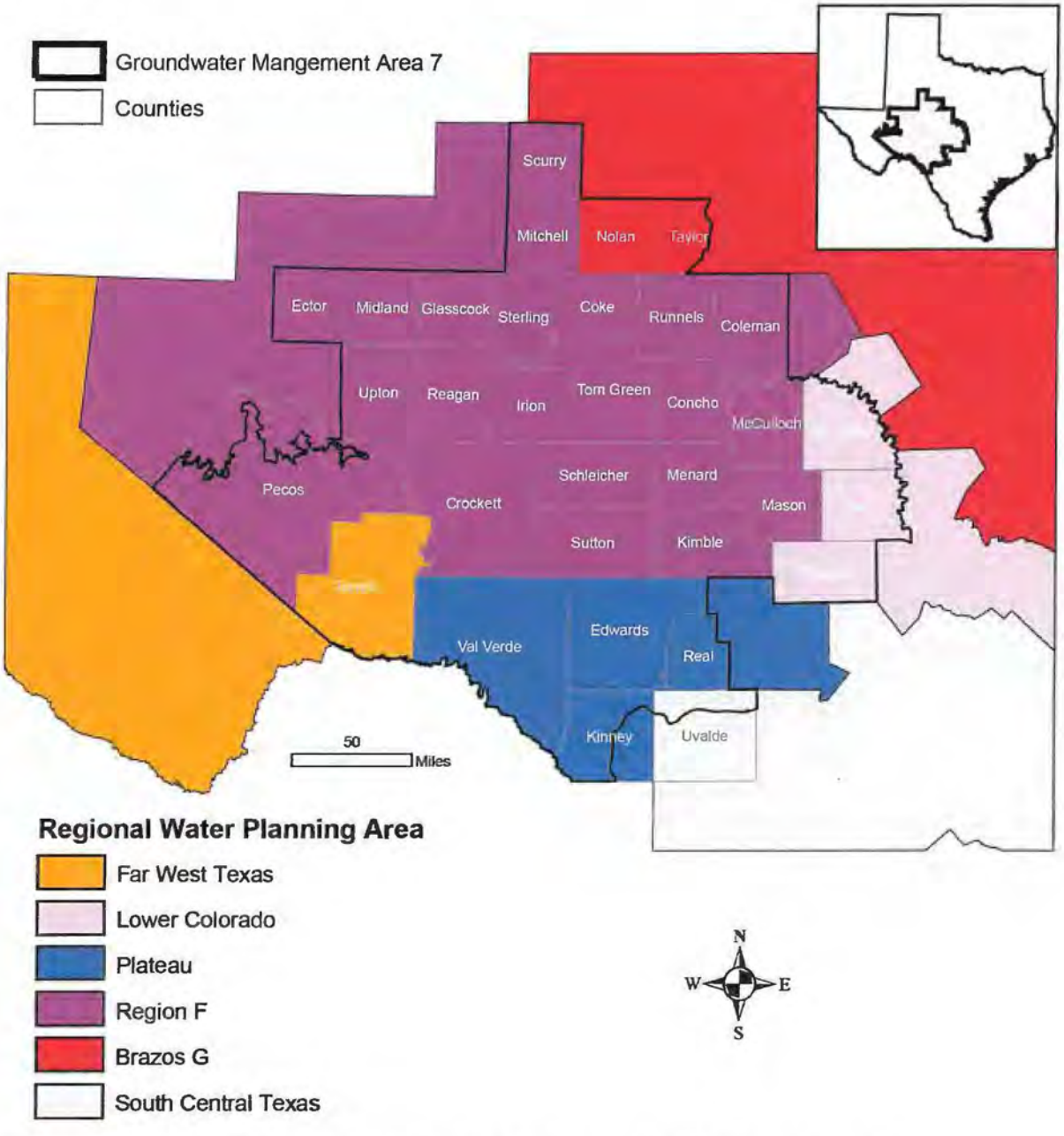


FIGURE 2. MAP SHOWING REGIONAL WATER PLANNING AREAS IN GROUNDWATER MANAGEMENT AREA 7.

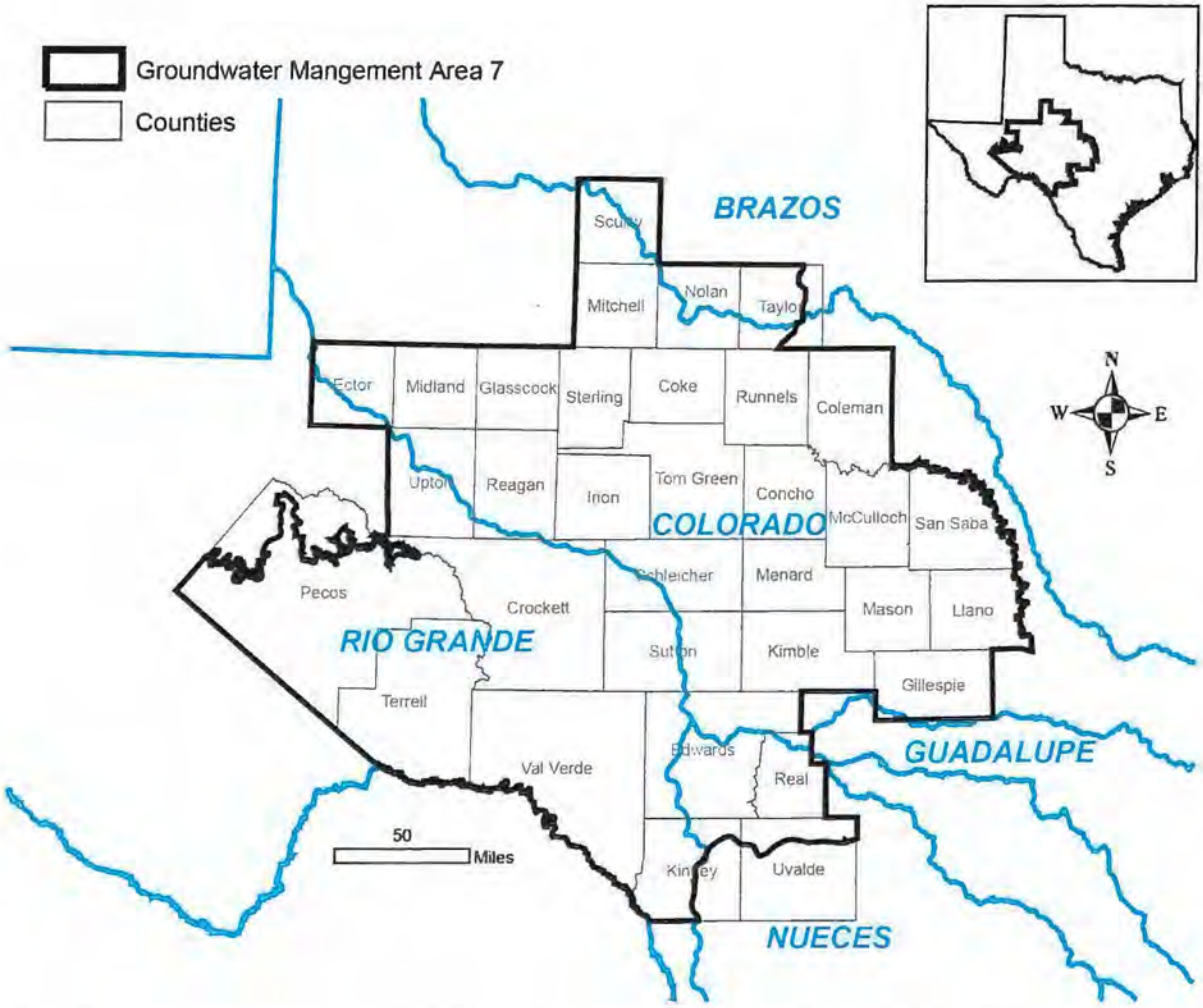


FIGURE 3. **MAP SHOWING RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 7. THESE INCLUDE PARTS OF THE BRAZOS, COLORADO, GUADALUPE, NUECES, AND RIO GRANDE RIVER BASINS.**

PARAMETERS AND ASSUMPTIONS:

Capitan Reef Complex Aquifer

- Version 1.01 of the groundwater availability model of the eastern arm of the Capitan Reef Complex Aquifer was used. See Jones (2016) for assumptions and limitations of the groundwater availability model. See Hutchison (2016a) for details on the assumptions used for predictive simulations.
- The model has five layers: Layer 1, the Edwards-Trinity (Plateau) and Pecos Valley aquifers; Layer 2, the Dockum Aquifer and the Dewey Lake Formation; Layer 3, the Rustler Aquifer; Layer 4, a confining unit made up of the Salado and Castile formations, and the overlying portion of the Artesia Group; and Layer 5, the Capitan Reef Complex Aquifer, part of the Artesia Group, and the Delaware Mountain Group. Layers 1 through 4 are intended to act solely as boundary conditions facilitating groundwater inflow and outflow relative to the Capitan Reef Complex Aquifer (Layer 5).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).
- The model was run for the interval 2006 through 2070 for a 64-year predictive simulation. Drawdowns were calculated by subtracting 2006 simulated water levels from 2070 simulated water levels, which were then averaged over the portion of the aquifer in Groundwater Management Area 7.
- During predictive simulations, there were no cells where water levels were below the base elevation of the cell ("dry" cells). Therefore, all drawdowns were included in the averaging.
- Drawdown averages and modeled available groundwater volumes are based on the official TWDB aquifer boundary within Groundwater Management Area 7.

Dockum and Ogallala Aquifers

- Version 1.01 of the groundwater availability model for the High Plains Aquifer System by Deeds and Jigmond (2015) was used to construct the predictive model simulation for this analysis. See Hutchison (2016c) for details of the initial assumptions.
- The model has four layers which represent the Ogallala and Pecos Valley Alluvium aquifers (Layer 1), the Edwards-Trinity (High Plains) and Edwards-Trinity (Plateau) aquifers (Layer 2), the Upper Dockum Aquifer (Layer 3), and the Lower Dockum Aquifer (Layer 4). Pass-through cells exist in layers 2 and 3 to hydraulically connect the Ogallala Aquifer to the Lower Dockum where the Edwards-Trinity (High Plains)

and Upper Dockum aquifers are absent. These pass-through cells were excluded from the calculations of drawdowns and modeled available groundwater.

- The model was run with MODFLOW-NWT (Niswonger and others, 2011). The model uses the Newton formulation and the upstream weighting package, which automatically reduces pumping as heads drop in a particular cell, as defined by the user. This feature may simulate the declining production of a well as saturated thickness decreases. Deeds and Jigmond (2015) modified the MODFLOW-NWT code to use a saturated thickness of 30 feet as the threshold—instead of percent of the saturated thickness—when pumping reductions occur during a simulation. Therefore, the groundwater management area should be aware that the modeled available groundwater values will be less than pumping input values if the modeled saturated thickness drops below that threshold.
- The model was run for the interval 2013 through 2070 for a 58-year predictive simulation. Drawdowns were calculated by subtracting initial water levels from 2070 simulated water levels, which were then averaged over the portion of the aquifer in Groundwater Management Area 7.
- During predictive simulations, there were no cells in the Dockum Aquifer where water levels were below the base elevation of the cell ("dry" cells). Therefore, all drawdowns were included in the averaging. However, in the Ogallala Aquifer, dry cells occurred during the predictive simulation. These dry cells were excluded from the modeled available groundwater calculations.
- Drawdown averages and modeled available groundwater volumes are based on the model boundary within Groundwater Management Area 7 for the Dockum Aquifer and the official TWDB aquifer boundary for the Ogallala Aquifer.

Pecos Valley, Edwards-Trinity (Plateau) and Trinity Aquifers

- The single-layer alternative groundwater flow model for the Edwards-Trinity (Plateau) and Pecos Valley aquifers was used for this analysis. This model is an update to the previously developed groundwater availability model documented in Anaya and Jones (2009). See Hutchison and others (2011a) and Anaya and Jones (2009) for assumptions and limitations of the model. See Hutchison (2016e; 2018) for details on the assumptions used for predictive simulations.
- The groundwater model has one layer representing the Pecos Valley Aquifer and the Edwards-Trinity (Plateau) Aquifer. In the relatively narrow area where both aquifers are present, the model is a lumped representation of both aquifers.
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

- The model was run for the interval 2006 through 2070 for a 65-year predictive simulation. Drawdowns were calculated by subtracting 2010 simulated water levels from 2070 simulated water levels, which were then averaged over the portion of the aquifer in Groundwater Management Area 7.
- Because simulated water levels for the baseline year (2010) are not included in the original calibrated historical model, these water levels had to be verified against measured water levels to confirm that the predictive model satisfactorily matched real-world conditions. Comparison of 2010 simulated and measured water levels indicated a root mean squared error of 100 feet or 4 percent of the range in water-level elevations, which is within acceptable limits. Based on these results, we consider the predictive model an appropriate tool for evaluating the attainability of desired future conditions and for calculating modeled available groundwater.
- Drawdowns for cells with water levels below the base elevation of the cell ("dry" cells) were included in the averaging.
- Drawdown averages and modeled available groundwater volumes are based on the official TWDB aquifer boundaries within Groundwater Management Area 7.

Edwards-Trinity (Plateau) Aquifer of Kinney County

- All parameters and assumptions for the Edwards-Trinity (Plateau) Aquifer of Kinney County in Groundwater Management Area 7 are described in GAM Run 10-043 MAG Version 2 (Shi, 2012). This report assumes a planning period from 2010 to 2070.
- The Kinney County Groundwater Conservation District model developed by Hutchison and others (2011b) was used for this analysis. The model was calibrated to water level and spring flux collected from 1950 to 2005.
- The model has four layers representing the following hydrogeologic units (from top to bottom): Carrizo-Wilcox Aquifer (Layer 1), Upper Cretaceous Unit (Layer 2), Edwards (Balcones Fault Zone) Aquifer/Edwards portion of the Edwards-Trinity (Plateau) Aquifer (Layer 3), and Trinity portion of the Edwards-Trinity (Plateau) Aquifer (Layer 4).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).
- The model was run for 56 annual stress periods under the conditions set in Scenario 3 in Task 10-027 (Hutchison, 2011).
- Modeled available groundwater volumes are based on the official TWDB aquifer boundary within Groundwater Management Area 7 in Kinney County.

Edwards-Trinity (Plateau) Aquifer of Val Verde County

- The single-layer numerical groundwater flow model for the Edwards-Trinity (Plateau) Aquifer of Val Verde County was used for this analysis. This model is based on the previously developed alternative groundwater model of the Kinney County area documented in Hutchison and others (2011b). See EcoKai and Hutchison (2014) for assumptions and limitations of the model. See Hutchison (2016e; 2021) for details on the assumptions used for predictive simulations, including recharge and pumping assumptions.
- The groundwater model has one layer representing the Edwards-Trinity (Plateau) Aquifer of Val Verde County.
- The model was run with MODFLOW-2005 (Harbaugh, 2005).
- The model was run for a 45-year predictive simulation representing hydrologic conditions of the interval 1968 through 2013. Simulated spring discharge from San Felipe Springs was averaged over duration of the simulation. The resultant pumping rate that met the desired future conditions was applied to the predictive period—2010 through 2070—based on the assumption that average conditions over the predictive period are the same as those over the historic period represented by the model run.
- Modeled available groundwater volumes are based on the official TWDB aquifer boundary within Groundwater Management Area 7 in Val Verde County.

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. See Hutchison (2016b) for details of the initial assumptions.
- The model contains eight layers: Trinity Aquifer, Edwards-Trinity (Plateau) Aquifer, and younger alluvium deposits (Layer 1), confining units (Layer 2), Marble Falls Aquifer and equivalent units (Layer 3), confining units (Layer 4), Ellenburger-San Saba Aquifer and equivalent units (Layer 5), confining units (Layer 6), Hickory Aquifer and equivalent units (Layer 7), and Precambrian units (Layer 8).
- The model was run with MODFLOW-USG beta (development) version (Panday and others, 2013). Perennial rivers and reservoirs were simulated using the MODFLOW-USG river package. Springs were simulated using the MODFLOW-USG drain package.
- The model was run for the interval 2011 through 2070 for a 60-year predictive simulation. Drawdowns were calculated by subtracting initial water levels from 2070 simulated water levels, which were then averaged over the portion of the

aquifer in Groundwater Management Area 7. During predictive simulations, there were no cells where water levels were below the base elevation of the cell ("dry" cells). Therefore, all drawdowns were included in the averaging.

- Drawdown averages and modeled available groundwater volumes are based on the model boundaries within Groundwater Management Area 7.

Rustler Aquifer

- Version 1.01 of the groundwater availability model for the Rustler Aquifer by Ewing and others (2012) was used to construct the predictive model simulation for this analysis. See Hutchison (2016d) for details of the initial assumptions, including recharge conditions.
- The model has two layers, the top one representing the Rustler Aquifer, and the other representing the Dewey Lake Formation and the Dockum Aquifer.
- The model was run with MODFLOW-NWT (Niswonger and others, 2011).
- The model was run for the interval 2009 through 2070 for a 61-year predictive simulation. Drawdowns were calculated by subtracting 2009 simulated water levels from 2070 simulated water levels, which were then averaged over the portion of the aquifer in Groundwater Management Area 7.
- The predictive model used to define desired future conditions uses 2008 recharge conditions throughout the predictive period.
- The predictive model used to define desired future conditions has general-head boundary heads that decline at a rate of 1.5 feet per year.
- During predictive simulations, there were no cells where water levels were below the base elevation of the cell ("dry" cells). Therefore, all drawdowns were included in the averaging.
- Drawdown averages and modeled available groundwater volumes are based on the model boundaries within Groundwater Management Area 7.

RESULTS:

The modeled available groundwater estimates for each decade from 2020 through 2070 are:

- 26,164 acre-feet per year in the Capitan Reef Complex Aquifer,
- 2,324 acre-feet per year in the Dockum Aquifer,
- 6,570 to 7,925 acre-feet per year in the Ogallala Aquifer,

- 479,063 acre-feet per year in the undifferentiated Edwards-Trinity (Plateau), Pecos Valley, and Trinity aquifers,
- 22,616 acre-feet per year in the Ellenburger-San Saba Aquifer,
- 49,936 acre-feet per year in the Hickory Aquifer, and
- 7,040 acre-feet per year in the Rustler Aquifer.

The modeled available groundwater for the respective aquifers has been summarized by aquifer, county, and groundwater conservation district (Tables 1, 3, 5, 7, 9, 11, and 13). 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, 8, 10, 12, and 14). The modeled available groundwater for the Ogallala Aquifer that achieves the desired future conditions adopted by districts in Groundwater Management Area 7 decreases from 7,925 to 6,570 acre-feet per year between 2020 and 2070 (Tables 5 and 6). This decline is attributable to the occurrence of increasing numbers of cells where water levels were below the base elevation of the cell ("dry" cells) in parts of Glasscock County. Please note that MODFLOW-NWT automatically reduces pumping as water levels decline.

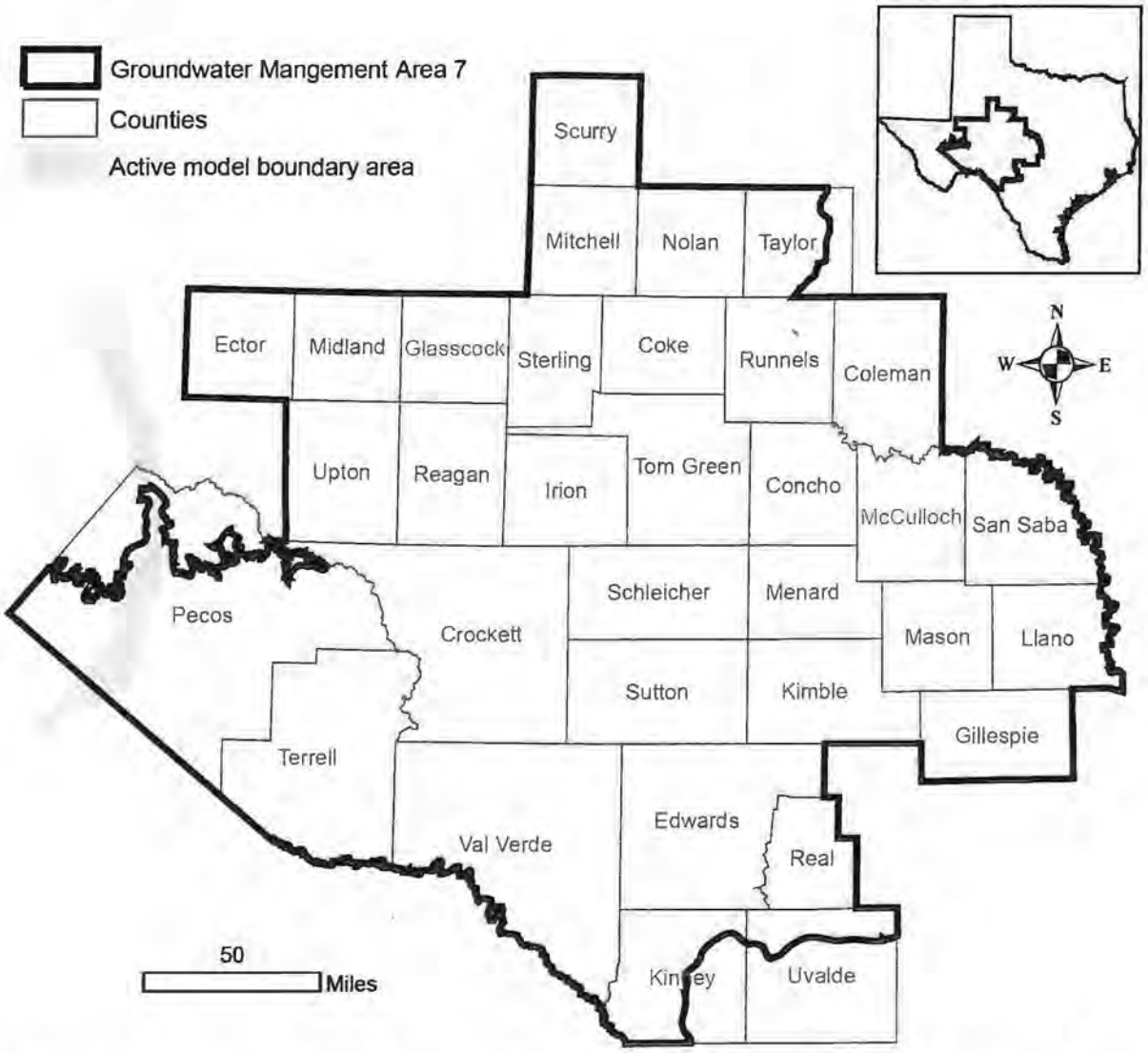


FIGURE 4. MAP SHOWING THE AREAS COVERED BY THE CAPITAN REEF COMPLEX AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE EASTERN ARM OF THE CAPITAN REEF COMPLEX AQUIFER IN GROUNDWATER MANAGEMENT AREA 7.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE CAPITAN REEF COMPLEX AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

District	County	Year					
		2020	2030	2040	2050	2060	2070
Middle Pecos GCD	Pecos	26,164	26,164	26,164	26,164	26,164	26,164
	Total	**26,164**	**26,164**	**26,164**	**26,164**	**26,164**	**26,164**
GMA 7		**26,164**	**26,164**	**26,164**	**26,164**	**26,164**	**26,164**

TABLE 2. MODELED AVAILABLE GROUNDWATER FOR THE CAPITAN REEF COMPLEX AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2030 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Year				
			2030	2040	2050	2060	2070
Pecos	F	Rio Grande	26,164	26,164	26,164	26,164	26,164
		Total	**26,164**	**26,164**	**26,164**	**26,164**	**26,164**
GMA 7			**26,164**	**26,164**	**26,164**	**26,164**	**26,164**

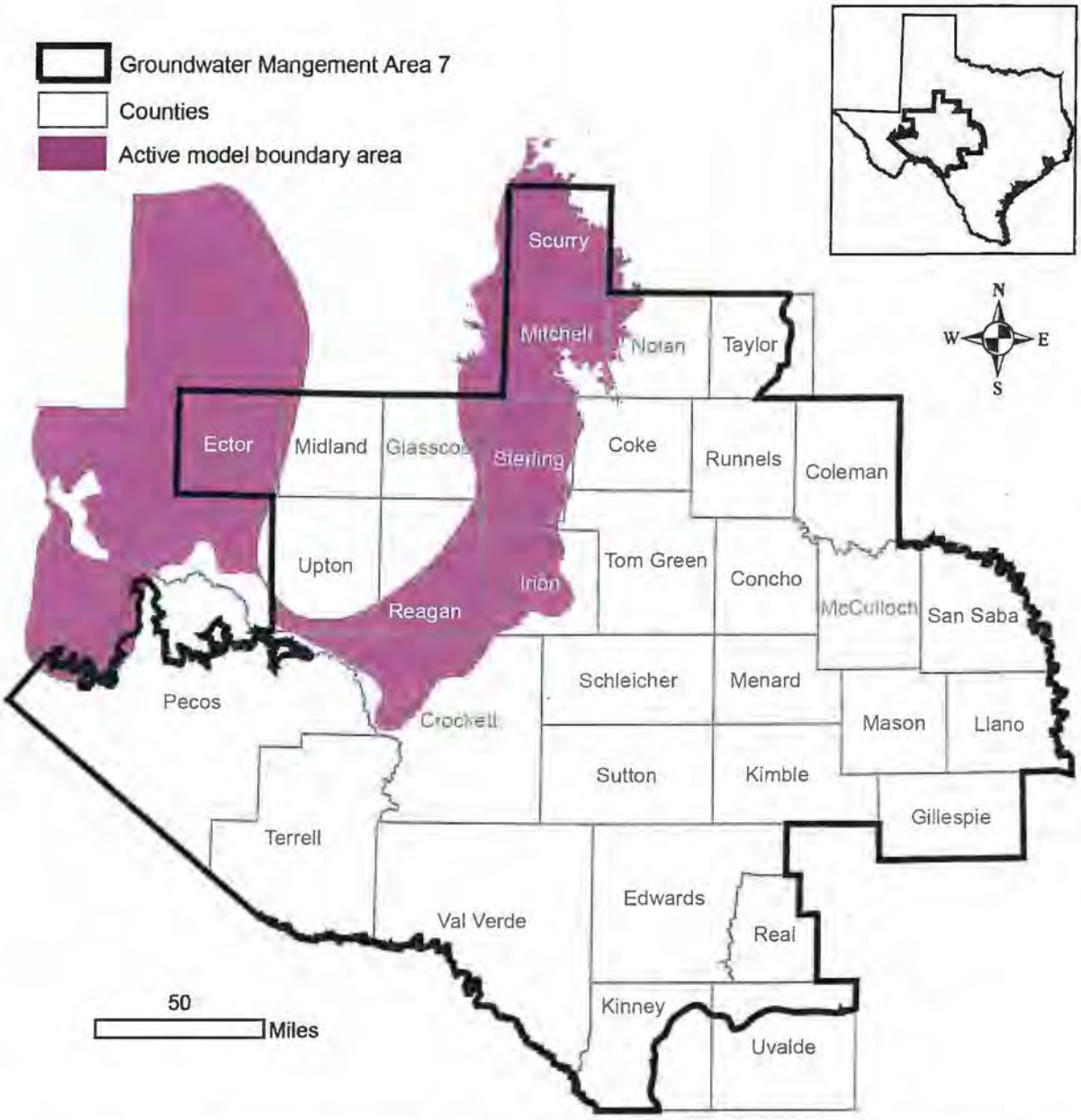


FIGURE 5. MAP SHOWING AREAS COVERED BY THE DOCKUM AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE HIGH PLAINS AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 7.

TABLE 3. MODELED AVAILABLE GROUNDWATER FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR. GCD AND UWCD ARE THE ABBREVIATIONS FOR GROUNDWATER CONSERVATION DISTRICT AND UNDERGROUND WATER CONSERVATION DISTRICT, RESPECTIVELY.

District	County	Year					
		2020	2030	2040	2050	2060	2070
Middle Pecos GCD	Pecos	2,022	2,022	2,022	2,022	2,022	2,022
	Total	**2,022**	**2,022**	**2,022**	**2,022**	**2,022**	**2,022**
Santa Rita UWCD	Reagan	302	302	302	302	302	302
	Total	**302**	**302**	**302**	**302**	**302**	**302**
GMA 7		**2,324**	**2,324**	**2,324**	**2,324**	**2,324**	**2,324**

Note: The modeled available groundwater for Santa Rita Underground Water Conservation District excludes parts of Reagan County that fall within Glasscock Groundwater Conservation District.

TABLE 4. MODELED AVAILABLE GROUNDWATER FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2030 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Year				
			2030	2040	2050	2060	2070
Pecos	F	Rio Grande	2,022	2,022	2,022	2,022	2,022
		Total	**2,022**	**2,022**	**2,022**	**2,022**	**2,022**
Reagan	F	Colorado	302	302	302	302	302
		Rio Grande	0	0	0	0	0
		Total	**302**	**302**	**302**	**302**	**302**
GMA 7			**2,324**	**2,324**	**2,324**	**2,324**	**2,324**

Note: The modeled available groundwater for Reagan County excludes parts of Reagan County that fall outside of Santa Rita Underground Water Conservation District.

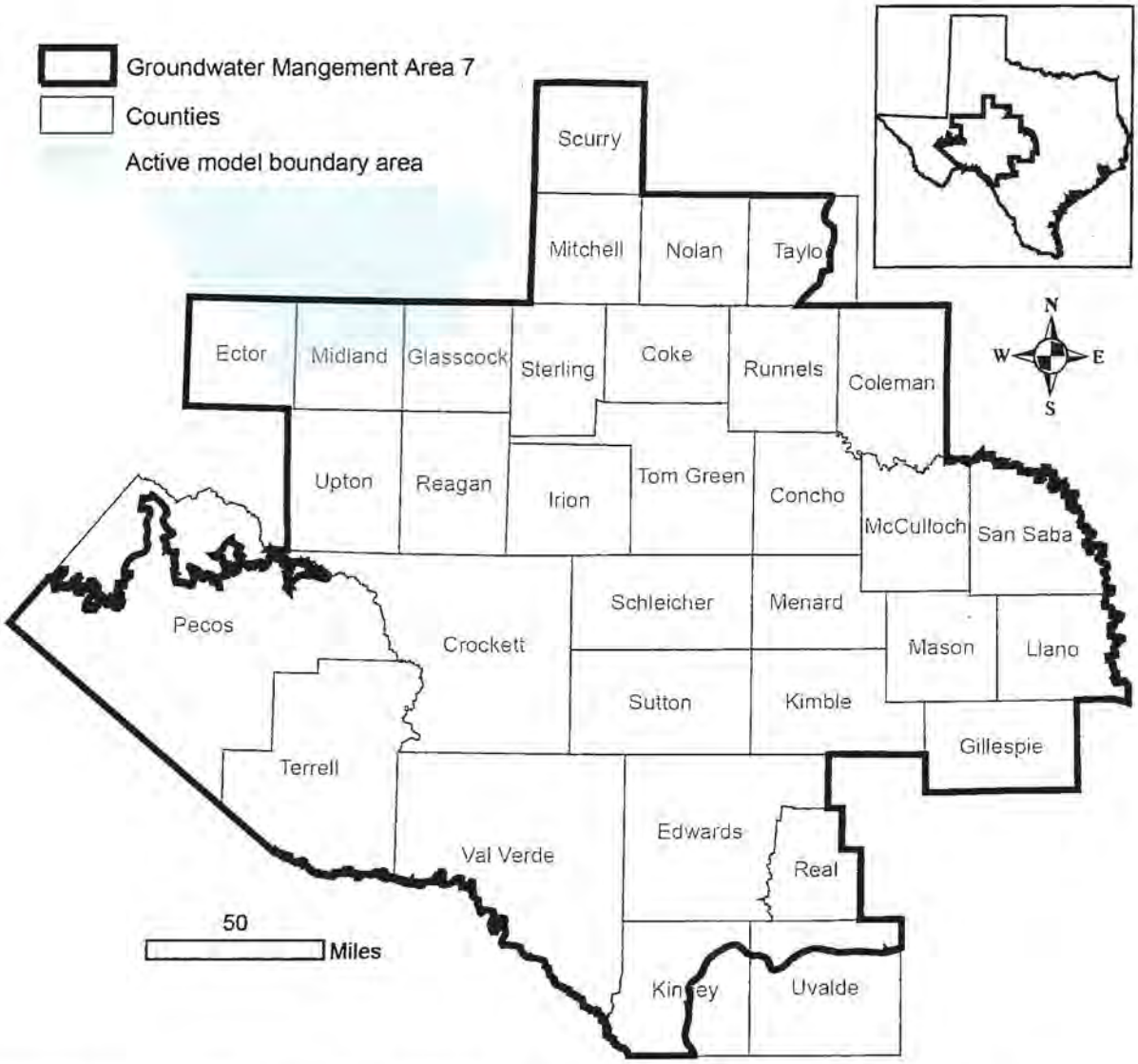


FIGURE 6. MAP SHOWING THE AREAS COVERED BY THE OGALLALA AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE HIGH PLAINS AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 7.

TABLE 5. MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

District	County	Year					
		2020	2030	2040	2050	2060	2070
Glasscock GCD	Glasscock	7,925	7,673	7,372	7,058	6,803	6,570
	Total	**7,925**	**7,673**	**7,372**	**7,058**	**6,803**	**6,570**
GMA 7		**7,925**	**7,673**	**7,372**	**7,058**	**6,803**	**6,570**

TABLE 6. MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2030 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Year				
			2030	2040	2050	2060	2070
Glasscock	F	Colorado	7,673	7,372	7,058	6,803	6,570
		Total	**7,673**	**7,372**	**7,058**	**6,803**	**6,570**
GMA 7			**7,673**	**7,372**	**7,058**	**6,803**	**6,570**

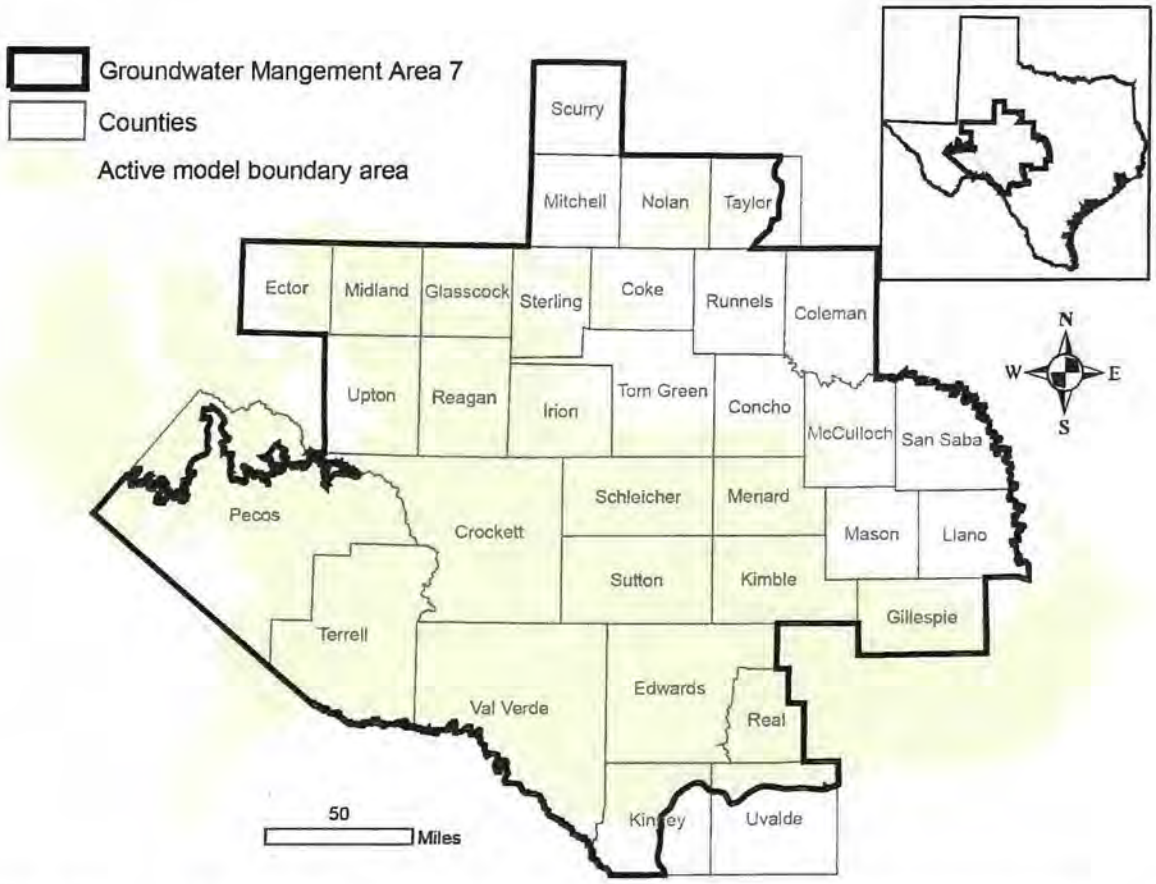


FIGURE 7. MAP SHOWING THE AREAS COVERED BY THE UNDIFFERENTIATED EDWARDS-TRINITY (PLATEAU), PECOS VALLEY, AND TRINITY AQUIFERS IN THE GROUNDWATER AVAILABILITY MODEL FOR THE EDWARDS-TRINITY (PLATEAU) AND PECOS VALLEY AQUIFERS IN GROUNDWATER MANAGEMENT AREA 7.

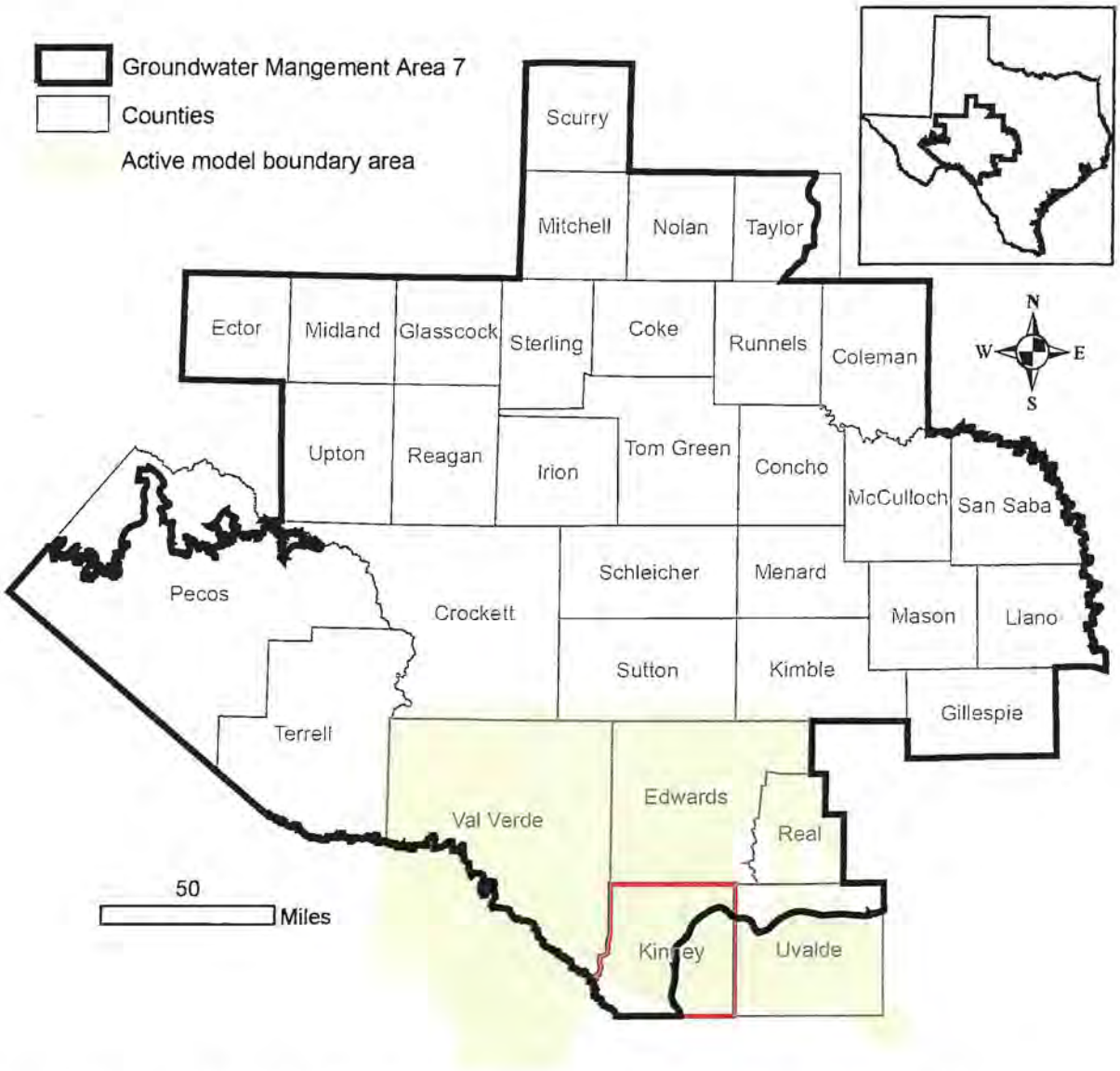


FIGURE 8. MAP SHOWING THE AREAS COVERED BY THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN THE ALTERNATIVE MODEL FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN KINNEY COUNTY [HIGHLIGHTED IN RED].

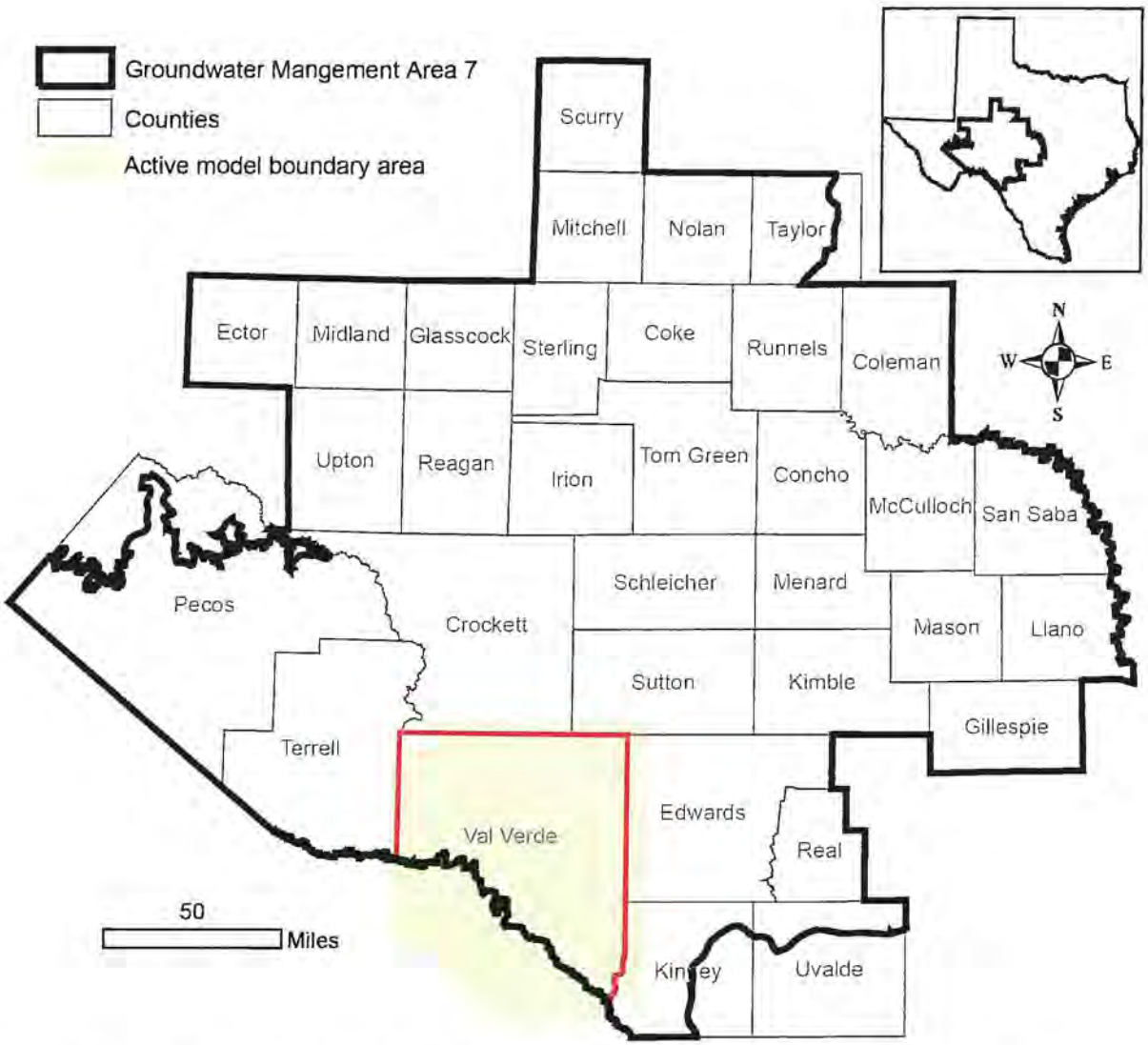


FIGURE 9. MAP SHOWING THE AREAS COVERED BY THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN THE GROUNDWATER FLOW MODEL FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN VAL VERDE COUNTY [HIGHLIGHTED IN RED].

TABLE 7. MODELED AVAILABLE GROUNDWATER FOR THE UNDIFFERENTIATED EDWARDS-TRINITY (PLATEAU), PECOS VALLEY, AND TRINITY AQUIFERS IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY, FOR EACH DECADE BETWEEN 2020 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD IS ABBREVIATION FOR UNDERGROUND WATER CONSERVATION DISTRICT, WCD IS WATER CONSERVATION DISTRICT, UWD IS UNDERGROUND WATER DISTRICT, UWC IS UNDERGROUND WATER CONSERVATION, AND C AND R DISTRICT IS CONSERVATION AND RECLAMATION DISTRICT.

District	County	Year					
		2020	2030	2040	2050	2060	2070
Coke County UWCD	Coke	997	997	997	997	997	997
	Total	**997**	**997**	**997**	**997**	**997**	**997**
Crockett County GCD	Crockett	4,675	4,675	4,675	4,675	4,675	4,675
	Total	**4,675**	**4,675**	**4,675**	**4,675**	**4,675**	**4,675**
Glasscock GCD	Glasscock	65,186	65,186	65,186	65,186	65,186	65,186
	Reagan	40,835	40,835	40,835	40,835	40,835	40,835
	Total	**106,021**	**106,021**	**106,021**	**106,021**	**106,021**	**106,021**
Hickory UWCD No. 1	Kimble	104	104	104	104	104	104
	Menard	380	380	380	380	380	380
	Total	**484**	**484**	**484**	**484**	**484**	**484**
Hill Country UWCD	Gillespie	4,979	4,979	4,979	4,979	4,979	4,979
	Total	**4,979**	**4,979**	**4,979**	**4,979**	**4,979**	**4,979**
Irion County WCD	Irion	3,289	3,289	3,289	3,289	3,289	3,289
	Total	**3,289**	**3,289**	**3,289**	**3,289**	**3,289**	**3,289**
Kimble County GCD	Kimble	1,282	1,282	1,282	1,282	1,282	1,282
	Total	**1,282**	**1,282**	**1,282**	**1,282**	**1,282**	**1,282**

TABLE 7. (CONTINUED).

District	County	Year					
		2020	2030	2040	2050	2060	2070
Kinney County GCD	Kinney	70,341	70,341	70,341	70,341	70,341	70,341
	Total	**70,341**	**70,341**	**70,341**	**70,341**	**70,341**	**70,341**
Menard County UWD	Menard	2,217	2,217	2,217	2,217	2,217	2,217
	Total	**2,217**	**2,217**	**2,217**	**2,217**	**2,217**	**2,217**
Middle Pecos GCD	Pecos	117,309	117,309	117,309	117,309	117,309	117,309
	Total	**117,309**	**117,309**	**117,309**	**117,309**	**117,309**	**117,309**
Plateau UWC and Supply District	Schleicher	8,034	8,034	8,034	8,034	8,034	8,034
	Total	**8,034**	**8,034**	**8,034**	**8,034**	**8,034**	**8,034**
Real-Edwards C and R District	Edwards	5,676	5,676	5,676	5,676	5,676	5,676
	Real	7,523	7,523	7,523	7,523	7,523	7,523
	Total	**13,199**	**13,199**	**13,199**	**13,199**	**13,199**	**13,199**

TABLE 7. (CONTINUED).

District	County	Year					
		2020	2030	2040	2050	2060	2070
Santa Rita UWCD	Reagan	27,398	27,398	27,398	27,398	27,398	27,398
	Total	**27,398**	**27,398**	**27,398**	**27,398**	**27,398**	**27,398**
Sterling County UWCD	Sterling	2,495	2,495	2,495	2,495	2,495	2,495
	Total	**2,495**	**2,495**	**2,495**	**2,495**	**2,495**	**2,495**
Sutton County UWCD	Sutton	6,400	6,400	6,400	6,400	6,400	6,400
	Total	**6,400**	**6,400**	**6,400**	**6,400**	**6,400**	**6,400**
Terrell County GCD	Terrell	1,420	1,420	1,420	1,420	1,420	1,420
	Total	**1,420**	**1,420**	**1,420**	**1,420**	**1,420**	**1,420**
Uvalde County UWCD	Uvalde	1,993	1,993	1,993	1,993	1,993	1,993
	Total	**1,993**	**1,993**	**1,993**	**1,993**	**1,993**	**1,993**
No district		102,703	102,703	102,703	102,703	102,703	102,703
GMA 7		**475,236**	**475,236**	**475,236**	**475,236**	**475,236**	**475,236**

TABLE 8. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE UNDIFFERENTIATED EDWARDS-TRINITY (PLATEAU), PECOS VALLEY, AND TRINITY AQUIFERS IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2030 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Year				
			2030	2040	2050	2060	2070
Coke	F	Colorado	997	997	997	997	997
		Total	**997**	**997**	**997**	**997**	**997**
Crockett	F	Colorado	20	20	20	20	20
		Rio Grande	5,427	5,427	5,427	5,427	5,427
		Total	**5,447**	**5,447**	**5,447**	**5,447**	**5,447**
Ector	F	Colorado	4,925	4,925	4,925	4,925	4,925
		Rio Grande	617	617	617	617	617
		Total	**5,542**	**5,542**	**5,542**	**5,542**	**5,542**
Edwards	J	Colorado	2,305	2,305	2,305	2,305	2,305
		Nueces	1,631	1,631	1,631	1,631	1,631
		Rio Grande	1,740	1,740	1,740	1,740	1,740
		Total	**5,676**	**5,676**	**5,676**	**5,676**	**5,676**
Gillespie	K	Colorado	4,843	4,843	4,843	4,843	4,843
		Guadalupe	136	136	136	136	136
		Total	**4,979**	**4,979**	**4,979**	**4,979**	**4,979**
Glasscock	F	Colorado	65,186	65,186	65,186	65,186	65,186
		Total	**65,186**	**65,186**	**65,186**	**65,186**	**65,186**

TABLE 8. (CONTINUED).

County	RWPA	River Basin	Year				
			2030	2040	2050	2060	2070
Irion	F	Colorado	3,289	3,289	3,289	3,289	3,289
		Total	**3,289**	**3,289**	**3,289**	**3,289**	**3,289**
Kimble	F	Colorado	1,386	1,386	1,386	1,386	1,386
		Total	**1,386**	**1,386**	**1,386**	**1,386**	**1,386**
Kinney	J	Nueces	12	12	12	12	12
		Rio Grande	70,329	70,329	70,329	70,329	70,329
		Total	**70,341**	**70,341**	**70,341**	**70,341**	**70,341**
Menard	F	Colorado	2,597	2,597	2,597	2,597	2,597
		Total	**2,597**	**2,597**	**2,597**	**2,597**	**2,597**
Midland	F	Colorado	23,233	23,233	23,233	23,233	23,233
		Total	**23,233**	**23,233**	**23,233**	**23,233**	**23,233**
Pecos	F	Rio Grande	117,309	117,309	117,309	117,309	117,309
		Total	**117,309**	**117,309**	**117,309**	**117,309**	**117,309**

TABLE 8. (CONTINUED).

County	RWPA	River Basin	Year				
			2030	2040	2050	2060	2070
Reagan	F	Colorado	68,205	68,205	68,205	68,205	68,205
		Rio Grande	28	28	28	28	28
		Total	**68,233**	**68,233**	**68,233**	**68,233**	**68,233**
Real	J	Colorado	277	277	277	277	277
		Guadalupe	3	3	3	3	3
		Nueces	7,243	7,243	7,243	7,243	7,243
		Total	**7,523**	**7,523**	**7,523**	**7,523**	**7,523**
Schleicher	F	Colorado	6,403	6,403	6,403	6,403	6,403
		Rio Grande	1,631	1,631	1,631	1,631	1,631
		Total	**8,034**	**8,034**	**8,034**	**8,034**	**8,034**
Sterling	F	Colorado	2,495	2,495	2,495	2,495	2,495
		Total	**2,495**	**2,495**	**2,495**	**2,495**	**2,495**
Sutton	F	Colorado	388	388	388	388	388
		Rio Grande	6,022	6,022	6,022	6,022	6,022
		Total	**6,410**	**6,410**	**6,410**	**6,410**	**6,410**
Taylor	G	Brazos	331	331	331	331	331
		Colorado	158	158	158	158	158
		Total	**489**	**489**	**489**	**489**	**489**
Terrell	E	Rio Grande	1,420	1,420	1,420	1,420	1,420
		Total	**1,420**	**1,420**	**1,420**	**1,420**	**1,420**

TABLE 8. (CONTINUED).

County	RWPA	River Basin	Year				
			2030	2040	2050	2060	2070
Upton	F	Colorado	21,243	21,243	21,243	21,243	21,243
		Rio Grande	1,126	1,126	1,126	1,126	1,126
		Total	**22,369**	**22,369**	**22,369**	**22,369**	**22,369**
Uvalde	L	Nueces	1,993	1,993	1,993	1,993	1,993
		Total	**1,993**	**1,993**	**1,993**	**1,993**	**1,993**
Val Verde	J	Rio Grande	50,000	50,000	50,000	50,000	50,000
		Total	**50,000**	**50,000**	**50,000**	**50,000**	**50,000**
GMA 7			**479,063**	**479,063**	**479,063**	**479,063**	**479,063**

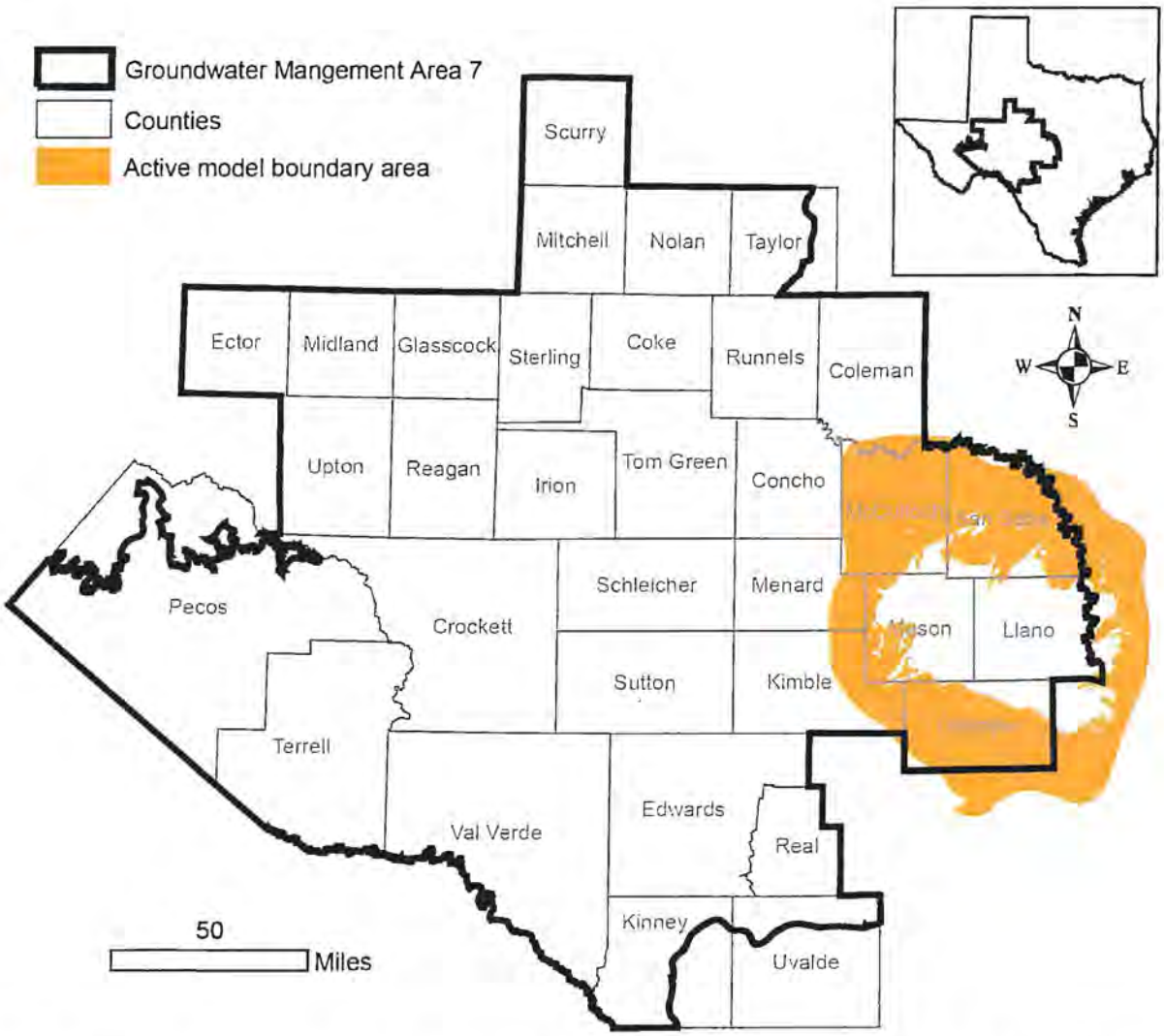


FIGURE 10. MAP SHOWING THE AREAS COVERED BY THE ELLENBURGER-SAN SABA AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE MINOR AQUIFERS OF THE LLANO UPLIFT AREA IN GROUNDWATER MANAGEMENT AREA 7.

TABLE 9. MODELED AVAILABLE GROUNDWATER FOR THE ELLENBURGER-SAN SABA AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD IS THE ABBREVIATION FOR UNDERGROUND WATER CONSERVATION DISTRICT AND UWD IS UNDERGROUND WATER DISTRICT.

District	County	Year					
		2020	2030	2030	2050	2060	2070
Hickory UWCD No. 1	Kimble	344	344	344	344	344	344
	Mason	3,237	3,237	3,237	3,237	3,237	3,237
	McCulloch	3,466	3,466	3,466	3,466	3,466	3,466
	Menard	282	282	282	282	282	282
	San Saba	5,559	5,559	5,559	5,559	5,559	5,559
	Total	**12,887**	**12,887**	**12,887**	**12,887**	**12,887**	**12,887**
Hill Country UWCD	Gillespie	6,294	6,294	6,294	6,294	6,294	6,294
	Total	**6,294**	**6,294**	**6,294**	**6,294**	**6,294**	**6,294**
Kimble County GCD	Kimble	178	178	178	178	178	178
	Total	**178**	**178**	**178**	**178**	**178**	**178**
Menard County UWD	Menard	27	27	27	27	27	27
	Total	**27**	**27**	**27**	**27**	**27**	**27**
No District	McCulloch	898	898	898	898	898	898
	San Saba	2,331	2,331	2,331	2,331	2,331	2,331
	Total	**3,229**	**3,229**	**3,229**	**3,229**	**3,229**	**3,229**
GMA 7		**22,615**	**22,615**	**22,615**	**22,615**	**22,615**	**22,615**

TABLE 10. MODELED AVAILABLE GROUNDWATER FOR THE ELLENBURGER-SAN SABA AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2030 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Year				
			2030	2040	2050	2060	2070
Gillespie	K	Colorado	6,294	6,294	6,294	6,294	6,294
		Total	**6,294**	**6,294**	**6,294**	**6,294**	**6,294**
Kimble	F	Colorado	521	521	521	521	521
		Total	**521**	**521**	**521**	**521**	**521**
Mason	F	Colorado	3,237	3,237	3,237	3,237	3,237
		Total	**3,237**	**3,237**	**3,237**	**3,237**	**3,237**
McCulloch	F	Colorado	4,364	4,364	4,364	4,364	4,364
		Total	**4,364**	**4,364**	**4,364**	**4,364**	**4,364**
Menard	F	Colorado	309	309	309	309	309
		Total	**309**	**309**	**309**	**309**	**309**
San Saba	K	Colorado	7,890	7,890	7,890	7,890	7,890
		Total	**7,890**	**7,890**	**7,890**	**7,890**	**7,890**
GMA 7			**22,615**	**22,615**	**22,615**	**22,615**	**22,615**

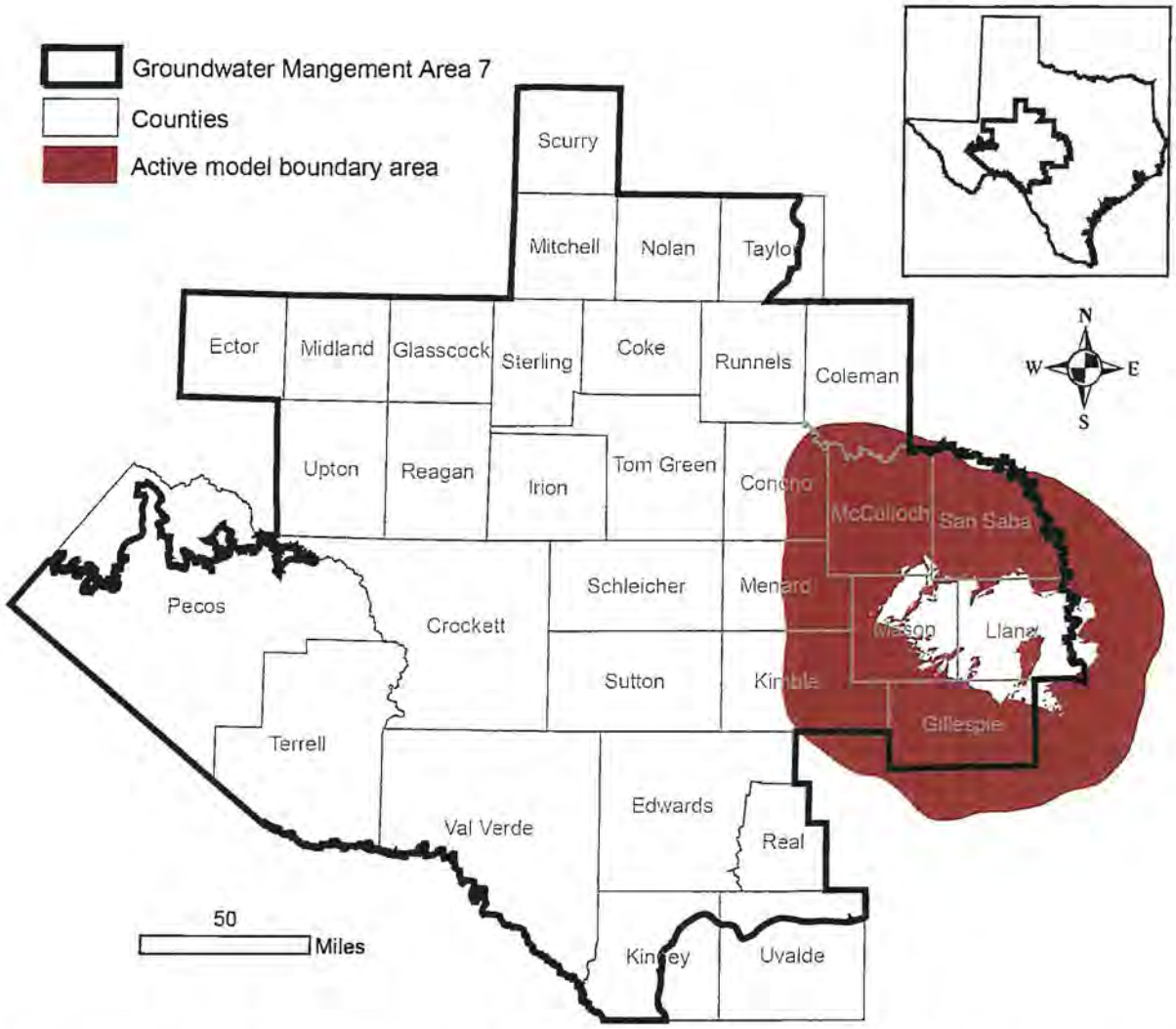


FIGURE 11. MAP SHOWING AREAS COVERED BY THE HICKORY AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE MINOR AQUIFERS OF THE LLANO UPLIFT AREA IN GROUNDWATER MANAGEMENT AREA 7.

TABLE 11. MODELED AVAILABLE GROUNDWATER FOR THE HICKORY AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD IS THE ABBREVIATION FOR UNDERGROUND WATER CONSERVATION DISTRICT AND UWD IS UNDERGROUND WATER DISTRICT.

District	County	Year					
		2020	2030	2040	2050	2060	2070
Hickory UWCD No. 1	Concho	13	13	13	13	13	13
	Kimble	42	42	42	42	42	42
	Mason	13,212	13,212	13,212	13,212	13,212	13,212
	McCulloch	21,950	21,950	21,950	21,950	21,950	21,950
	Menard	2,600	2,600	2,600	2,600	2,600	2,600
	San Saba	7,027	7,027	7,027	7,027	7,027	7,027
	Total	**44,843**	**44,843**	**44,843**	**44,843**	**44,843**	**44,843**
Hill Country UWCD	Gillespie	1,751	1,751	1,751	1,751	1,751	1,751
	Total	**1,751**	**1,751**	**1,751**	**1,751**	**1,751**	**1,751**
Kimble County GCD	Kimble	123	123	123	123	123	123
	Total	**123**	**123**	**123**	**123**	**123**	**123**
Lipan-Kickapoo WCD	Concho	13	13	13	13	13	13
	Total	**13**	**13**	**13**	**13**	**13**	**13**
Menard County UWD	Menard	126	126	126	126	126	126
	Total	**126**	**126**	**126**	**126**	**126**	**126**
No District	McCulloch	2,427	2,427	2,427	2,427	2,427	2,427
	San Saba	652	652	652	652	652	652
	Total	**3,080**	**3,080**	**3,080**	**3,080**	**3,080**	**3,080**
GMA 7		**49,937**	**49,937**	**49,937**	**49,937**	**49,937**	**49,937**

TABLE 12. MODELED AVAILABLE GROUNDWATER FOR THE HICKORY AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2030 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Year				
			2030	2040	2050	2060	2070
Concho	F	Colorado	27	27	27	27	27
		Total	**27**	**27**	**27**	**27**	**27**
Gillespie	K	Colorado	1,751	1,751	1,751	1,751	1,751
		Total	**1,751**	**1,751**	**1,751**	**1,751**	**1,751**
Kimble	F	Colorado	165	165	165	165	165
		Total	**165**	**165**	**165**	**165**	**165**
Mason	F	Colorado	13,212	13,212	13,212	13,212	13,212
		Total	**13,212**	**13,212**	**13,212**	**13,212**	**13,212**
McCulloch	F	Colorado	24,377	24,377	24,377	24,377	24,377
		Total	**24,377**	**24,377**	**24,377**	**24,377**	**24,377**
Menard	F	Colorado	2,725	2,725	2,725	2,725	2,725
		Total	**2,725**	**2,725**	**2,725**	**2,725**	**2,725**
San Saba	K	Colorado	7,680	7,680	7,680	7,680	7,680
		Total	**7,680**	**7,680**	**7,680**	**7,680**	**7,680**
GMA 7			**49,937**	**49,937**	**49,937**	**49,937**	**49,937**

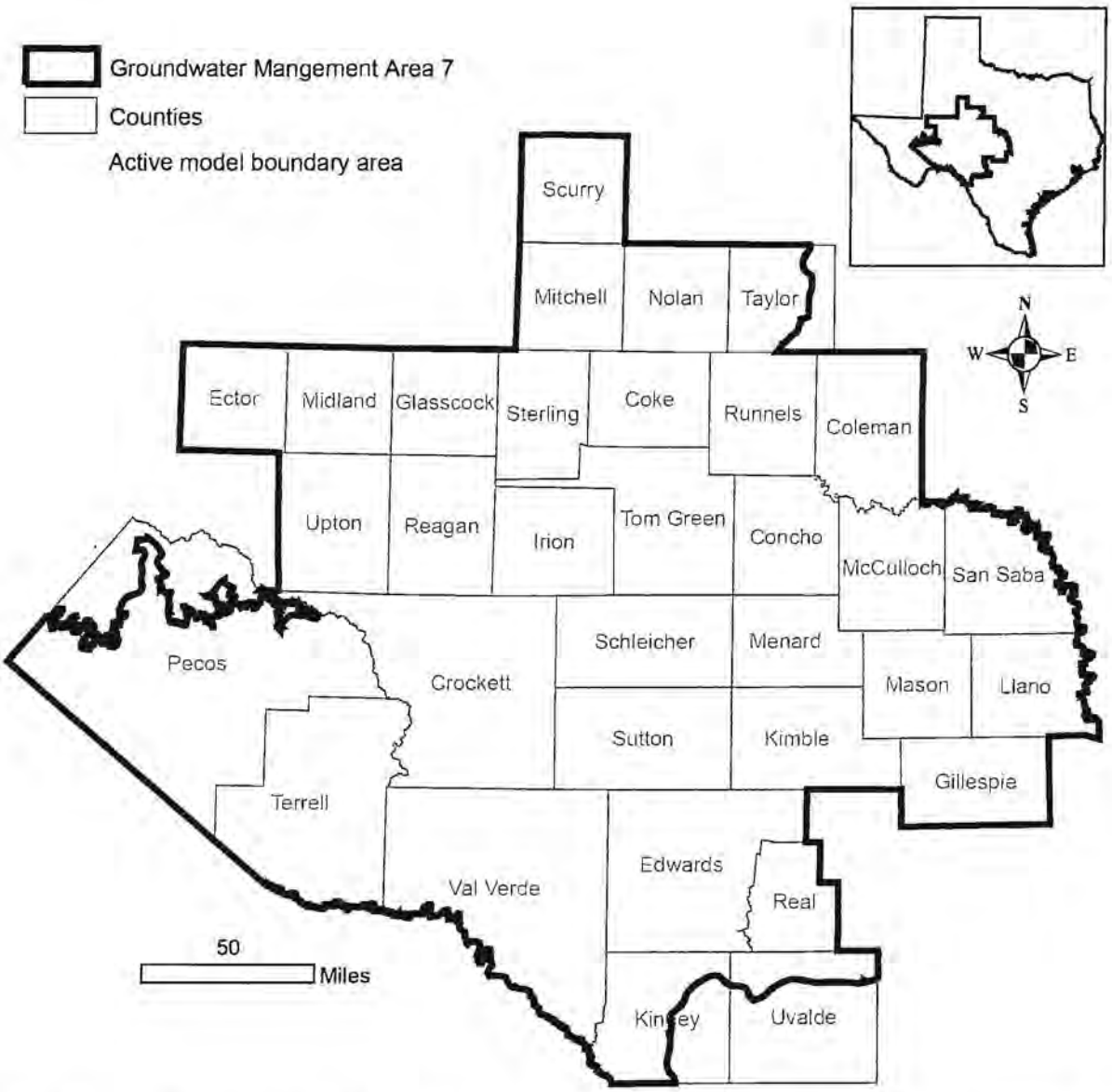


FIGURE 13. MAP SHOWING AREAS COVERED BY THE RUSTLER AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE RUSTLER AQUIFER IN GROUNDWATER MANAGEMENT AREA 7.

TABLE 13. MODELED AVAILABLE GROUNDWATER FOR THE RUSTLER AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY DISTRICT AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

District	County	Year					
		2020	2030	2040	2050	2060	2070
Middle Pecos GCD	Pecos	7,040	7,040	7,040	7,040	7,040	7,040
	Total	**7,040**	**7,040**	**7,040**	**7,040**	**7,040**	**7,040**

TABLE 14. MODELED AVAILABLE GROUNDWATER FOR THE RUSTLER AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2030 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Year				
			2030	2040	2050	2060	2070
Pecos	F	Rio Grande	7,040	7,040	7,040	7,040	7,040
		Rio Grande	**7,040**	**7,040**	**7,040**	**7,040**	**7,040**

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

In some cases, the predictive model run for this analysis could result 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. This would mean that the modeled available groundwater would include imaginary "pumping" values that are coming from cells that are actually dry.

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APPENDIX C

HICKORY UWCD NO 1 RULES

Hickory UWCD # 1
Rules (Adopted February 12, 2009)

RULE 1. DEFINITIONS

RULE 1.1 DEFINITIONS: The definitions that follow are presented in alphabetical order. The order of appearance does not imply or mean to assign priority or relative importance.

"**Abandoned Well**" shall mean a well from which a) the pump has been removed and/or b) the casing and pump column are deteriorated and c) that has not been used for six consecutive months. A well is considered to be in use in the following cases: (A) a non-deteriorated well that contains the casing, pump, and pump column in good condition; or (B) a non-deteriorated well that has been capped.

"**Aggregate Withdrawal**" shall mean the amount of groundwater withdrawn from two or more wells in a water system which is permitted under a single permit for a total pumpage of all wells in the aggregate.

"**Agricultural**" shall mean any of the following activities:

(A) Cultivating the soil to produce crops for human food, animal feed, or planting seed or for the production of fibers;

(B) The practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or nonsoil media, by a nursery grower;

(C) Raising, feeding, or keeping animals for breeding purposes or for the production of food or fiber, leather, pelts, or other tangible products having a commercial value;

(D) Planting cover crops, including cover crops cultivated for transplantation, or leaving land idle for the purpose of participating in Federal CRP program or normal crop or livestock rotation procedure;

(E) Wildlife management; and

(F) Raising or keeping equine animals.

"**Agricultural Use**" shall mean using water for any use or activity involving agriculture,

"**Annular Space**" shall mean the space between the casing and borehole wall.

"Applicant" shall mean a person applying for a permit or permit amendment who is the owner of the land on which the well(s) or proposed well(s) are located unless the landowner authorizes, in writing, another person to act as well operator, to apply for the permit or registration, and otherwise act on his behalf in matters pertaining to registration or permitting or wells on his property.

"Aquifer" shall mean a formation or group of saturated geologic units capable of storing and yielding water in usable quantities.

"Aquifer Mining" shall mean the existence of that condition where the average annual available recharge of an aquifer or a portion of the aquifer is less than the annual production form the aquifer. For purposes of these rules the terms of "Aquifer overdrafting', reduction of artesian pressure" and "drawdown of the water table or aquifer" shall mean aquifer mining.

"Artesian Pressure" shall mean the pressure in a confined aquifer.

"Artesian Well" shall mean a well completed in the confined portion of an aquifer such that, when properly cased, water will rise in the well, by natural pressure, above the top of the confined aquifer.

"Beneficial Use or Beneficial Purpose" shall mean groundwater use for:

(A) agricultural, gardening, domestic, stock raising, municipal, mining, manufacturing, industrial, commercial, recreational, fish and wildlife, or pleasure purposes;

(B) exploring for, producing, handling, or treating oil, gas, sulfur, or other minerals; or

(C) any other purpose that is useful and beneficial to the user(s) and does not commit waste as defined in this rule.

"Bentonite" shall mean a sodium hydrous aluminum silicate clay mineral (montmorillonite) commercially available in powdered, granular, or pellets form which is mixed with water and used for a variety of purposes including the stabilization of borehole walls during drilling, the control of potential or existing high fluid pressures encountered during drilling below a water table, and to provide a seal in the annular space between the well casing and borehole wall.

"Board" shall mean the Board of Directors of the Hickory Underground Water Conservation District No. 1, consisting of five (5) duly elected members.

"Capped Well" shall mean a well that is closed or capped with a covering capable of preventing surface pollutants from entering the well and sustaining a weight of 400 pounds and constructed in such a way that it cannot be removed by hand.

"Casing" shall mean a tubular watertight structure installed in the excavated or drilled hole to maintain the well bore.

"Cement" shall mean a neat Portland or construction cement mixture of not more than seven (7) gallons of water per ninety-four (94) pound sack of dry cement, or cement slurry that contains cement and may also contain bentonite, gypsum or other additives.

"Completion" shall mean a sealing off of undesirable water in the well bore by proper casing and/or cementing procedures and adherence to State standards for completion.

"Conservation" shall mean practices, techniques and technologies that will reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling or reuse of water.

"Contested Hearing" shall mean a permit hearing that is noticed and conducted according to the procedures of Rule 12.3.

"Contiguous" shall mean property within a continuous perimeter boundary situated within the District. Contiguous may also apply to properties that are divided by a publicly owned road or highway if the properties would otherwise share a common border.

"Deteriorated Well" shall mean a well, the condition of which will cause, or is likely to cause, pollution of any groundwater in the District.

"**Discharge**" means the amount of water that leaves an aquifer by natural or artificial means.

"District" shall mean the Hickory Underground Water Conservation District Number 1. For the purpose of filing reports, applications or other required documents it shall mean the District headquarters in Brady, Texas.

"Driller's Log" shall mean a record, made at the time of drilling, showing the depth, thickness, character of the different strata penetrated, and location of water-bearing strata, as well as the depth, size and character of casing installed.

"Domestic Use" shall mean use of groundwater by an individual or a household to support essential domestic activity. Such essential domestic activity includes water for use(s) inside the home; for irrigation of lawns, flower beds, shrubs, trees shading the home, or a family garden and/or orchard with manual sprinklers and garden hoses; for

watering of domestic animals; for protection of foundations; and for swimming pools. Essential domestic activity does not include:

(A) water used to support activities for which consideration is given or for which the product of the activity is sold;

(B) Pond, lake, tank, reservoir, or other confinement which has a capacity greater than 50,000 gallons;

(C) Non-closed system geothermal heating/cooling systems.

(E) Water use which constitutes waster as defined by these rules.

"Enforcement Action" shall mean an action taken by the District to enforce District Rules or any other law within its authority.

"Enforcement Hearing" shall mean a hearing held on an enforcement action which is noticed and conducted according to the procedures of Rule 12.4.

"Exempt Well" shall mean a well which is not subject to permitting by the District pursuant to Section 36.117(b) of the Texas Water Code, generally being wells drilled and equipped to produce less than 25,000 gpd for domestic and livestock purposes, and certain wells used for mineral exploration and/or production purposes pursuant to said statute.

"Flow Monitoring Device" shall mean an electrical or mechanical register that incorporates both a digit totalizer and instantaneous flowrate indicator utilizing generally accepted units (i.e. gallons, acre feet, or acre inches.)

"Fresh Water" shall mean water having physical and chemical properties such that it is suitable and feasible for beneficial use.

"Groundwater" shall mean water percolating below the surface of the earth, but not including water in a defined subterranean system or in the underflow of a river.

"Hazardous substances" shall mean any substance designated as a hazardous substance under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 40 CFR Part 302, as amended.

"Hazardous wastes" shall mean any "solid waste," as that term is defined by 30 Texas Administrative Code 335.1, identified or listed as a hazardous waste by the administrator of the Environmental Protection Agency pursuant to the federal Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, 42 United States Code 6901 et seq., as amended.

"Hearings Officer" shall mean any person appointed by the Board to conduct a hearing on a permit, rule or enforcement matter.

"**Inflows**" means the amount of water that flows into an aquifer from another formation.

"Irrigation System, Installer, and Irrigator" shall mean a person or system as defined in 30 Texas Administrative Code, Section 344.1.

"Landscape Irrigation" shall mean systems or devices used to deliver water to lawns and shrubbery at private residences and at commercial establishments for ornamental purposes solely.

"Licensed Water Well Driller" shall mean any person who holds a license issued by the State of Texas pursuant to the provisions of the Texas Water Well Drillers Act, as amended, and substantive rules of the Water Well Drillers board, or its successors.

"Lot" shall mean any single contiguous parcel of land covered by deed.

"**Managed Available Groundwater**" means the amount of water that may be permitted by a district for beneficial use in accordance with the desired future condition of the aquifer as determined under Section 36.108.

"Manager" shall mean a person selected by the Board to manage and operate the affairs of the District subject only to the orders of the Board.

"Open or Uncovered Wells" shall mean an excavation at least ten feet in depth dug for the purpose of producing underground water and is not covered or capped as required by the Texas Water Code.

"Open Meetings Act" shall mean Chapter 551, Government Code.

"Public Information Act" shall mean Chapter 552, Government Code.

"**Other Aquifer Penetration**" shall mean any penetration of an aquifer within the District including oil and gas test wells; mineral test wells (stratigraphic or core holes or geophysical shot holes); or any other penetrations that fall under the oversight of the TCEQ or Texas Railroad Commission.

"Owner" shall mean without limitation any person or legal entity having legal title to the property on which the water well or proposed water well is located.

"Party in a Contested Hearing" shall mean an applicant or other persons who have a justiciable interest related to a legal right, duty, privilege, power, or economic interest

that is within the District's regulatory authority and that may be affected by a permit or permit amendment. Said party shall not include persons who have an interest common to members of the public.

"**Permit**" shall mean a permit for drilling and production for non-exempt use as described in Rule 8.

"**Person**" shall mean any individual, partnership, firm, governmental agency, political subdivision, corporation, or other legal entity.

"**Plugging**" shall mean an absolute sealing of the well bore in accordance with the Texas Water Well Drillers rules.

"**Pollution**" shall mean the alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the District that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to public health, safety or welfare, or impairs the usefulness of the water for any lawful or reasonable purpose.

"**Presiding Officer**" shall mean the Chairman, Vice Chairman, Secretary, or other Board member presiding at any hearing or other proceeding, or a Contested Hearings Officer.

"**Recharge**" means the amount of water that infiltrates to the water table of an aquifer.

"**Recharge Zone**" shall mean the area of an aquifer where rainfall, surface water, or both, infiltrates into the aquifer.

"**Respondent**" shall mean the individual who receives a notice of violation under Rule 12.4.

"**Retail Public Utility**" shall mean any person, corporation, public utility, water supply or sewer service corporation, municipality, political subdivision, or agency operating, maintaining, or controlling in this state facilities for providing potable water service or service, or both, for compensation.

"**Rules**" shall mean the rules of the District compiled in this document and as may be supplemented or amended from time to time.

"**Rulemaking Hearing**" shall mean a Board meeting noticed and conducted according to Rule 12.1 at which the Board considers changes to District Rules and Management Plan during which the public has an opportunity to comment on such changes.

"**Service Area**" shall mean:

(A) the total acreage within the corporate boundary of a municipality in the case of a municipal water utility;

(B) Except for those lots defined in a platted subdivision which will be added to the existing service of the servicing retail public utility, the extraterritorial jurisdiction of a retail public utility.

"**Total aquifer storage**" means the total calculated volume of groundwater that an aquifer is capable of producing

"**Toxic pollutants**" shall mean any pollutants subject to regulation under 40 Code of Federal Regulations (CFR), Chapter I, Part 129, as defined in 40 CFR 129.4, as amended.

"**Tract**" shall mean a contiguous parcel of land under the ownership of a single entity, such as a corporation, partnership or trust, or an individual or individuals holding as joint owners or tenants in common.

"**Transport**" shall mean the transport of water out of the District.

"**Transfer**" shall mean moving water from one well location(s) in the District to another non contiguous location(s) in the District.

"**Underground Water**" shall mean water, percolating below the earth's surface, but shall not include water in a defined subterranean stream or in the underflow of a river.

"**Undesirable Water**" shall mean water that can cause pollution or water that is injurious to human or animal life, vegetation, land or fresh water.

"**Waste" (§ 36.001(8))** shall mean any one or more of the following:

(A) withdrawal of groundwater from a groundwater reservoir at a rate and in an amount that causes or threatens to cause intrusion into the reservoir of water unsuitable for agricultural, gardening, domestic, or stock raising purposes;

(B) the flowing or producing of wells from a groundwater reservoir if the water produced is not used for a beneficial purpose;

(C) escape of groundwater from a groundwater reservoir to any other reservoir or geologic strata that does not contain groundwater; or contains undesirable water

(D) pollution or harmful alteration of groundwater in a groundwater reservoir by saltwater or by other deleterious matter admitted from another stratum or from the surface of the ground;

(E) willfully or negligently causing, suffering, or allowing groundwater to escape into any river, creek, natural watercourse, depression, lake, reservoir, drain, sewer, street, highway, road, or road ditch, or onto any land other than that of the owner of the well unless such discharge is authorized by permit, rule, or order issued by the commission under Chapter 26;

(F) groundwater pumped for irrigation or landscape irrigation that escapes as irrigation tail water onto land other than that of the owner of the well unless written permission has been granted by the occupant of the land receiving the discharge;

(G) for water produced from an artesian well, waste has the meaning assigned by Section 11.205;

(H) the supply of groundwater to any surface reservoir with a capacity greater than 50,000 gallons except as provided in District Rules;

(I) groundwater pumped for industrial use or application in excess of that quantity, if any, recognized by the industry according to its Standard Industrial Code (SIC) classification as being the maximum amount of water necessary to efficiently meet the demands for the particular use or application to which the groundwater is being made;

(J) groundwater used for heating or cooling that is allowed to drain onto the land surface as tail water and is not re-circulated back to the aquifer (a non-closed system).

(K) loss of groundwater in a distribution system and/or storage facilities in excess of 20% of total annual pumpage. Excessive line loss is a nonbeneficial use of groundwater.

"Water" shall mean groundwater.

"Well" or "Water Well" shall mean and include any artificial excavation into which groundwater from the district aquifers may flow and be produced.

"Well Location" shall mean the location of a proposed well on an application duly filed until such application is granted or denied, or the location of a well on a valid permit.

RULE 1.2 PURPOSE OF RULES: These rules, regulations and modes procedure herein contained are and have been adopted for the purpose of simplifying procedure, avoiding delays, saving expense, and facilitating the administration of the groundwater laws of the State by the District. These rules shall pertain to all wells producing some or all of their water from the Hickory

Aquifer regardless of date drilled, and to all other wells in the District drilled after August 12, 1999.

RULE 1.3 USE AND EFFECT OF RULES: These rules may be used guides in the exercise of discretion, where discretion is vested. However, under no circumstances, and in no particular case shall they, or any of them, be construed as a limitation or restriction upon the exercise of any discretion, where such exists; nor shall they in any event be construed to deprive the Board of an exercise of powers, duties, and jurisdiction conferred by law, nor to limit or restrict the amount and character of data or information which may be required for the proper administration of the law.

RULE 1.4 ACTIONS ON RULES:

A. All changes to the District's Rules will be made after notice and hearing pursuant to the requirements of Rule 12.1. Such changes include repeal or amendment of existing Rules and the adoption of new Rules.

B. The Board may adopt an emergency Rule without prior notice or hearing, or with an abbreviated notice and hearing, according to Rule 12.2 (36.1001).

RULE 1.5 HEADINGS AND CAPTIONS: The section and other headings and captions contained in these rules are for reference purposes only. They do not affect the meaning or interpretation of these rules in any way.

RULE 1.6 CONSTRUCTION: A reference to a title, chapter or section without further identification is a reference to a title, chapter of section of Chapter 36 of the Texas Water Code. Construction of words and phrases are governed by the Code Construction Act, Subchapter B, Chapter 311, Government Code. All references to Texas statutes and the Texas Administrative Code shall be to those statutes and regulations as amended.

RULE 1.7 METHODS OF SERVICE UNDER THESE RULES: Except a otherwise expressly provided in these rules, any notice or documents required by these rules to be served or delivered may be delivered to the recipient, or the recipient's authorized representative, in person, by agent, by courier receipted delivery, by certified mail sent to the recipient's last known address, or by telephonic document transfer to the recipient's current telecopier number or digitally signed email. Service by mail is complete upon transfer deposit in a post office or other official depository in the United States Postal Service. Service by telephonic document transfer is complete upon documented transfer, except that any transfer occurring after 5:00 p.m. Central Standard Time will be deemed complete on the following business day. Where service by one or more methods has been attempted and failed, the service is complete upon notice publication in a

generally circulated newspaper in McCulloch, San Saba, Mason, Kimble, Concho, and Menard County.

RULE 1.8 SEVERABILITY: If any one or more of the provisions contained in these rules are for any reason held to be invalid, illegal, or unenforceable in any respect, the invalidity, illegality, or unenforceability shall not affect any other rules or provisions of these rules, and these rules shall be construed as if such invalid, illegal or unenforceable rules or provision had never been contained in these rules.

RULE 2. BOARD OF DIRECTORS

RULE 2.1 PURPOSE OF BOARD: The Board was created to determine policy and regulate groundwater within the boundaries of the District; for promulgating rules and taking actions to conserve, preserve, protect and recharge the groundwater within the District; and to exercise its rights, powers, and duties in a way that will effectively and expeditiously accomplish the purposes of the District Act. The Board's responsibilities include, but are not limited to, the adoption and enforcement of reasonable rules and other orders.

RULE 2.2 BOARD STRUCTURE, OFFICERS: The Board consists of the members elected and qualified as required by the District Act. The offices of the board of directors shall consist of President, Vice-President, and Secretary. At the first meeting of the board of directors after the regular election and after the canvass of the returns and declaring the results of the election, the board shall elect from among their number, the officers hereinabove specified, who shall hold office for the duration of their term or until their successor is elected and qualified.

RULE 2.3 MEETINGS: The Board will hold a regular meeting on the second Thursday in January, April, July and October of each year and may hold other meetings at such other times and places as the business of the District may require. Notice to the directors as to meetings shall be required. Special meetings of the directors may be called by the President or a majority of the board of directors, upon three (3) days notice by mail, stating the purpose or purposes thereof and the time and place of such meeting. All Board meetings will be noticed and held in accordance with the provisions of the Texas Open Meetings Act.

RULE 3. DISTRICT STAFF

RULE 3.1 MANAGER: The Board may employ a person to manage the District, and title this person Manager. The Manager shall have only those powers, duties, or responsibilities in performing District functions as determined by the Board. The Board shall determine the salary and review the position of Manager during the last quarter of every fiscal year. The manager, with approval of the Board, may

employ all persons necessary for the proper handling of business and operation of the District and their salaries shall be set by the Board and may delegate such duties as may be necessary to effectively and expeditiously accomplish these duties; provided, however, that no such delegation may relieve the Manager from responsibilities under the Texas Water Code, the act creating the District, and the policies, orders and permits promulgated by the Board. The Board may also employ co-managers or consulting managers to perform duties or responsibilities determined by the Board.

RULE 4. MANAGEMENT PLAN

RULE 4.1 DISTRICT MANAGEMENT PLAN: The District Management Plan specifies the acts, procedures, performances and avoidance necessary to conserve, preserve and protect the aquifer, to prevent waste and regulate the decline of the water table, and forms the basis of the District rules in regards to permitting decisions and other requirements imposed by the Board. The Board will review the plan at least every fifth year. The Board's action on the Plan, either to renew it or to amend or replace it, will occur after an opportunity for notice and hearing by using the procedure required by Rule 12.1. A plan, once adopted, remains in effect until the adoption of a new plan. The District Management Plan will be prepared in accordance with Section. 36.1071.

RULE 5. DISTRICT RECORDS

RULE 5.1 MINUTES AND RECORDS OF THE DISTRICT: All documents, reports, records, and minutes of the District are available for public inspection and copying to the extent required by the Public Information Act. Upon written application of any person, the District will furnish copies of its public records. A copying charge shall be established pursuant to the Public Information Act. A list of the charges for copies will be furnished by the District.

RULE 5.2 CERTIFIED COPIES: Requests for certified copies must be in writing. Certified copies will be made under the direction of the Board of Directors. A certification charge and copying charge may be assessed, pursuant to policies established by the Board of Directors.

RULE 6.0 – DRILLING AND PRODUCTION PREREQUISITES

RULE 6.1 NOTICE OF INTENT TO DRILL: A Notice of Intent to Drill shall be filed with the district prior to the drilling of any well, whether exempt or permitted. Following receipt of a Notice of Intent to Drill, the Manager may approve the drilling of any well that is exempt from permitting under Rule 8.2 or Section 36.117 of the Texas Water Code and drilling may proceed.

Permits must be issued for non-exempt wells pursuant to the provisions of Rule 8 prior to the commencement of drilling. Any non-exempt well which is drilled prior to receiving permit approval is in violation of District Rules, and is subject to injunction against production and levy of fines.

RULE 6.2 DRILLER'S LOG REQUIRED

No person shall produce water from any well hereafter drilled and equipped within the District, except that necessary to the drilling and testing of such well and equipment, unless or until the District has been furnished with: a) an accurate driller's log and record of completion and equipping of the well, b) any electric log which may have been made, and c) a registration submitted on forms furnished by the District. Upon completion of the well, District personnel shall have access to the property at a reasonable times for all District purposes, including inspection of the well, performing production tests and completing the inventory of the well.

RULE 6.3 FAILURE TO FILE: Failure to file accurate driller's logs and records of equipping and completion of the wells, including any electric logs made, pump test data, any water level data, water quality data, or any data pertinent to the well, in the District office in Brady, Texas, within sixty (60) days after completion of the well or project will constitute an violation of these rules. In such event the District may take appropriate action under Rule 14 or any other applicable rule or statute to enforce compliance with this rule.

RULE 7.0 - WELL REGISTRATION

RULE 7.1 REGISTRATION REQUIRED FOR ALL WELLS

Registration is required for all wells drilled in the District including wells that are exempt from permitting under Rule 8.2, and those used for monitoring purposes. Registration shall be on forms provided by the District and shall include the following information:

(a) The exact location of the well including the County, section, block, or other legal description; and latitude and longitude;

(b) Use or proposed use of well;

(c) Size or proposed size of the pump;

(d) For those wells drilled after the effective date of this Rule an agreement, by the applicant, that a complete well construction registration form and Driller's and geophysical log (if available) will be

furnished to the District upon completion of the well and prior to the production of water from the well.

(e) Such additional data as may be required by the-Manager; and

(f) The name and address of the landowner applicant .

(g) The name and address of the well operator, if different from the landowner.

B. All wells so registered shall be equipped and maintained so as to conform to the standards set by the Texas Water Well Drillers and Pump Installers Rules, 16 Texas Administrative Code Chapter 76.

RULE 8. WELL PERMITTING

RULE 8.1 STANDARD PERMIT PROVISION: No person shall begin to drill , alter, or produce from a well without having received a permit from the District, unless the well is exempted from permitting under Rule 8.2. For purposes of these rules, alteration of a permitted well, changes in pumping equipment that results in an increase in pumping rate , change in use(s) or location of use, or loss of exemption shall be considered as a new well requiring a new permit application by the Owner.

A. Application for a well drilling and production permit shall be made to the District on permit forms promulgated by the District for all wells drilled and completed unless the well is exempted from permitting under Rule 8.2.

B. When approved by the District Board the permit shall authorize the drilling of the well and shall specify the location of the well, the annual maximum production allowed from the well, ownership of the well, and nature of the permitted beneficial use of production from the well.

RULE 8.2 EXEMPTIONS; EXCEPTIONS; LIMITATIONS:

The following exemptions, exceptions and limitations apply to permitting of wells:

A. The District may not require a permit for drilling or producing from a well exempted from permitting under Section 36.117(b)(1) including: wells used solely: (1) for domestic use or, (2) for providing water for livestock or poultry on a tract of land larger than 10 acres that is either drilled, completed or equipped so that it is incapable of producing more than 25,000 gallons of groundwater a day;

B. The District may not require a permit for drilling or producing from a well for groundwater used to supply water for hydrocarbon production in accordance with 36.117(b)(2) and (3), except that permits may be required by the District for water wells drilled for hydrocarbon production under conditions defined in 36.117(d)(1) and (2).

C. In addition to the exceptions required by law in Texas Water Code, Section 36.117 (b) stated above, the District also exempts from the requirement of a permit a well on a lot ten (10) acres or less in size if there shall be only one well per lot and a) that well is used to supply groundwater to no more than four households solely for domestic use and b) a member of each household shall either be the owner of the well, a person related to the owner or a member of the owner's household within the second degree by consanguinity or affinity, or an employee of the owner. Wells exempted by the provisions of this sub-section C are required to be registered pursuant to Rule 7 and are subject to the regulations of Rule 9.

D. A well to supply water for a subdivision of land for which plat approval is required by Chapter 232, Local Government Code, is not exempted under Subsections A and C above.

E. Wells exempted under this rule and Section 36.117 of the Texas Water Code are required to be registered pursuant to Rule 7.0

F. Nothing in the exemptions of Rule 5.2(A), (C) and (D) above -shall be construed to allow waste of groundwater as defined in Rule 1.1) (36.0001(8)).

(a) The supply of groundwater to a surface reservoir (stock tank, lake, or non-enclosed impoundment) that has a capacity greater than 50,000 gallons is considered waste, except for surface catchments used by irrigators for temporary daily storage of groundwater prior to irrigation use or impoundments required by municipal or industrial users for the treatment of the groundwater.

(b) The area and capacity of surface reservoirs permitted for livestock or wildlife management purposes in excess of 50,000 gallons surface storage will be based on the total contiguous acreage and the carrying capacity of the acreage for the livestock or wildlife management watered.

G. At any time the production of a well exempted by Rule 8.2 exceeds the exempted amount or is used for purposes or at locations_other than those exempted under in this rule the well is no longer exempted and continued use is a violation of District Rules subject to injunction and civil penalties until such time as it is permitted by the District for such increased production, change in use or change in location of use.

H. Wells exempted under this Rule shall be equipped and maintained so as to conform to the District's rules requiring installation of casing, pipe and fittings to prevent waste or pollution.

I. The District may impose more restrictive permit conditions on new permit applications and applications for increased production by existing permit holders if the limitations are reasonably necessary to protect existing use (36.113(e)(3).

RULE 8.3 WELL PERMIT APPLICATION:

A. The permit application provided for herein must be filed with the District on the form or forms promulgated by the District, contain all requested information, be sworn to, and such permit must be obtained from the District prior to the drilling of a water well and production of water.

B. All permit applications shall include a description of methods used in the system to:

(1) Prevent contamination of the groundwater supply, including as a minimum a backflow preventor on wells used for irrigation;

(2) Achieve water conservation;

(3) Measure the amount of water. produced by the well;

4) measure drawdown;

5) Prevent or minimize interference with existing permitted or r registered wells.

C. The District will determine whether the application, maps, and other materials comply with the requirements of this rule and are administratively complete. The District may require amendment of the application, maps, or other materials to achieve necessary compliance and/or may require additional information to be provided to the District.

D. Municipal applicants for a permit, amendment or renewal shall submit to the District a copy of Applicant's State approved water conservation plan and drought management plan. Applicants for non-municipal permits shall submit forms which contain water conservation and drought management information requested by the District.

RULE 8.4 PERMIT APPLICATIONS PROCEDURE; TERM, RENEWAL, AND AMENDMENT:

A. Rule 8.4 B, C, D. and E. and Texas Water Code Section 36.114 are applicable to all well permit applications and applications for amendment.

B. Within sixty days after the date that an application for a permit or permit amendment is filed, the Manager will make a determination as to whether the application contains the data and maps required by district rules and is administratively complete. An administratively complete application requires information set forth in the application instructions and/or in accordance with Rule 8.3, and Texas Water Code Sections 36.113 and 36.1131. If the Manager determines that the application is incomplete, the Manager shall notify the applicant of the deficiencies. Any such application for which deficiencies have not been remedied within 60 days of notification by the manager will be cancelled, and another application for the requested production must be submitted *de novo*, unless that applicant, prior to the expiration of the 60 day-period, has requested and received an extension from the Board. Only one such 30-day extension may be granted by the Board.

C. Within 60 days after the application is administratively and technically complete the District shall conduct a public hearing on the completed application at a time and location which has been noticed in the same manner as the District's regular monthly Board meetings. The public hearing may be held in conjunction with any regular or specially called meeting of the Board, or a special meeting may be called solely for the purpose of holding a hearing on an application.

D. At the hearing at which the Board first considers the application, the Board will determine the need for a Rule 8.5 hearing (Sec. 36.114B). Conditions of a well permit application which may be considered by the Board when determining the need for a hearing pursuant to this Rule are set forth in Rules 8. 4 and 8.5:

E. If the Board determines at the initial hearing that no Rule 8.5 hearing is needed, the Board may act immediately on the application at the Board meeting (Section 36.114(c). The application may be granted in whole or in part as amended. The application may be approved only if the Board of Directors finds that the proposed use does not constitute waste and that such use constitutes a use for a beneficial purpose, as those terms are defined in these Rules, or is otherwise consistent with the objective and goals of the District's Management Plan or with these Rules. In evaluating whether the application is consistent with the District Management Plan or Rules, the District will consider whether:

(1) the proposed use of water adversely affects existing groundwater and surface water resources or existing permitted and registered wells;

(2) the proposed use of water is dedicated to a beneficial use and does not constitute waste;

(3) the proposed water production is consistent with the District Management Plan;

(4) the applicant has agreed to avoid waste and achieve water conservation;

(5) the applicant has agreed that reasonable diligence shall be used to protect groundwater quality and that the applicant shall follow well plugging guidelines at the time of well closure; and

(6) the well will meet District spacing and production limits.

F. If the application is approved, the District Manager shall issue a permit in accordance with the Board's decision setting forth the name of the owner, location of the well, type of use, maximum number of acre-feet to be produced and any limiting conditions such as requirements for metering, drilling, maintenance and measuring of monitor wells, or annual water quality tests.

G. The effective date of the permit will be 10 days after the date on which the Board's order is signed. The permit will include a statement that the permit becomes effective and final on that date. Any appeal authorized by Texas Water Code Chapter 36, Subchapter H will run from that effective date

RULE 8.5 - CONTESTED CASE HEARINGS.

A. A contested application is one in which:

1. parameters of the application regarding production, spacing, setback, use or location of use are not consistent with District Rules and Management Plan;

2. one or more parties file a contest of an application. Parties contesting an application must file notice of their intent to contest at least ten days prior to the date set for the initial hearing

3. one or more parties have requested a rehearing of an application approved pursuant to the provisions of Rule 8.4E. Parties requesting a rehearing must file the request within 10 days of the Board's issuance of its permit.

B. Parties contesting an application or requesting a rehearing on a Board decision on an application shall be limited to parties to the original hearing.

C. All contested case hearings will be conducted in accordance with the provisions of Rule 15.3

D. Within 30 days following the completion of all hearings on a contested case the Board will issue a written order reflecting its decision. If the application is approved the District Manager shall issue a permit in accordance with the Board's order setting forth the name of the owner, location of the well, type of use, maximum number of acre-feet to be produced and any limiting conditions such as requirements for metering, drilling, maintenance and measuring of monitor wells, or annual water quality tests.

RULE 8.6 COMPLETION OF PERMIT PROCESS; AMENDMENT OR TRANSFER OF PERMIT

A. If the Board comes into possession of information not previously available to the Board and which would have been of material significance in the Board's original decision, following notice and hearing the Board may cancel, change conditions, or let stand the permit.

B. The application/permit process will be deemed completed upon the completion and equipping of the well and the filing of the required information and copy of the drillers log with the District.

C. Each permit shall state that it will automatically terminate within a specified time period unless a well has been completed and placed into production within that specified period. Except as provided below, once a permit is issued pursuant to an application to drill a well, it remains valid for a period of twenty-four (24) months for municipalities or public water suppliers and for a period of six (6) months for all other water users, after which time if the well is not drilled the permit is cancelled and a new application process shall be initiated. Upon written request by permittees permits may be extended by the Board, for reasonable cause shown, for an additional six months No permit shall be granted for a period exceeding five years before commencement of production unless the applicant submits a specific request for a longer development period with the original application and includes therewith supporting justification, including detailed plans, engineering studies and specific timetables establishing the necessity for additional time. The District may require the permittee to provide periodic progress reports, and may provide for cancellation of the permit if the permittee is not in compliance with the conditions and time schedule set forth in its application and/or permit or has evidenced intent that the water will not be used for the purposes or in the location stated in the application or permit.

D. Permits may be transferred to another person through change of ownership of the well provided all permit conditions remain unchanged and in compliance with District rules and the District is notified of the change in ownership. A change in purpose of use by the new well owner or location of use invalidates the permit and requires a new permit or permit amendment.

E. Permits issued under these Rules after February 12, 2009, are subject, following notice and an enforcement hearing conducted according to procedures required by Rule 15.4, to amendment or revocation by the District for waste, for deviation from the purposes and terms of the permit, or, where declines in the water table have been shown to have impaired existing use, to proportionate reduction among all such permit holders within the affected area of the aquifer.

F. Permit amendments or new permits are required for any change in well size, depth, or use, or an increase in production over the permitted amount.

RULE 8.7 REPORTING AND MONITORING:

A. Reporting: All permittees shall annually report to the District the total amount pumped per well during the previous year. To facilitate reporting the District will make available forms to report the amount of water used annually. Reports must be completed and returned to the District office in Brady, Texas by March 15th of the year following the reporting period. Failure to timely file the annual report will subject the permittee to a civil penalty of $100.day for the first 30 days of delinquency, $500/day for every day after 30 days, and other sanctions provided in these rules.

B. Monitoring: All permitted wells shall be equipped with a flow monitoring device approved by the District and available for District inspection.

C. Water Quality Sampling: Owners of registered wells shall allow the District to sample such wells for water quality analysis as often as deemed necessary to implement District goals, but no more frequently than annually, except for:

1) monitor wells, which may be sampled semi-annually or quarterly; or

2) where there is evidence of, or a complaint has been filed with the District alleging, contamination of groundwater in the area where the well is located.

RULE 9.0 WELL SPACING

RULE 9.1 WELL SPACING (§ 36.116):

A. All water wells intended for domestic and livestock use shall be a minimum of fifty feet (50 ft.) from property lines and public roadways. On any new division of property, new property lines shall also be fifty feet (50ft.) from any existing wells, unless the owner of the existing well grants a variance to the adjoining landowner. Where public roadways are involved it is permissible to use the centerline of a public roadway to calculate the distance required for the setback of a tract bordering a roadway.

B. Wells shall be located a minimum horizontal distance of 100 feet from any concentrated source of pollution, such as existing or proposed livestock or poultry yards and septic system absorption fields. Such horizontal distance may be decreased, provided the total depth of pressurized cement slurry in the annular space (the space between the casing and the borehole wall), is increased by twice the horizontal _____reduction, or to the top of the water bearing strata, but in no case shall such distance be less than 50 feet (16 Texas Administrative Code, Section 76.1000(a).In order to obtain such an exception from the District, the owner shall submit an affidavit stipulating the additional cement slurry in the annular space, the reduction of the horizontal minimum distance, and a release of District from any liability resulting from the well's location in proximity to any concentrated source of pollution. The affidavit shall be signed by the owner, notarized and recorded with the county.

C. In all other respects the spacing of wells shall conform to the requirements of 16 Texas Administrative Code 76.1000(a)

RULE 10. PRODUCTION AND DEPLETION LIMITATIONS

RULE 10.1 PRODUCTION LIMITATIONS:

A. Each permit application, or related group of applications, requesting new or additional production of greater than 500 acre feet per year of groundwater on a contiguous tract shall include an evaluation by a licensed engineer or geologist of the impact of the proposed production on water levels within the aquifer(s) from which the wells are proposed to produce water.

B. The District may deny in whole or part any permit application which, due to its proposed production volume, will cause or contribute to water table decline with potential impairment to existing use in the aquifer(s), or relevant parts thereof, or would have a high probability of exceeding a seven (7) foot drawdown of the water table over a three year period.

C. The evaluation of the impact of proposed production on the water levels in the aquifer shall consist of:

(i) Evaluating the historical rate of water-level decline in the outcrop area or areas relevant to the permit application, then estimating the additional water-level decline which will be caused by the proposed production in the relevant outcrop area or areas:

(ii) The evaluation shall use a statistically valid trend analysis, a computer model, or any other method commonly used by professional geologists or groundwater hydrologists which will provide accurate results and is acceptable to the District.

D. Permittees with permitted production exceeding 500-1000 acre-feet/year will be required to maintain one or more monitor wells in locations deemed necessary by the District for the purpose of monitoring potential impairment of existing wells on adjacent properties or within a one-miles radius, whichever is greater. The location, number and depth of such monitor wells shall be determined by the District on the basis of engineering data supplied to the District by the applicant and/or by the District's engineering consultants. Permittees shall collect and furnish to the District regular periodic data on water levels in required monitor wells, and such wells and data shall be available at all times for inspection and testing by District staff.

RULE 11. WASTE and POLLUTION

RULE 11.1 PROHIBITION AGAINST WASTE:

A. Groundwater shall not be produced within, or used within or without the District, in such a manner as to constitute waste as defined by Rule 1.1.

B. Any owner producing or using groundwater shall use every feasible precaution, in accordance with the latest approved methods, to stop and prevent waste of such water.

C. Groundwater pumped for industrial or commercial use or application shall be considered waste if the quantity is in excess of the quantity, if any, recognized by the industry according to its Standard Industrial Code (SIC) classification to be the maximum amount of water necessary to efficiently meet the demands for the particular use or application in question.

RULE 11.2 PROHIBITED AQUIFER PENETRATIONS: There shall be no

excavation or drilling of a well(s), or use of an excavation or a well(s) for the purpose of temporarily or permanently disposing of the following materials or substances, as defined in District Rules, within the District unless such drilling, construction or operations are approved and permitted by the governing regulatory agency:

(1) Radioactive wastes

(2) Toxic pollutants

(3) Hazardous substances

(4) Hazardous wastes

(5) Polychlorinated biphenyls(PCBs)

(6) Soils, fluids or other materials or substance contaminated with any of the above.

RULE 12. WELL CONSTRUCTION AND COMPLETION STANDARDS

RULE 12.1 WELL CONSTRUCTION AND COMPLETION STANDARDS:

Monitor wells are exempt from this rule; however, their construction shall follow state guidelines.

A. The diameter of the drilled hole shall be a minimum of three inches (3") larger than the outside diameter of the casing to be used down to a depth of fifty feet (50') or to the top of the first potable water bearing strata above fifty feet (50').

B. Either steel pipe or polyvinyl chloride (PVC) casing may be used. PVC casing shall meet minimum specifications as defined by the Department of Licensing and Regulations Water Well Drillers and Pump Installers in 16 Texas Administrative Code Chapter 76.

C. a) Wells Drilled to All Aquifers: The annular space in the borehole shall be filled with cement slurry or bentonite from ground level to a depth of not less than fifty feet (50') below the land surface or to the top of the first potable water bearing strata above fifty feet (50').

b) Wells Drilled to the Hickory Aquifer: In addition, the Board of Directors may require the annular space in the borehole to be cemented from ground level to the top of the Hickory, Lion Mountain or Welge sandstone water-bearing strata when district data, and/or evidence presented at the permit hearing, indicate a probability that water from the subject sandstone formation may be commingled with waters from overlying strata, or that overlying waters may be produced from an uncased well.

c) All wells shall satisfy all State water well completion and annular space sealing requirements.

D. The casing shall extend at least eighteen inches (18") above land surface at a site not generally subject to flooding; provided however, that if a well must be placed in a flood prone area, it shall be completed with a water tight sanitary well seal and steel casing extending a minimum of thirty six inches (36") above known flood levels.

E. All wells completed with plastic casing shall be completed according to one of the three surface completion methods as described by the following:

(1) Slab - The slab or block shall extend at least two feet (2') from the well in all directions and have a minimum thickness of four inches (4"), and should be separated from the well casing by a plastic or mastic coating or sleeve to prevent bonding of the slab to the casing. The surface of the slab shall be sloped to drain away from the well. The top of the casing shall extend a minimum of one foot (1') above the top of the slab.

(2) Steel and PVC Sleeve - The steel sleeve shall be a minimum of 3/16" in thickness and/or the plastic sleeve shall be a minimum of schedule 80 sun resistant and twenty four inches (24") in length and shall extend twelve inches (12") into the cement, except when steel casing or a pitless adapter is used. The casing shall extend a minimum of one foot (1') above the original ground surface, and the steel sleeve shall be two inches (2"), larger in diameter than the plastic casing being used.

(3) Pitless Adapters - In wells with Steel or Plastic Casings completed with pitless adapters, the adapters shall be welded to the casing or fitted with another suitably effective seal, and the borehole-casing annulus filled with cement slurry or bentonite to a depth of not less than fifty feet (50') below land surface, or to the top of the first potable water bearing strata above fifty feet (50'). All wells completed with pitless adapters shall satisfy all State water well completion and annular space sealing requirements that pertain to pitless adapters.

F. Wells completed with steel casing shall meet all specifications set forth by the Water Well Driller and Pump Installers Rules, 16 Texas Administrative Code Chapter 76, and need to be completed at the surface with the annular space filled with cement slurry or bentonite as described in Rule 8.1C.

G. All wells, especially those that are gravel packed, shall be completed so that aquifers or zones containing waters that are known to differ significantly in chemical quality are not allowed to commingle through the borehole-casing annulus or the gravel pack and cause quality degradation of any aquifer or zone.

H. All wells shall be equipped with a water tight sanitary well seal with an inspection port, or some other means which allows for free access to the water table for the purpose of water level measurement and disinfection. Any well presently not equipped with a water tight sanitary well seal is required to be so equipped in the future when that well is serviced. On those wells with odd sized casing, which cannot be fitted with a factory made water tight sanitary well seal, the completion shall be done in a manner that shall prevent any pollutants (waste, insects, chemicals, etc.) from entering the well.

RULE 12.2 PERSONS AUTHORIZED TO DRILL WELLS AND INSTALL PUMPS:

A. Only persons who are licensed water well drillers, in good standing with the Department of Licensing and Regulation Texas Water Well Drillers Board and whose licenses are verified with the District are allowed to commercially drill water wells within the District. License verification with the District shall be on forms provided by the District and be in accordance with and contain information called for in the form of verification. Owners may personally drill water wells on their own property provided wells are completed according to State and District completion requirements.

B. Commercial Pump Installers are required to show licensed verification with the District. License verification shall be on forms provided by the District and shall be in accordance with and contain the information called for in the form of verification.

RULE 13. TRANSPORTATION OF GROUNDWATER OUT OF THE DISTRICT

RULE 13.1 PURPOSE: By the authority granted it under Section 36.122 of the Texas Water Code, the District adopts these rules and requires that an application shall be made and a transport permit be obtained to transfer groundwater out of the District. Transport applications shall be on forms provided by the District and contain all required information before application is considered. All water wells producing water for the transfer of water out of the District in any manner shall be permitted

wells. Rule 13 applies only to a transfer of water that is permitted after September 1, 1997 (36.122(n)).

RULE 13.2 EXCEPTIONS: Water used for emergency purposes such as for fire fighting may be transported by truck out of the District on a per incident basis without need for a transport permit. Likewise occasional transport by truck out of the District of water for support of county or state construction or paving projects may be made without need for a transport permit.

RULE 13.3 APPLICATION PROCEDURES: All applications to obtain permits to transfer groundwater out of the District (transport permits) will be considered and processed under the same procedures as applications for well permits under Rule 8 and shall contain the following:

(1) The name and address of the applicant,

(2) The legal description of the exact location(s) of the well(s) from which water to be transported is to be produced and the well(s) permit number,

(3) The name and address of the well owner(s) of the land upon which is located the well(s) which is to produce water to be transported,

(4) The time schedule for construction and/or operation of the facility,

(5) A construction and operations plan that shall include, but is not limited to, information as to a technical description of the facilities to be used for transportation of water,

(6) The use of the water to be transported,

(7) The volume of water to be transported annually,

(8) Scientific evidence showing that the proposed operation will not cause pollution as defined in Rule 1 or waste as defined in Rules 1 and 11,

(9) A scientific evaluation by a licensed engineer or geologist showing the impact of the proposed groundwater production for transportation on the quantity and quality of water available within the District pursuant to Rule 10,

(10) Scientific evaluation showing the projected effect of the proposed transfer on aquifer conditions, depletions, subsidence, or effects on existing permit holders or other groundwater users within the District,

(11) Evidence that the proposed transfer conforms to the goals and objectives of the approved District Management Plan and the pertinent Regional Water Plans,

(12) A water conservation plan and a drought management plan,

(13) Additional information that may be required by the Board.

RULE 13.4 HEARING: The District shall conduct a hearing on an application for a transport permit in accordance with procedures set forth in Rule 15.3.

RULE 13.5 PERMIT APPROVAL/DENIAL:

(1) The District may not impose more restrictive permit conditions on transporters than the District imposes on existing in-district users, except as provided in §36.122 of the Texas Water Code or otherwise allowed by law. In reviewing a proposed transfer of groundwater out of the District, the Board will consider:

(a) the availability of water in the District and in the proposed receiving area during the period for which the water supply is requested (§36.122(f)(1)),

(b) the projected effect of the proposed transfer on aquifer conditions, and depletion, with special concern for the possibility of water table decline and effects on existing permit holders or exempt groundwater users within the District (36.122(f)(2))

(c) the approved pertinent Regional Water Plans and certified District Management Plan (36.122(f)(3)),

RULE 13.6 TRANSPORT FEE (§36.122(e)(1)(2)): The District may impose a reasonable fee or surcharge for a transport fee using one of the following methods:

(1) A fee negotiated between the district and the transporter,

(2) A rate not to exceed the amount authorized by Section 36.122(e) of the Texas Water Code.

RULE 13.7 PERMIT TO TRANSPORT GROUNDWATER OUT OF THE DISTRICT: If a permit is granted to an applicant, the permit may specify the following (§36.122):

(1) The amount of water that may be transferred out of the District; and the period for which the water may be transferred (§36.122 (h).

(2) A transport permit will be issued for an initial term of at least 3 years if construction of a conveyance system has not been initiated prior to the issuance of the permit (36.122(i)(l)); or at least 30 years if construction of a conveyance system has been initiated prior to the issuance of the permit (§36.122 (j)(2)).

(3) If during the initial term of a transport permit, construction of a conveyance system is begun, the transport permit will automatically be extended to the full 30-year term; provided, however, that the District may review the transport permit every five years and, if conditions warrant, reduce permitted production in accordance with the provisions of Rule 10.

(4) In its five-year review and renewal of a transport permit, the District shall consider relevant and current data for the conservation of groundwater resources and will consider the permit in the same manner it would consider a permit under Rules 8.3 through 8.7 and Rule 10. The District may reduce the amount of water authorized by the transport permit by 10% per year until decline in the water table in the affected area of the aquifer ceases.

(5) The District may not alter the terms of an export of groundwater if the purchase for that purpose was in effect on or before June 1, 1997 (36.122(m)).

RULE 13.8 MONITORING AND REPORTING:

(1) All permitted transportation facilities shall be equipped with flow monitoring devices approved by the District and shall be available at all reasonable times for inspection by District personnel,

(2) The operation of a permitted transportation facility shall be required to keep records and provide monthly production reports to the District, which show daily production rates.

RULE 14: INVESTIGATIONS AND ENFORCEMENT

RULE 14.1 NOTICE AND ACCESS TO PROPERTY: (§36.123) Board Members and District representatives and employees are entitled to access to all property within the District to carry out technical and other routine investigations (i.e. photographing, sampling, monitoring and testing) necessary to the implementation of the District Rules. Prior to entering upon the property for the purpose of conducting an investigation, the person seeking access will give notice in writing or in person or by telephone to the owner, operator, agent, or employee of the well owner, as determined by information contained in the application or other information on file with the District. Notice is not required if prior permission has been granted to enter without notice. Inhibiting or prohibiting access to any Board Member or District representative or employees who are attempting to conduct an investigation under District Rules constitutes a violation and subjects the person who is inhibiting or prohibiting access, as well as any other person who authorizes or allows such action, to the penalties set forth in §36.102.

RULE 14.2 INVESTIGATION OF POSSIBLE VIOLATION(S) (§36.123):

A. When the District's Board of Directors has been informed of a possible violation of a District Rule, the District Manager will notify the owner of the potential violation and request to meet with the owner to investigate the potential violation.

B. Investigations or inspections that require entrance upon property will be conducted at reasonable times, and will be consistent with the establishment's reasonable rules and regulations concerning safety, internal security, and fire protection. The persons conducting such investigations shall identify themselves and present credentials upon request of the owner.

C. Following the investigation, the District Manager shall report to the Board of Directors the findings of the investigation. If the Board determines that no violation has occurred, the District will notify the owner by letter of the Board's finding that no violation has occurred or that no determination can be made.

D. If the Board of Directors determines from the investigation that a violation has occurred, the District will notify the owner by certified mail that the owner is in violation and outline the action the owner shall take to come into compliance with District Rules.

E. When the owner notifies the District that compliance has been met, an investigation by the District Manager will be made and reported to the Board. The

Board shall determine if compliance has been met by the owner. If so, the District will notify the owner by letter that compliance with District Rules has been met. If not, the District may require further corrective measures or take enforcement action.

RULE 14.3 RULE ENFORCEMENT: If the Board determines that a landowner or well is not in compliance with District Rules, then the Board may choose from the following actions to ensure compliance:

A. Begin the enforcement hearing process under Rule 12.4 for permit revocation, involuntary amendment or suspension.

B. Enforce these rules by injunction, mandatory injunction or other appropriate remedy in a court of competent jurisdiction.

C. Assess any or all reasonable civil penalties for breach of any District Rule as authorized in §36.102 of the Texas Water Code. A penalty under this Rule is in addition to any other penalty provided by law of this state and may be enforced by complaints filed in the appropriate court of jurisdiction in the county in which the District's principal office or meeting place is located. If the District prevails in any suit to enforce its Rules, it may, in the same action, recover reasonable fees for attorneys, expert witnesses, and other cost incurred by the District before the court. The amount of the attorney's fee shall be fixed by the court.

D. After a notice and an enforcement hearing conducted according to the procedure required by Rule 15.4, order a non-compliant well to be sealed under District Rule 14.4A.

E. Continue to work with the owner until compliance is met and may mandate the monitoring of groundwater use by requiring the metering of the well or any other monitoring methods and provide regular production reports as determined by the Board.

F. Any combination of the above actions or other reasonable means as determined by the Board to ensure compliance.

RULE 14.4 SEALING, CAPPING AND PLUGGING WELLS:

A. SEALING OF WELLS: After notice and an enforcement hearing conducted according to the procedure required by Rule 12.4, the District may seal wells to ensure that a well is not operated in violation of the District Rules. A well may be sealed when:

(1) no permit has been obtained to drill a new water well that requires a permit under Rule 8;

(2) no application form has been filed for a permit to withdraw groundwater; or

(3) the Board has denied, cancelled or revoked a drilling permit or an operating permit.

The well may be sealed by physical means and tagged to indicate that the well has been sealed by the District. Other appropriate action may be taken as necessary to preclude operation of the well or to detect unauthorized operation of the well. Tampering with, altering, damaging, or removing the seal of a sealed well, or in any other way violating the integrity of the seal, or pumping of groundwater from a well that has been sealed constitutes a violation of these rules and subjects the person performing that action, as well as any well owner or primary operator who authorizes or allows that action, to such penalties as provided by the District Rules.

B. CAPPING WELLS: After notice and an enforcement hearing conducted according to the procedure required by Rule 12.4, the District may require a well to be capped to prevent waste, prevent pollution, or prevent further deterioration of a well casing. The well shall remain capped until such time as the conditions that led to the capping requirement are eliminated. If well pump equipment is removed from a well and the well will be re-equipped at a later date, the well shall be capped, provided however that the casing is not in a deteriorated condition that would permit commingling of water strata in which case the well shall be plugged. The cap shall be capable of sustaining a weight of at least four hundred (400) pounds.

C. PLUGGING WELLS: A deteriorated or abandoned or open and uncovered well shall be plugged in accordance with the Well Driller and Pump Installers Rules, 16 Texas Administrative Code Chapter 76. It is the responsibility of the owner to see that such a well is plugged to prevent pollution of the underground water and to prevent injury to persons.

D. PLUGGING REPORT: Not later than the 30th day after a well is plugged, the person plugging the well shall submit a plugging report to the District on a form provided by the District.+

RULE 15. HEARINGS

This Rule 15 sets forth circumstances and procedures for holding formal hearings on the specific topics stated. Nothing in this Rule 15 will preclude the District Board from including as a standard Board meeting agenda item an allotted time for public comment and said agenda item for public comment will not be considered a hearing as defined by this Rule 15.

RULE 15.1 RULE MAKING HEARING

A. Once the District has developed a proposal involving changes to District Rules or changes to the District Management Plan the District will decide at which Board meeting the proposal will be considered for action. The Board meeting at which the proposal is considered under this Rule will be considered the hearing on the proposal and fulfills the requirement, if any, for a hearing.

B. The Manger shall provide notice of all rulemaking hearings in accordance with the Open Meetings Act.

C. In addition to the notice required by the Open Meetings Act, not later than the 20th day before the date of the hearing, notice shall be provided as follows:

(1) Post notice in a place readily accessible to the public at the District office;

(2) Provide notice to the county clerks of McCulloch, Mason, San Saba, Menard, Concho and Kimble County;

(3) Publish notice in one or more newspapers of general circulation in each county in the District; and

(4) Provide notice by mail, facsimile, or electronic mail to any person who has requested notice under Rule 15.1.F. Failure to provide notice under this Rule 15.1.C(4) does not invalidate an action taken by the District at a hearing under Rule 15.1.

D. Notice of the hearing on the proposal required by Rule 12.1.C. will include:

(1) A statement that District's Board of Directors will consider proposed changes to the District's Rules or Management Plan, and a brief summary of the substance of those changes.

(2) The time, date, and location of the hearing.

(3) The agenda of the hearing.

(4) A statement that the proposal is available to be reviewed or copied at the District Office and on the District's website prior to the hearing.

(5) A statement that the District will accept written comments and give the deadline for submitting written comments.

(6) A statement that oral public comment will be taken at the hearing.

E. Copies of the proposal will be available during normal business hours at the District and posted on the District's website.

F. A person may submit to the District a written request for notice of hearings conducted under Rule 15.1. A request is effective for the remainder of the calendar year in which the request is received by the District.

G. Anyone interested in the proposal may submit written comments about the proposal to the District at least 5 business days prior to the scheduled hearing at which the proposal will be considered by the Board.

H. Anyone interested in the proposal may attend the hearing and make oral comments at the time designated for comments.

I. The District will make and keep in its files an audio recording of the hearing, written minutes of the hearing, and any written comments submitted at the hearing.

J. The Board will issue a written order or resolution reflecting its decision and the proposal that the Board approves will be an attachment to that written order or resolution.

K. The effective date of the written order will be the date on which the Chairman of the District signs the order or resolution. The order or resolution will include a statement that the proposal becomes effective and final on that date. Any appeal authorized by Texas Water Code Chapter 36, Subchapter H will run from that effective date.

L. If in the course of the deliberation during the hearing, the Board decides to substantially change the proposal, the Board will "continue" or postpone the matter until a future Board meeting. Prior to consideration of the substantially changed proposal, the District will provide a notice and opportunity for comment and hold a hearing on the substantially changed proposal. It is solely within the discretion of the Board what constitutes a substantial change to a proposal under this Rule.

RULE 15.2 ADOPTION OF EMERGENCY RULES

A. The District may adopt an emergency rule without following the notice and hearing provisions of Rule 15.1, if the Board:

(1) Finds that a substantial likelihood of imminent peril to the public health, safety, or welfare, or a requirement of state or federal law, requires adoption of a rule on less than 20 days' notice; and

(2) Prepares a written statement of the reasons for its finding under Rule 15.2.A(1).

B. An emergency rule under this Rule 15.2 must be adopted at a meeting of the Board subject to the requirements of the Open Meetings Act. Notice required by the Open Meetings Act shall be provided.

C. Except as provided by Rule 15.2.D., a rule adopted under this Rule may not be effective for longer than 90 days.

D. If notice of a hearing under Rule 15.1 is given before the emergency rule expires under Rule 15.2.C., the emergency rule is effective for an additional 90 days.

RULE 15.3 HEARINGS ON PERMITS AND PERMIT AMENDMENTS

A. In this Rule, "applicant" means a person who is applying for a permit or permit amendment, and "application" means the formal process for applying for a well permit or permit amendment. For this Rule "permit" shall mean a drilling and production permit or a permit for transport of water.

B. In accordance with Rule 5.4E, the Board may hold a hearing on one or more applications. The decision by the Board for a hearing will be made at the Board meeting in which the administratively complete application(s) is/are first brought before the Board for consideration. Any hearing will be held as part of a scheduled Board meeting at the regular Board meeting location unless the Board provides for the hearing to be held at a different location

C. Notice (Sec. 36.404)

(1) If the Board schedules a hearing on a permit or permit amendment, the District will give notice of the hearing as provided by this section.

(2) The notice must include:

(a) The name of the applicant;

(b) The address or approximate location of the well or proposed well;

(c) A brief explanation of the proposed permit or permit amendment, including any requested amount of groundwater, the purpose of the proposed use, and any change in use;

(d) The time, date, and location of the hearing;

(e) A statement that the District will accept written comments on the application and give the deadline for submitting written comments;

(f) A statement that oral public comment on the application will be taken at the hearing; and

(g) Any other information the Board considers relevant and appropriate.

(3) Not later than the 10th day before the date of a hearing, the District will:

(a) Post notice in a place readily accessible to the public at the District office;

(b) Provide notice to the county clerk; and

(c) Provide notice by:

(1) Regular mail to the applicant;

(2) Regular mail, facsimile, or electronic mail to any person who has requested notice under Subsection (4);

(3) Regular mail to any other person entitled to receive notice under District Rules; and

(4) Other notification deemed appropriate by the Board.

(4) A person may request notice from the District of a hearing on a permit or a permit amendment application. The request must be in writing and is effective for the remainder of the calendar year in which the request is received by the District. To receive notice of hearing in a later year, a person must submit a new request. An affidavit of an officer or employee of the District establishing attempted service by first class mail, facsimile, or e-mail to the person in accordance with the information provided by the person is proof that notice was provided by the District.

(5) Failure to provide notice under Subsection (3)(c)(ii) does not invalidate an action taken by the District at the hearing.

D. Hearing Registration (36.405)

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

(1) The person's name;

(2) The person's address; and

(3) Whom the person represents, if the person is not there in the person's individual capacity,

E. Hearing Procedures (36.406)

(1) The hearing must be conducted by a quorum of the Board, or the Board, at its sole discretion, may appoint a hearing Examiner to preside at and conduct the hearing on the permit or permit amendment. The appointment of a hearing Examiner shall be made in writing. If the hearing is conducted by a quorum of the Board, the President will preside. If the President is not present, the Board will select one of the Directors present to preside. Notice of all hearings conducted by a quorum of the Board will be made in accordance with the Open Meetings Act.

(2) The presiding officer may:

(a) Convene the hearing at the time and place specified in the notice;

(b) Set any necessary additional hearing dates;

(c) Designate the parties regarding a contested application;

(d) Establish the order for presentation of evidence;

(e) Administer oaths to all persons presenting testimony;

(f) Examine persons presenting testimony;

(g) Ensure that information and testimony are introduced as conveniently and expeditiously as possible without prejudicing the rights of any party.

(h) Allow testimony to be submitted in writing and may require that written testimony be sworn to. On the motion of a party to the hearing, the presiding officer may exclude written testimony if the person who submits the testimony is not available for cross-examination by telephone, a deposition before the hearing, or other reasonable means;

(i) Continue a hearing from time to time and from place to place without providing notice under Rule 15.3.C. If the continuance is not announced on the record at the hearing, the presiding officer must provide notice of the continued hearing by regular mail to the parties.(36.409)

(j) If the Board has not acted on the application, the presiding officer may allow a person who testifies at the hearing to supplement the testimony given at the hearting by filing additional written materials with the presiding officer not later than the 10th day after the date of the hearing. A person who files additional written material with the presiding officer under this subsection must also provide the material at the same time to any person who provided comment at the hearing and to any party to a contested hearing. A persons who receives additional written material under this subsection may file a response to the material with the presiding officer not later than the 10th day after the date the additional material was received.(36.408(g))

F. Evidence. (36.407)

The presiding officer shall:

(1) Admit relevant evidence; and

(2) Prescribe reasonable time limits for testimony and the presentation of evidence;

G. Recording. (36.408)

The presiding officer shall prepare and keep a record of each hearing in the form of meeting minutes except in a contested hearing an audio recording shall also be made. On the request of a party to a contested hearing, the hearing shall be transcribed by a court reporter. The costs of such court reporter may be assessed against the party requesting it or among the parties to the hearing. The presiding officer may exclude a party from further participation in the hearing for failure to pay or have paid by others in a timely manner costs assessed against that party under this Rule 15.3.G.

H. Report. (36.410)

If the Board has appointed a hearing examiner to be the presiding officer at the hearing, the hearing examiner shall submit a report to the Board not later than the 30th day after the date the hearing is concluded. The report must include:

(1) A summary of the subject matter of the hearing;

(2) A summary of the evidence received; and

(3) The presiding officer's recommendations for Board action on the subject matter of the hearing.

A copy of the report shall be provided to the applicant and to each party who provided comments or to each designated party. The applicant and other parties who receive the report may submit to the Board written exceptions to the report within 10 days of issuance of the report.

I. Board Action. (36.411)

The Board shall act on a permit or permit amendment application within 60 days after the final hearing on the application is concluded.

J. Request for Rehearing or Findings and Conclusions. (36.412)

(1) Not later than the 20th day after the date of the Board's decision, an applicant, or a party to a contested hearing, may administratively appeal a decision of the Board on an application by requesting written findings and conclusions or a rehearing before the Board.

(2) On receipt of a timely written request, the Board will make written findings and conclusions regarding a decision of the Board on permit or permit amendment. The Board will provide certified copies of the findings and conclusions to the person who requested them, and to each designated party, not later than the 35th day after the date the Board receives the request. The applicant or a party to a contested hearing, may request a rehearing before the Board not later than the 20th day after the date the Board issues the findings and conclusions.

(3) A request for rehearing must be filed in the District office and must state the grounds for the request. The person requesting a rehearing must provide copies of the request to all parties to the hearing.

(4) If the Board grants a request for rehearing, the Board will schedule the rehearing not later than the 45th day after the date the request is granted.

(5) The failure of the Board to grant or deny a request for rehearing before the 91st day after the date the request is submitted is a denial of the request.

K. Decision; When Final. (36.413)

(1) A decision by the Board on permit or permit amendment is final if:

(a) A request for rehearing is not filed on time, on the expiration of the period for filing a request for rehearing; or

(b) A request for rehearing is filed on time, on the date:

(i) the Board denies the request for rehearing; or

(ii) the Board renders a written decision after rehearing.

(2) An applicant or a party to a contested hearing may file a suit against the District under Texas Water Code § 36.251 to appeal a decision on permit or permit amendment not later than the 60th day after the date on which the decision becomes final. A timely filed request for rehearing is a prerequisite to any such suit.

RULE 15.4 HEARINGS ON ENFORCEMENT ACTIONS

A. Once the District has determined that a person may have violated any rule under the District's jurisdiction and that the Board is considering taking some action against the person, the District will decide at which Board meeting the enforcement action will be considered. The Board meeting at which the enforcement action is considered under this Rule will be considered the enforcement hearing on the matter and fulfills the requirement.

B. The Manger shall post notice in accordance with the Open Meetings Act.

C. Notice of the enforcement hearing will be mailed to the respondent by certified mail, return receipt requested, at least ten days prior to the scheduled hearing date. This notice serves as the notice of violation.

D. Anyone attending the enforcement hearing may make oral comments at the time designated for comments.

E. The Board, at its sole discretion, may administer an oath to the staff, the respondent, and anyone who makes oral comments on the enforcement action.

F. The Board, at its sole discretion, may appoint a Hearings Officer or committee of the Board to conduct the enforcement hearing (Hearing Body). Any hearing conducted by a Hearing Body, will be conducted in the same manner as provided in this Rule 15.4. At the close of the enforcement hearing, the Presiding Officer of the Hearing Body will make a written recommendation to the Board. The recommendation will become part of the record. The Board is not required to approve the recommendation of the Hearing Body.

G. The Board will issue a written order reflecting its decision and actions. Actions may include the sealing of the well(s), cancellation of permit(s), civil penalties or injunctions.

H. The effective date of the written order will be the date on which the President of the District signs the order or resolution. The order or resolution will include a statement that the order or resolution becomes effective and final on that date. Any appeal authorized by Texas Water Code Chapter 36, Subchapter H will run from that effective date.

REPEAL OF PRIOR REGULATIONS

All previous rules and regulations of the District have been revised and amended; and except as they are herein republished, they are repealed. Any previous rule or regulation which conflicts with, or is contrary to, these rules is hereby repealed.

SAVINGS CLAUSE

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

APPENDIX D

GAM Run 23-019, TWDB, August 16, 2023

GAM Run 23-019: Hickory Underground Water Conservation District No. 1 Groundwater Management Plan

Micaela Pedrazas, GIT and Shirley Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
512-463-3075
August 16, 2023

Shirley C. Wade
8/16/2023

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Micaela Pedrazas, GIT and Shirley Wade, Ph.D., P.G.
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512-463-3075
August 16, 2023

EXECUTIVE SUMMARY:

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

The TWDB provides data and information to the Hickory Underground Water Conservation District No. 1 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. Part 2 is the required groundwater availability modeling information, which includes:

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

The groundwater management plan for the Hickory Underground Water Conservation District No. 1 should be adopted by the district on or before October 31, 2023 and submitted to the executive administrator of the TWDB on or before November 30, 2023. The current management plan for the Hickory Underground Water Conservation District No. 1 expires on January 29, 2024.

The management plan information for the aquifers within Hickory Underground Water Conservation District No. 1 was extracted from two groundwater availability models. We used the groundwater availability model for the Minor Aquifers of the Llano Uplift (Shi and others, 2016) to estimate management plan information for the Hickory, Ellenburger-San Saba, and Marble Falls aquifers. We used the groundwater availability model for the Edwards-Trinity (Plateau) and Pecos Valley aquifers (Anaya and Jones, 2009) to estimate management plan information for the Edwards-Trinity (Plateau) Aquifer.

While a small portion of the Cross Timbers Aquifer exists in the northern portion of the district, there is currently no groundwater availability model for Cross Timbers Aquifer. For more information concerning this aquifer, please contact Mr. Stephen Allen at 512-463-7317 or stephen.allen@twdb.texas.gov.

This report replaces the results of GAM Run 18-007 (Anaya, 2018). Values may differ from the previous report as a result of routine updates to the spatial grid file used to define county, groundwater conservation district, and aquifer boundaries, which can impact the calculated water budget values. Additionally, the approach used for analyzing model results is reviewed during each update and may have been refined to better delineate groundwater flows. Tables 1, 2, 3, and 4 summarize the groundwater availability model data required by statute. Figures 1, 3, 5, and 7 show the area of the model from which the values in Tables 1, 2, 3, and 4 were extracted. Figures 2, 4, 6, and 8 provide a generalized diagram of the groundwater flow components provided in Tables 1, 2, 3, and 4. If the Hickory Underground Water Conservation District No. 1 determines that the district boundaries used in the assessment do not reflect current conditions after reviewing the figures, please notify the TWDB Groundwater Modeling Department at your earliest convenience.

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

METHODS:

In accordance with the provisions of the Texas Water Code § 36.1071 (h), the groundwater availability models mentioned above were used to estimate information for the Hickory Underground Water Conservation District No. 1 management plan. Water budgets were extracted for the historical calibration period for the Hickory, Ellenburger-San Saba, and Marble Falls aquifers (1980 through 2010) using ZONEBUDGET for MODFLOW USG Version 1.0 (Panday and others, 2013). Water budgets were extracted for the historical calibration period for the Edwards-Trinity (Plateau) Aquifer (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:

Hickory, Ellenburger-San Saba, and Marble Falls aquifers

- We used version 1.01 of the groundwater availability model for the Minor Aquifers of the Llano Uplift to analyze the Hickory, Ellenburger-San Saba, and Marble Falls aquifers. See Shi and others (2016) for assumptions and limitations of the model.
- The groundwater availability model for the Minor Aquifers of the Llano Uplift contains eight active layers:
    - Layer 1 represents the Trinity Aquifer, Edwards-Trinity (Plateau) Aquifer, and younger alluvium deposits
    - Layer 2 represents Permian and Pennsylvanian age confining units
    - Layer 3 represents the Marble Falls Aquifer and equivalent units
    - Layer 4 represents Mississippian age confining units
    - Layer 5 represents the Ellenburger-San Saba Aquifer and equivalent units
    - Layer 6 represents Cambrian age confining units
    - Layer 7 represents the Hickory Aquifer and equivalent units
    - Layer 8 represents Precambrian age confining units
- Perennial rivers and reservoirs were simulated using the MODFLOW-USG river package. Springs were simulated using the MODFLOW-USG drain package. For this

management plan, groundwater discharge to surface water includes groundwater leakage to the river and drain boundaries.

- Individual water budgets for the district were determined for the Marble Falls Aquifer (Layer 3), Ellenburger-San Saba Aquifer (Layer 5), and the Hickory Aquifer (Layer 7).

- The model was run with MODFLOW-USG (Panday and others, 2013).

Edwards-Trinity (Plateau) Aquifer

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

- The Pecos Valley Aquifer does not occur within Hickory Underground Conservation Water District No. 1 and therefore no groundwater budget values are included for it in this report.

- The groundwater availability model for the Edwards-Trinity (Plateau) and Pecos Valley aquifers contains two active layers:

    - Layer 1 represents the Edwards Group and equivalent limestone hydrostratigraphic units of the Edwards-Trinity (Plateau) Aquifer

    - Layer 2 represents the Trinity Group hydrostratigraphic units or equivalent units of the Edwards-Trinity (Plateau) and Trinity aquifers

- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

- The water budget for the district was determined for the Edwards-Trinity (Plateau) Aquifer (Layers 1 and 2, collectively).

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability model results for the Hickory, Ellenburger-San Saba, Marble Falls, and Edwards-Trinity (Plateau) aquifers located within Hickory Underground Water Conservation District No. 1 and averaged over the historical calibration period, as shown in Tables 1, 2, 3, and 4.

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.

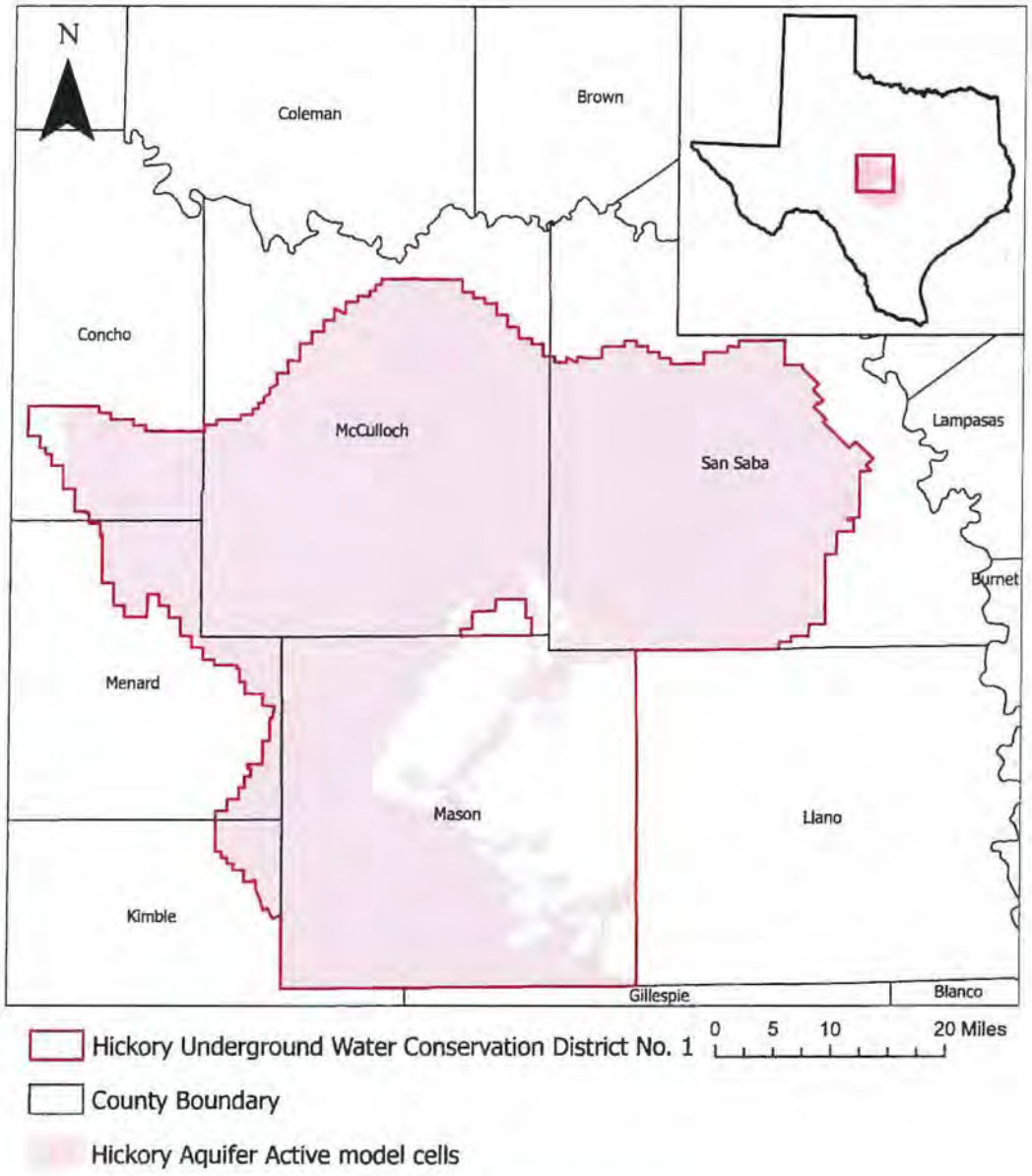
3. Flow into and out of district—the lateral flow within the aquifer between the district and adjacent counties.

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, 2, 3, and 4. Figures 1, 3, 5, and 7 show the area of the model from which the values in Tables 1, 2, 3, and 4 were extracted. Figures 2, 4, 6, and 8 provide a generalized diagram of the groundwater flow components provided in Tables 1, 2, 3, and 4. 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.

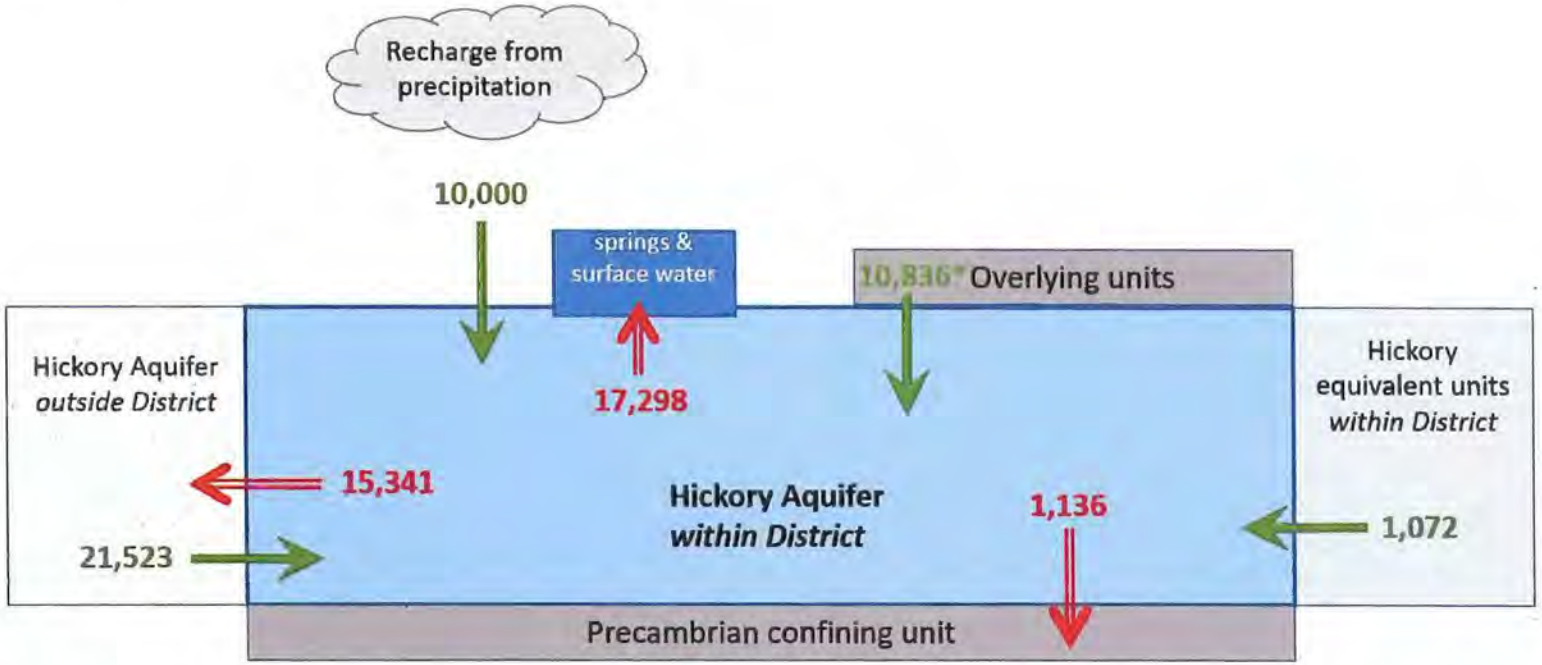
Table 1: Summarized information for the Hickory Aquifer for the Hickory Underground Water Conservation District No. 1 groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Hickory Aquifer	10,000
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Hickory Aquifer	17,298
Estimated annual volume of flow into the district within each aquifer in the district	Hickory Aquifer	21,523
Estimated annual volume of flow out of the district within each aquifer in the district	Hickory Aquifer	15,341
Estimated net annual volume of flow between each aquifer in the district	To Hickory Aquifer from Edwards-Trinity (Plateau) Aquifer	31
	To Hickory Aquifer from Quaternary alluvium	12
	To Hickory Aquifer from Permian/Pennsylvanian confining units	122
	To Hickory Aquifer from Marble Falls equivalent units	3
	To Hickory Aquifer from Mississippian confining unit	164
	From Hickory Aquifer to Ellenburger-San Saba Aquifer	3,318
	From Hickory Aquifer to Ellenburger-San Saba equivalent units	306
	To Hickory Aquifer from Cambrian confining unit	14,128
	To Hickory Aquifer from Hickory equivalent units	1,072
	From Hickory Aquifer to Precambrian confining unit	1,136



county boundary date: 07.03.2019, gcd boundary date: 06.26.2020, lnup grid date: 01.06.2020

Figure 1: Area of the groundwater availability model for the Minor Aquifers of the Llano Uplift from which the information in Table 1 was extracted (the Hickory Aquifer extent within the district boundary).



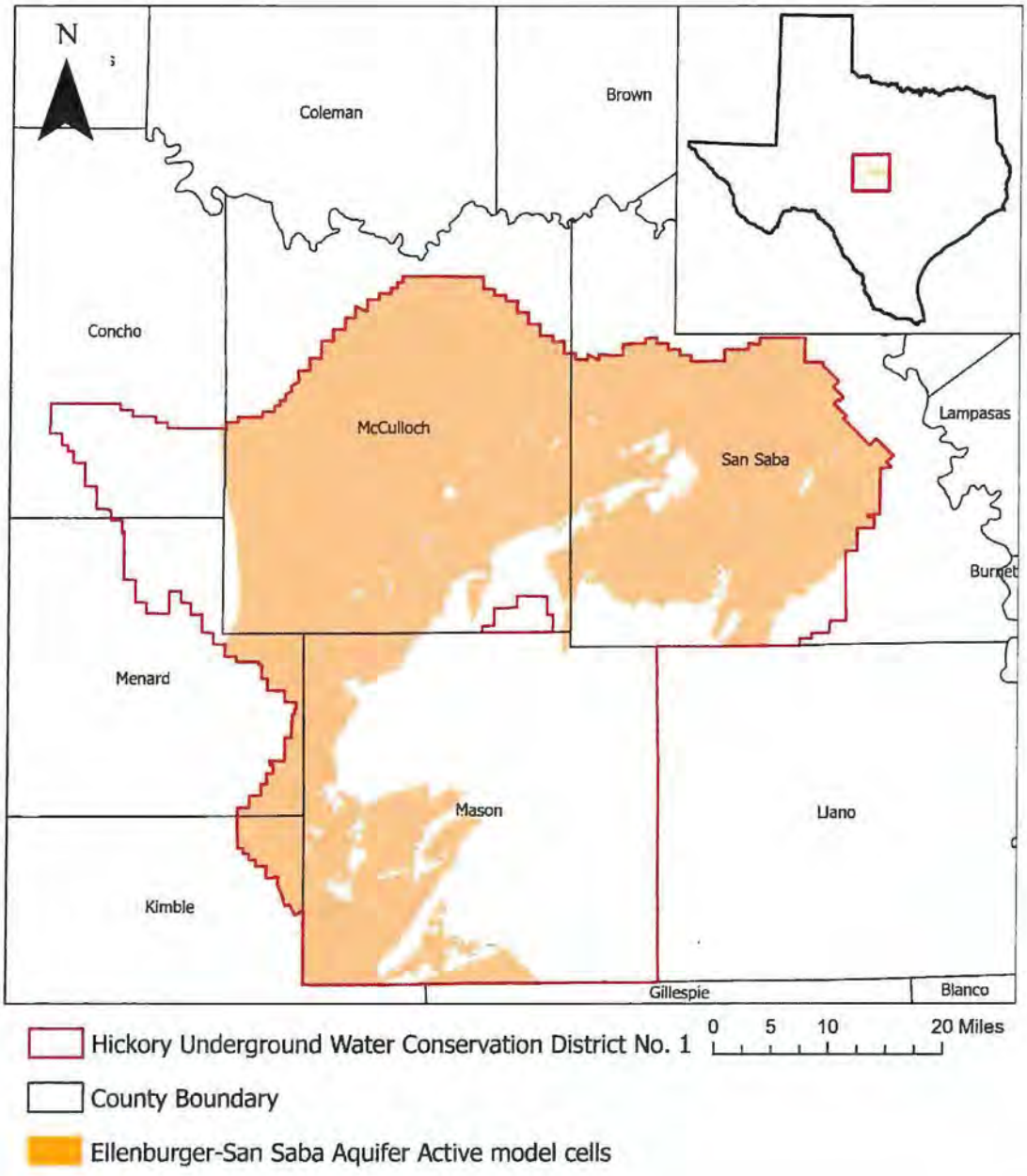
*Flow from Overlying units within district includes net flow of 31 acre-feet per year from Edwards-Trinity (Plateau) Aquifer, 12 acre-feet per year from Quaternary alluvium, 122 acre-feet per year from Permian and Pennsylvanian confining unit, 3 acre-feet per year from Marble Falls equivalent units, 164 acre-feet per year from Mississippian confining unit, 3,318 acre-feet per year to Ellenburger-San Saba Aquifer, 306 acre-feet per year to Ellenburger-San Saba equivalent units, and 14,128 acre-feet per year from Cambrian confining unit.

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

Figure 2: Generalized diagram of the summarized budget information from Table 1, representing directions of flow for the Hickory Aquifer within the Hickory Underground Water Conservation District No. 1. Flow values are expressed in acre-feet per year.

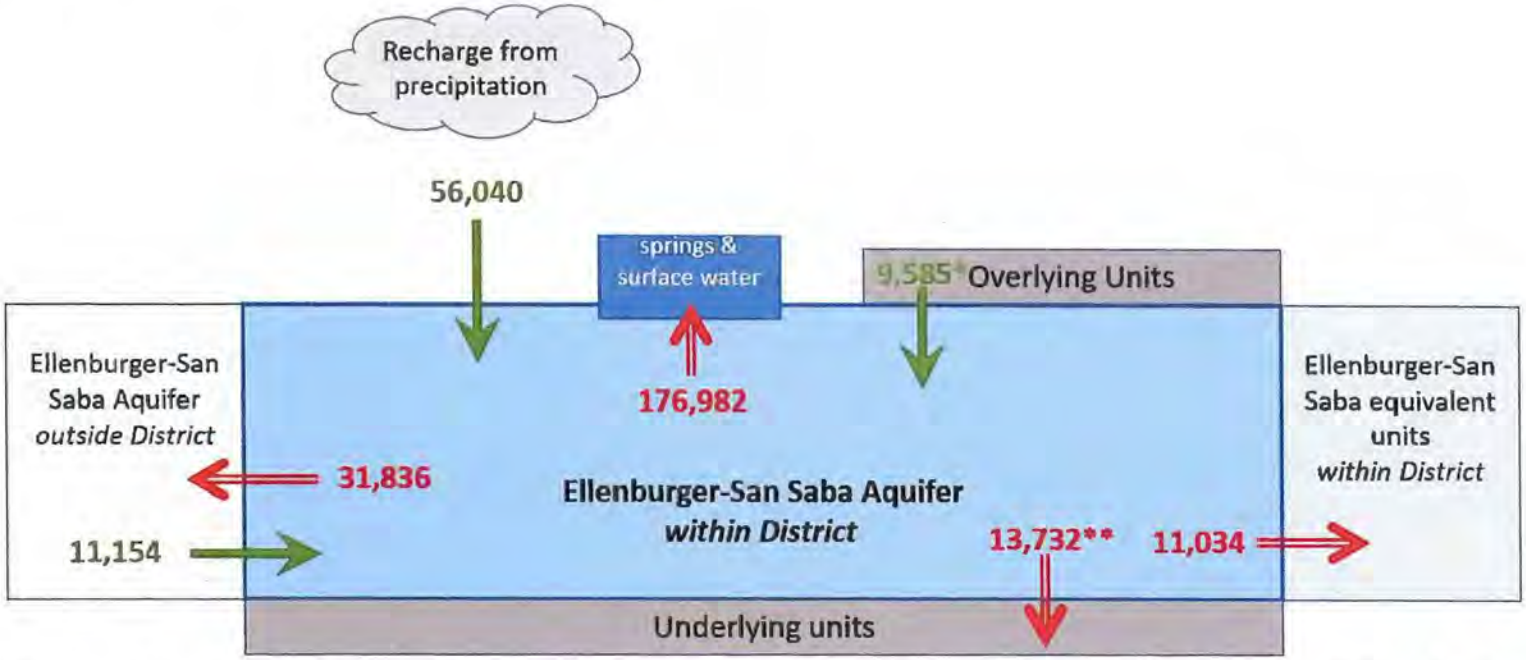
Table 2: Summarized information for the Ellenburger-San Saba Aquifer for the Hickory Underground Water Conservation District No. 1 groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Ellenburger-San Saba Aquifer	56,040
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Ellenburger-San Saba Aquifer	176,982
Estimated annual volume of flow into the district within each aquifer in the district	Ellenburger-San Saba Aquifer	11,154
Estimated annual volume of flow out of the district within each aquifer in the district	Ellenburger-San Saba Aquifer	31,836
Estimated net annual volume of flow between each aquifer in the district	To Ellenburger-San Saba Aquifer from Edwards-Trinity (Plateau) Aquifer	394
	To Ellenburger-San Saba Aquifer from Quaternary alluvium	75
	To Ellenburger-San Saba Aquifer from Permian/Pennsylvanian confining unit	420
	To Ellenburger-San Saba Aquifer from Marble Falls Aquifer	1,843
	To Ellenburger-San Saba Aquifer from Marble Falls equivalent units	3,164
	To Ellenburger-San Saba Aquifer from Mississippian confining unit	3,689
	From Ellenburger-San Saba Aquifer to Ellenburger-San Saba equivalent units	11,034
	From Ellenburger-San Saba Aquifer to Cambrian confining unit	17,243
	To Ellenburger-San Saba Aquifer from Hickory Aquifer	3,318
	From Ellenburger-San Saba Aquifer to Hickory equivalent units	136
	To Ellenburger-San Saba Aquifer from Precambrian confining unit	329



county boundary date: 07.03.2019, gcd boundary date: 06.26.2020, lnup grid date: 01.06.2020

Figure 3: Area of the groundwater availability model for the Minor Aquifers of the Llano Uplift from which the information in Table 2 was extracted (the Ellenburger-San Saba Aquifer extent within the district boundary).



*Flow from Overlying units within district includes net flow of 75 acre-feet per year from Quaternary alluvium, 394 acre-feet per year from Edwards-Trinity (Plateau) Aquifer, 420 acre-feet per year from Permian and Pennsylvanian confining unit, 1,843 acre-feet per year from Marble Falls Aquifer, 3,164 acre-feet per year from Marble Falls equivalent units, and 3,689 acre-feet per year from Mississippian confining unit.

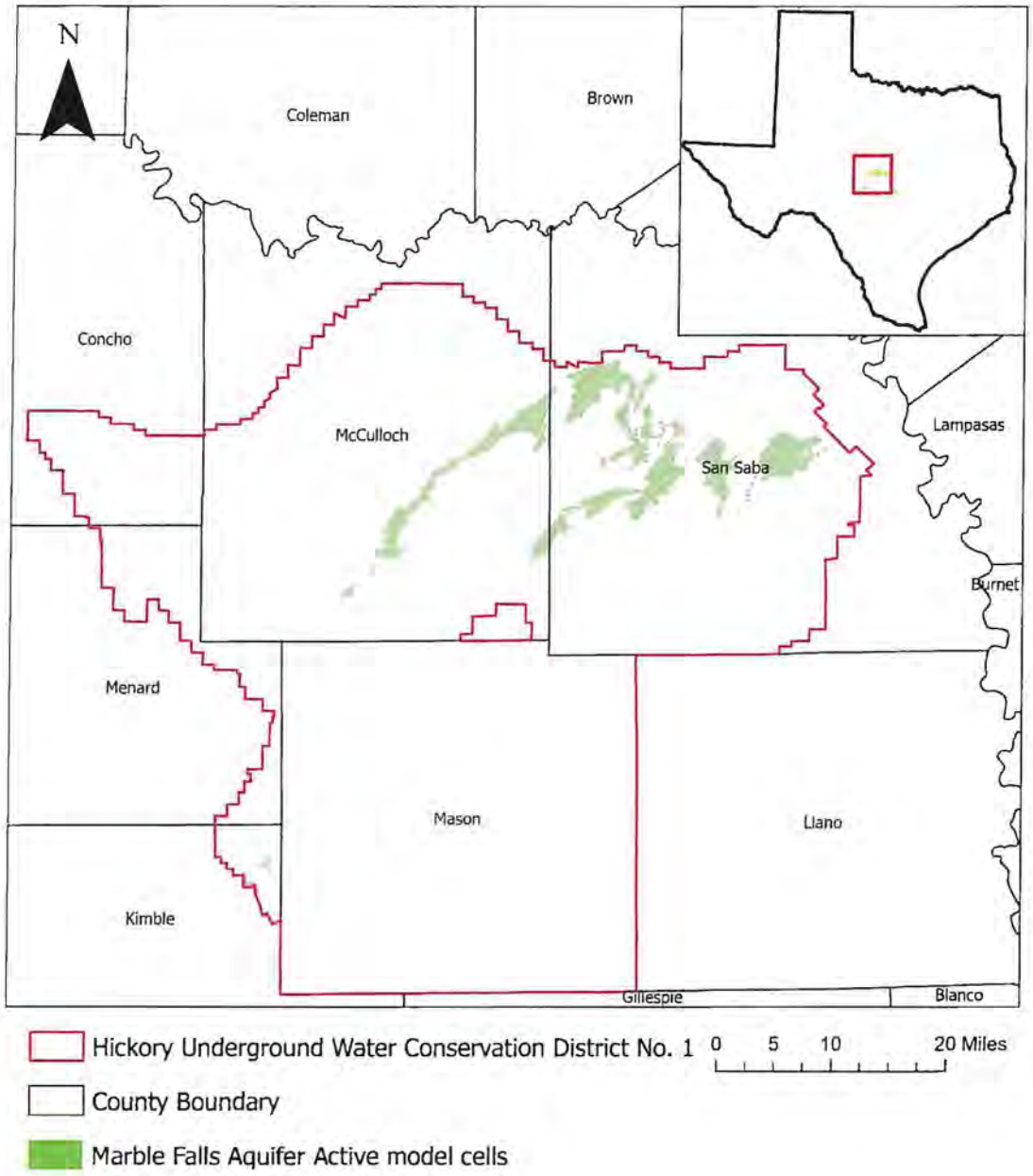
**Flow to Underlying units within district includes net flow of 17,243 acre-feet per year to Cambrian confining unit, 136 acre-feet per year to Hickory equivalent units, 3,318 acre-feet per year from Hickory Aquifer, 329 acre-feet per year from Precambrian confining unit.

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

Figure 4: Generalized diagram of the summarized budget information from Table 2, representing directions of flow for Ellenburger-San Saba Aquifer within Hickory Underground Water Conservation District No. 1. Flow values are expressed in acre-feet per year.

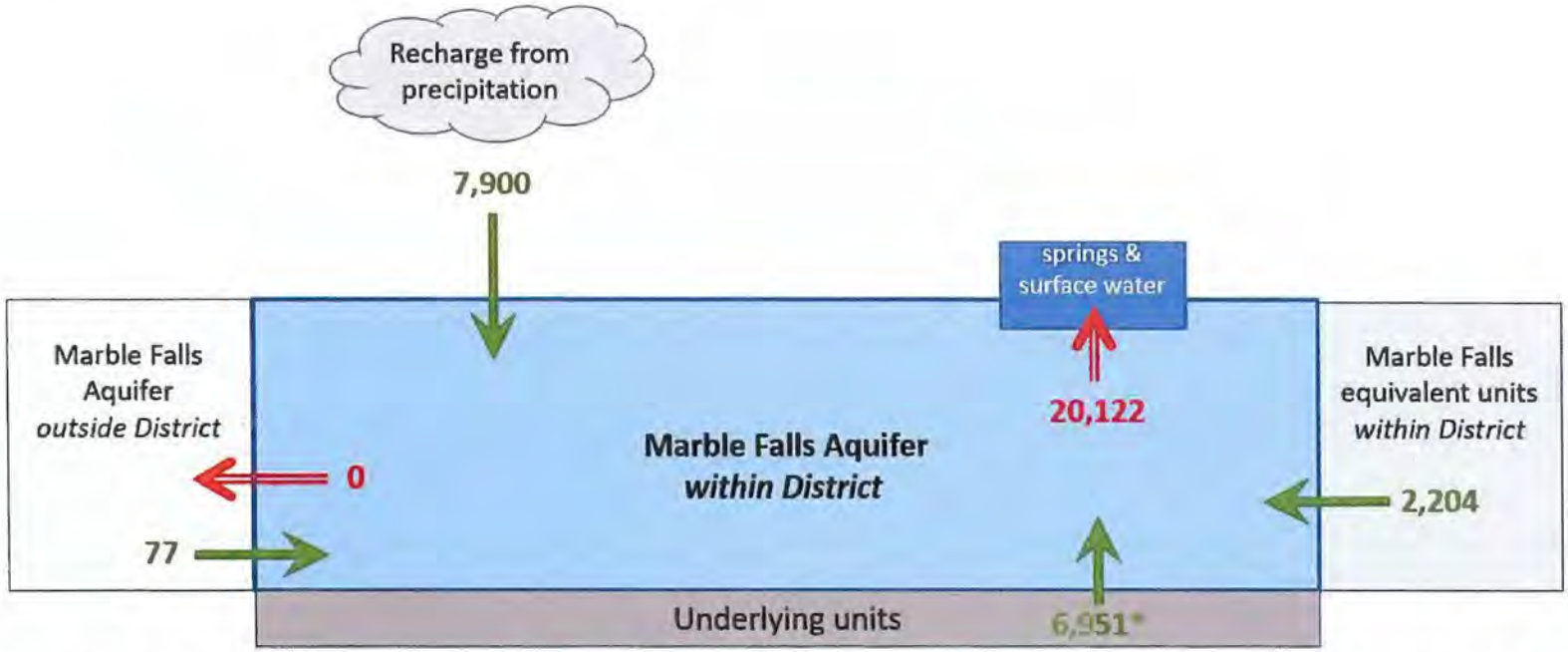
Table 3: Summarized information for the Marble Falls Aquifer for the Hickory Underground Water Conservation District No. 1 groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Marble Falls Aquifer	7,900
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Marble Falls Aquifer	20,122
Estimated annual volume of flow into the district within each aquifer in the district	Marble Falls Aquifer	77
Estimated annual volume of flow out of the district within each aquifer in the district	Marble Falls Aquifer	0
Estimated net annual volume of flow between each aquifer in the district	To Marble Falls Aquifer from Marble Falls equivalent units	2,204
	To Marble Falls Aquifer from Mississippian confining unit	3,600
	From Marble Falls Aquifer to Ellenburger-San Saba Aquifer	1,843
	To Marble Falls Aquifer from Ellenburger-San Saba equivalent units	5,190
	To Marble Falls Aquifer from Cambrian confining unit	4



county boundary date: 07.03.2019, gcd boundary date: 06.26.2020, lnup grid date: 01.06.2020

Figure 5: Area of the groundwater availability model for the Minor Aquifers of the Llano Uplift from which the information in Table 3 was extracted (the Marble Falls Aquifer extent within the district boundary).



* Flow from Underlying units within district includes net flow of 3,600 acre-feet per year from Mississippian confining unit, 5,190 acre-feet per year from Ellenburger San-Saba equivalent units, 4 acre-feet per year from Cambrian confining unit, and 1,843 acre-feet per year to Ellenburger-San Saba Aquifer.

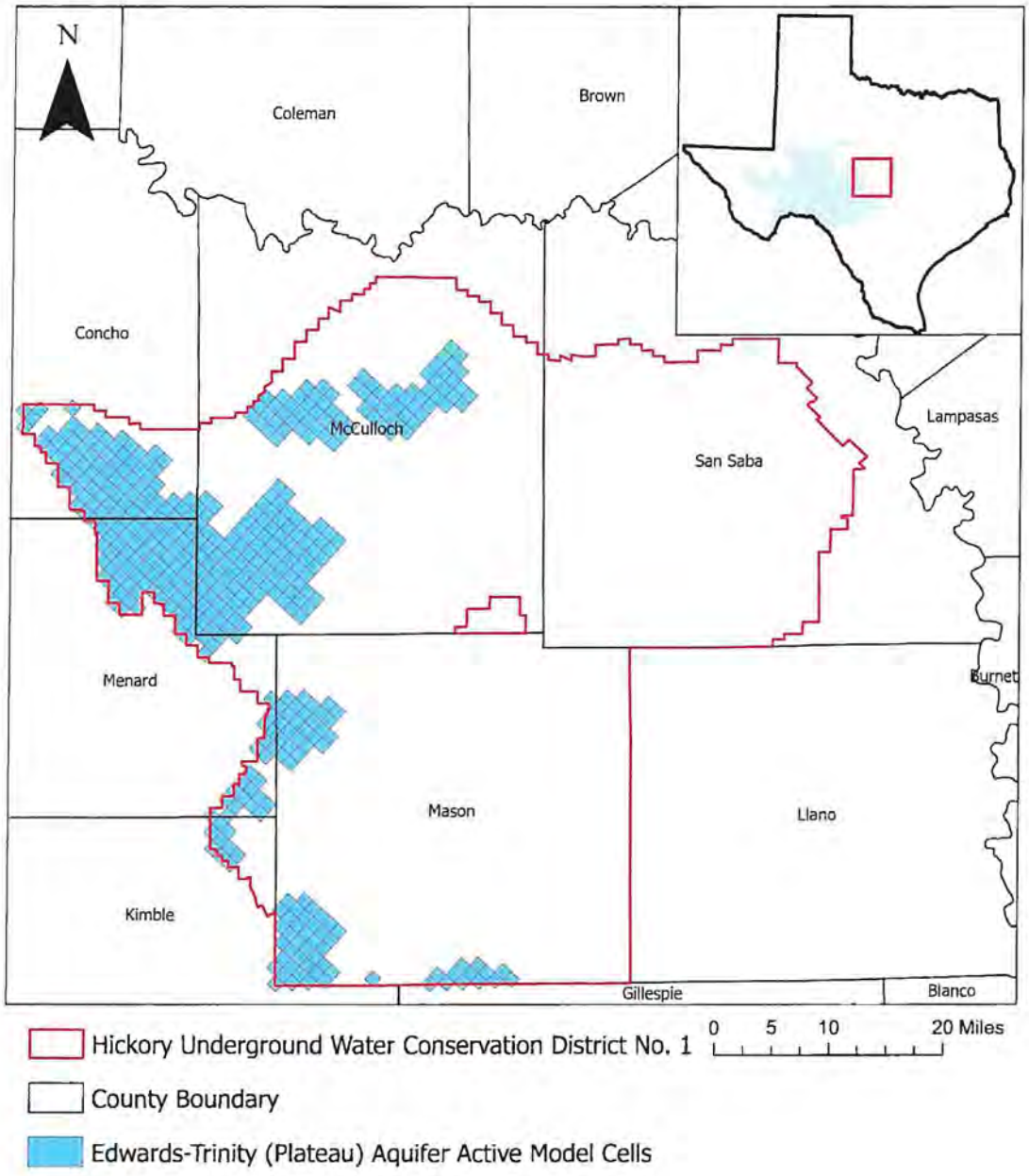
Caveat: This diagram only includes the water budget items provided in Table 3. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.

Figure 6: Generalized diagram of the summarized budget information from Table 3, representing directions of flow for the Marble Falls Aquifer within the Hickory Underground Water Conservation District No. 1. Flow values are expressed in acre-feet per year.

Table 4: Summarized information for the Edwards-Trinity (Plateau) Aquifer for the Hickory Underground Water Conservation District No. 1 groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.

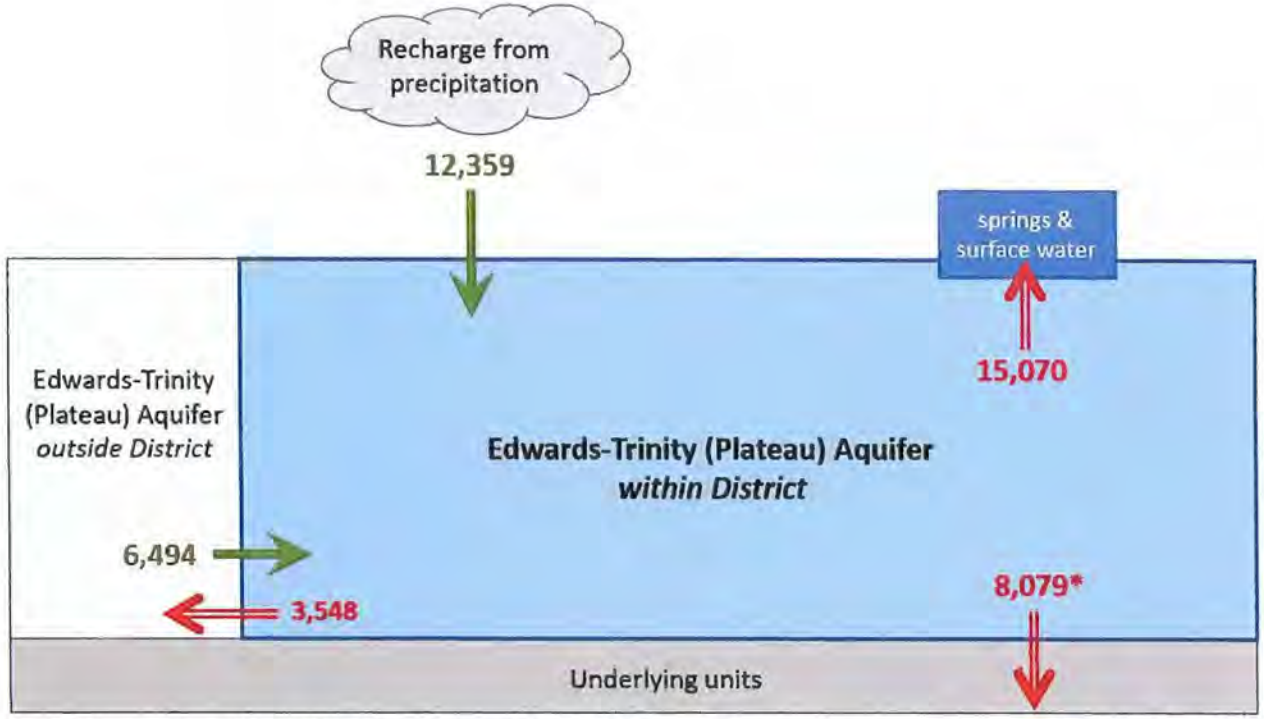
Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Edwards-Trinity (Plateau) Aquifer	12,359
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Edwards-Trinity (Plateau) Aquifer	15,070
Estimated annual volume of flow into the district within each aquifer in the district	Edwards-Trinity (Plateau) Aquifer	6,494
Estimated annual volume of flow out of the district within each aquifer in the district	Edwards-Trinity (Plateau) Aquifer	3,548
Estimated net annual volume of flow between each aquifer in the district	From Edwards-Trinity (Plateau) Aquifer to Quaternary alluvium*	881
	From Edwards-Trinity (Plateau) Aquifer to Permian/Pennsylvanian confining unit*	6,061
	From Edwards-Trinity (Plateau) Aquifer to Marble Falls equivalent units*	545
	From Edwards-Trinity (Plateau) Aquifer to Mississippian confining unit*	50
	From Edwards-Trinity (Plateau) Aquifer to Ellenburger-San Saba Aquifer*	394
	To Edwards-Trinity (Plateau) Aquifer from Ellenburger-San Saba equivalent units*	29
	From Edwards-Trinity (Plateau) Aquifer to Cambrian confining unit*	140
	From Edwards-Trinity (Plateau) Aquifer to Hickory Aquifer*	31
	From Edwards-Trinity (Plateau) Aquifer to Hickory equivalent units*	5
	From Edwards-Trinity (Plateau) Aquifer to Precambrian confining unit*	1

**Budget value comes from the groundwater availability model for the Minor Aquifers of the Llano Uplift (Shi and others, 2016).*



county boundary date: 07.03.2019, gcd boundary date: 06.26.2020, eddt_p grid date: 01.06.2020

Figure 7: Area of the groundwater availability model for the Edwards-Trinity (Plateau) and Pecos Valley aquifers from which the information in Table 4 was extracted (the Edwards-Trinity [Plateau] Aquifer extent within the district boundary).



* Flow to Underlying units within district includes net flow of 881 acre-feet per year to Quaternary alluvium, 6,061 acre-feet per year to Permian and Pennsylvanian confining unit, 545 acre-feet per year to Marble Falls equivalent units, 50 acre-feet per year to Mississippian confining unit, 394 acre-feet per year to Ellenburger-San Saba Aquifer, 29 acre-feet per year from Ellenburger San-Saba equivalent units, 140 acre-feet per year to Cambrian confining unit, 31 acre-feet per year to Hickory Aquifer, 5 acre-feet per year to Hickory equivalent units and 1 acre-feet per year to Precambrian confining unit.

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

Figure 8: Generalized diagram of the summarized budget information from Table 4, representing directions of flow for the Edwards-Trinity (Plateau) Aquifer within the Hickory Underground Water Conservation District No. 1. Flow values are expressed in acre-feet per year.

LIMITATIONS:

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

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

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

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

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

REFERENCES:

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., www.twdb.texas.gov/groundwater/models/gam/eddt_p/ET-Plateau_Full.pdf.

Anaya, R., 2018, GAM Run 18-007: Texas Water Development Board, GAM Run 18-007 Report, 16 p., www.twdb.texas.gov/groundwater/docs/GAMruns/GR18-007.pdf

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., water.usgs.gov/software/MODFLOW-96/.

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., water.usgs.gov/nrp/gwsoftware/zonebud3/zonebudget3.html.

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., www.nap.edu/catalog/11972/models-in-environmental-regulatory-decision-making.

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., pubs.usgs.gov/tm/06/a45/.

Shi, J., Boghici, R., Kohlrenken, W., and Hutchison, W.R., 2016, Numerical Model Report: Minor Aquifers of the Llano Uplift Region of Texas (Marble Falls, Ellenburger-San Saba, and Hickory). Texas Water Development Board Report, 435 p., www.twdb.texas.gov/groundwater/models/gam/llano/Llano_Uplift_Numerical_Model_Report_Final.pdf.

Texas Water Code § 36.1071

APPENDIX E –

Resolutions Adopting and Amending the Management Plan

HICKORY UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

P.O. Box 1214 ● 111 East Main Street
Brady, Texas 76825
Phone (325) 597-2785
hickoryuwcd@yahoo.com http://www.hickoryuwcd.org

May 9, 2024

Bryan McMath
Interim Executive Administrator
Texas Water Development Board
PO Box 13231
Austin, TX 78711-3231

On May 9, 2024, the Hickory UWCD convened a public hearing alongside its regular board meeting to hear public comment. The Board examined and deliberated on the recently amended Management Plan which incorporated revisions proposed by the TWDB during their evaluation. Adhering to legal requirements, notice of the public hearing was duly disseminated, and the plan, along with its appendices, was accessible on our website for public scrutiny.

At this meeting, the board voted to officially adopt the plan. A signed resolution affirming this decision has been included as an appendix to the plan.

Thank you,

Amy Greer
Board President

RESOLUTION OF THE BOARD OF DIRECTORS OF THE HICKORY UNDERGROUND WATER CONSERVATION DISTRICT NO. 1 ADOPTING DISTRICT MANAGEMENT PLAN

STATE OF TEXAS §
COUNTY OF MCCULLOCH §

On this the 09th day of May 2024, the Board of Directors of Hickory Underground Water Conservation District No. 1 consisting of the following directors:

Amy Greer, President
Gay Nesloney, Secretary
Shawn Oliver, Director
Bill Sloan, Vice President
Steve Magill, Director

convened in public hearing and regular session open to the public with all the directors present except the following:

Shawn Oliver

constituting a quorum, and among other proceedings had by said Board of Directors was the following:

WHEREAS, the Hickory UWCD #1 (District) is a duly created and existing groundwater conservation district created and operating under State Statutes and Chapter 36, as amended;

WHEREAS, the Management Plan of the District attached hereto as Attachment A, has been developed for the purpose of conserving, preserving, protecting, and recharging the aquifers in the District, and this action is taken under the District's statutory authority to prevent waste and protect the rights of owners of interest in groundwater;

WHEREAS, after notice and hearing the Board of Directors (Board) of the District revised and readopted a Management Plan on **May 9, 2024**; and

WHEREAS modifications made to the readopted Management Plan as required and suggested by the Texas Water Development Board have been incorporated in the Plan;

WHEREAS the Management Plan meets the requirements of Texas Water Code §36.1071 and §36.1072 and 31 TAC §356.5 and 356.6

NOW, THEREFORE, BE IT RESOLVED AND ORDERED BY THE BOARD OF DIRECTORS OF HICKORY UNDERGROUND WATER CONSERVATION DISTRICT NO. 1 THAT:

1. The facts and recitations found in the preamble of this Resolution are hereby found and declared to be true and correct and are incorporated by reference herein and expressly made a part hereof, as if copied verbatim.

2. The Board of Directors hereby adopts the attached Management Plan as the Management Plan for the District, subject to those amendments

necessary based on comments received from the public at the Board meeting, recommendations from the District Board, staff, or legal counsel, or to incorporate technical information received from the Texas Water Development Board (TWDB) and/or District consultants.

3. The Manager of the District is hereby authorized to take all steps necessary to implement this resolution and submit the Management to TWDB for its approval.

4. The Manager of the District is further authorized to take any and all action necessary to coordinate with the TWDB as may be required in furtherance of TWDB's approval pursuant to the provisions of Section 36.1072 of the Texas Water Code.

APPROVED AND ADOPTED this 09th day of May 2024

Amy Greer, Board President

Gay Nesloney, Board Secretary

APPENDIX F

Evidence of Notice and Hearing

Notice is hereby given that the Board of Directors of the Hickory Underground Water Conservation District No. 1 will meet in a **Public Hearing and Regular Session** on **Thursday, May 9, 2024, at 6:00 p.m.**, in the conference room of the Hickory Underground Water Conservation District No. 1 Office, 111 E. Main in Brady, Texas. The Board of Directors may take action on any items on this agenda it may determine would be appropriate.

HEARING AND REGULAR MEETING
AGENDA

I. CALL TO ORDER
II. AGENDA
III. PUBLIC COMMENTS
IV. PUBLIC HEARING ON REVISED HICKORY UWCD MANAGEMENT PLAN
V. MINUTES FROM THE MARCH 14, 2024
VI. FINANCIAL REPORT
  A. FINANCIAL REPORTS FOR MARCH AND APRIL 2024
  B. ORDER 24-04 MOVING UNAPPROPRIATED FUNDS
VII. REVIEW, DISCUSS AND POSSIBLE ACTION TO APPROVE AND ADOPT REVISED HICKORY UWCD MANAGEMENT PLAN AND RESOLUTION 24-01 TO THAT EFFECT
VIII. REPORTS ON DISTRICT ACTIVITES
  A. STAFF REPORT ON PERSONNEL ACTIVITIES AND FUNCTIONS, INCLUDING HYDRO-GEO REPORT: PERMITS, REGISTRATIONS, WATER LEVELS, WATER QUALITY, MAPPING, STUDIES, GMA AND REGIONAL ACTIVITIES, INTERACTIONS WITH STATE AGENCIES
  B. LEGISLATIVE CONSULTANT REPORT: ANY LEGISLATIVE ACTIVITIES AND INTERACTIONS IN WHICH CONSULTANT PARTICIPATED, LIST OF ADDITIONAL EXPENSES ACCRUED BY CONSULTANT, AND ANY ISSUES OF RELEVANCE TO THE DISTRICT
IX. ELECTION PRECINCTS 3 AND 4
  A. REVIEW, DISCUSS, AND POSSIBLE ACTION ON CERTIFICATE OF ELECTION FOR PRECINCTS 3 & 4
  B. REVIEW, DISCUSS, AND POSSIBLE ACTION ON STATEMENT OF ELECTED/APPOINTED OFFICERS FOR PRECINCTS 3 & 4
  C. REVIEW, DISCUSS AND POSSIBLE ACTION ON OATH OF OFFICE FOR PRECINCTS 3 & 4
  D. REVIEW, DISCUSS, AND POSSIBLE ACTION ON ELECTION OF OFFICER POSITIONS ON BOARD
X. ADJOURN

I, the undersigned authority, do hereby certify that the attached notice of the Board of Directors of the Hickory Underground Water Conservation District No. 1 is a true and correct copy of said notice. I posted copies of said notice the McCulloch County Clerk's bulletin board in Brady, Texas, and in the front entrance of the Hickory Underground Water Conservation District, in a place convenient and readily accessible to the general public, both being posted at least 72 hours preceding the time of the meeting.

DAVID G. HUIE, MANAGER

S.O.S. Acknowledgment of Receipt

From: texreg@sos.texas.gov

To: hickoryuwcd@yahoo.com

Date: Tuesday, April 30, 2024 at 07:55 AM CDT

Acknowledgment of Receipt

Agency: Hickory Underground Water Conservation District Number 1

Liaison: Angelina Deans

The Office of the Secretary of State has posted

notice of the following meeting:

Board: Hickory Underground Water Conservation District No. 1

Committee: Board of Directors

Date: 05/09/2024 06:00 PM "TRD# 2024002521"

Notice posted: 04/30/24 07:55 AM

Proofread your current open meeting notice at:

http://texreg.sos.state.tx.us/public/pub_om_lookup$.startup?Z_TRD=2024002521

Angelina Deans Log Off

Open Meeting Submission

TRD:	2024002521
Date Posted:	04/30/2024
Status:	Accepted
Agency Id:	0901
Date of Submission:	04/30/2024
Agency Name:	Hickory Underground Water Conservation District Number 1
Board:	Hickory Underground Water Conservation District No. 1
Committee:	Board of Directors
Date of Meeting:	05/09/2024
Time of Meeting:	06:00 PM **(##:## AM Local Time)**
Street Location:	111 E. Main
City:	Brady
State:	TX
Liaison Name:	Angelina Deans
Liaison Id:	6
Additional Information Obtained From:	David G. Huie or Angelina Deans at 325-597-2785 or hickoryuwcd@yahoo.com
Agenda:	Conservation District No. 1 will meet in a Public Hearing and Regular Session on Thursday, May 9, 2024, at 6:00 p.m., in the conference room of the Hickory Underground Water Conservation District No. 1 Office, 111 E. Main in Brady, Texas. The Board of Directors may take action on any items on this agenda it may determine would be appropriate. HEARING AND REGULAR MEETING AGENDA I. CALL TO ORDER II. AGENDA III. PUBLIC COMMENTS IV. PUBLIC HEARING ON REVISED HICKORY UWCD MANAGEMENT PLAN V. MINUTES FROM THE MARCH 14, 2024 VI. FINANCIAL REPORT A. FINANCIAL REPORTS FOR MARCH AND APRIL 2024 B. ORDER 24-04 MOVING UNAPPROPRIATED FUNDS VII. REVIEW, DISCUSS AND POSSIBLE ACTION TO APPROVE AND ADOPT REVISED HICKORY UWCD MANAGEMENT PLAN AND RESOLUTION 24-01 TO THAT EFFECT VIII. REPORTS ON DISTRICT ACTIVITES

A. STAFF REPORT ON PERSONNEL ACTIVITIES AND FUNCTIONS, INCLUDING HYDRO-GEO REPORT: PERMITS, REGISTRATIONS, WATER LEVELS, WATER QUALITY, MAPPING, STUDIES, GMA AND REGIONAL ACTIVITIES, INTERACTIONS WITH STATE AGENCIES
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D. REVIEW, DISCUSS, AND POSSIBLE ACTION ON ELECTION OF OFFICER POSITIONS ON BOARD
X. ADJOURN

I, the undersigned authority, do hereby certify that the attached notice of the Board of Directors of the Hickory Underground Water Conservation District No. 1 is a true and correct copy of said notice. I posted copies of said notice the McCulloch County Clerk's bulletin board in Brady, Texas, and in the front entrance of the Hickory Underground Water Conservation District, in a place convenient and readily accessible to the general public, both being posted at least 72 hours preceding the time of the meeting.

_____
DAVID G. HUIE, MANAGER

Notice is hereby given that the Board of Directors of the Hickory Underground Water Conservation District No. 1 will meet in a **Public Hearing and Regular Session** on **Thursday, May 9, 2024, at 6:00 p.m.**, in the conference room of the Hickory Underground Water Conservation District No. 1 Office, 111 E. Main in Brady, Texas. The Board of Directors may take action on any items on this agenda it may determine would be appropriate.

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DAVID G. HUIE, MANAGER

#6456
FILED
The 30 Day of April
2024 at 9:36 o'clock A M
County Clerk Concho Co. TX.
By

Notice is hereby given that the Board of Directors of the Hickory Underground Water Conservation District No. 1 will meet in a **Public Hearing and Regular Session** on **Thursday, May 9, 2024, at 6:00 p.m.**, in the conference room of the Hickory Underground Water Conservation District No. 1 Office, 111 E. Main in Brady, Texas. The Board of Directors may take action on any items on this agenda it may determine would be appropriate.

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DAVID G. HUIE, MANAGER

Filed May 2, 2024
at 11:15 o'clock A M
Karen E. Page, County Clerk, Kimble County, Texas

Notice is hereby given that the Board of Directors of the Hickory Underground Water Conservation District No. 1 will meet in **a Public Hearing and Regular Session** on **Thursday, May 9, 2024, at 6:00 p.m.**, in the conference room of the Hickory Underground Water Conservation District No. 1 Office, 111 E. Main in Brady, Texas. The Board of Directors may take action on any items on this agenda it may determine would be appropriate.

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  B. LEGISLATIVE CONSULTANT REPORT: ANY LEGISLATIVE ACTIVITIES AND INTERACTIONS IN WHICH CONSULTANT PARTICIPATED, LIST OF ADDITIONAL EXPENSES ACCRUED BY CONSULTANT, AND ANY ISSUES OF RELEVANCE TO THE DISTRICT
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X. ADJOURN

I, the undersigned authority, do hereby certify that the attached notice of the Board of Directors of the Hickory Underground Water Conservation District No. 1 is a true and correct copy of said notice. I posted copies of said notice the McCulloch County Clerk's bulletin board in Brady, Texas, and in the front entrance of the Hickory Underground Water Conservation District, in a place convenient and readily accessible to the general public, both being posted at least 72 hours preceding the time of the meeting.

DAVID G. HUIE, MANAGER

FILED at 9:43 A M
April 30, 2024
PAM BEAM, Clerk
CO Court, Mason County, Texas
By Bonnie Beam

Notice is hereby given that the Board of Directors of the Hickory Underground Water Conservation District No. 1 will meet in a **Public Hearing and Regular Session** on **Thursday, May 9, 2024, at 6:00 p.m.**, in the conference room of the Hickory Underground Water Conservation District No. 1 Office, 111 E. Main in Brady, Texas. The Board of Directors may take action on any items on this agenda it may determine would be appropriate.

POSTED

APR 30 2024

Christine A. Jones
McCulloch, County Clerk

HEARING AND REGULAR MEETING
AGENDA

I. CALL TO ORDER
II. AGENDA
III. PUBLIC COMMENTS
IV. PUBLIC HEARING ON REVISED HICKORY UWCD MANAGEMENT PLAN
V. MINUTES FROM THE MARCH 14, 2024
VI. FINANCIAL REPORT
  A. FINANCIAL REPORTS FOR MARCH AND APRIL 2024
  B. ORDER 24-04 MOVING UNAPPROPRIATED FUNDS
VII. REVIEW, DISCUSS AND POSSIBLE ACTION TO APPROVE AND ADOPT REVISED HICKORY UWCD MANAGEMENT PLAN AND RESOLUTION 24-01 TO THAT EFFECT
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DAVID G. HUIE, MANAGER

Filed for Record in my Office
the 2nd day of May 20 24
at 11:45 o'clock A M
County Clerk, Menard County, Texas

Re: Agenda to post

County/District Clerk <clerk@co.san-saba.tx.us>
Mon 5/6/2024 1:34 PM
To:Hickory UWCD # 1 <hickory@hickoryuwcd.org>

1 attachments (71 KB)
DOC.pdf;

Here is a copy for your records.

Christi Whitley
Chief Deputy Clerk
San Saba County Clerk's Office
500 E. Wallace, Suite 202
San Saba, Texas 76877
(325) 372-3614

From: Hickory UWCD # 1 <hickory@hickoryuwcd.org>
Sent: Monday, May 6, 2024 1:13 PM
To: County/District Clerk <clerk@co.san-saba.tx.us>
Subject: Agenda to post

I haven't heard back from you and worried you never got the two other emails I sent so I'm trying this email address that we rarely use just in case you're not getting our emails.

Please, stamp and post it and send me a copy via email so I have proof for the state.

Thank you so much. Sorry for being a pest. I know y'all are busy with election results.

Angelina

Hickory Underground Water Conservation District No. 1

(325) 597-2785
111 E. Main Street
P.O. Box 1214
Brady, TX 76825
http://www.hickoryuwcd.org

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DAVID G. HUIE, MANAGER

POSTED
5-4-2024 @
1:30pm

Hickory Underground Water Conservation District No. 1

Serving Central Texas since 1982

On the Square in Downtown Brady

ABOUT including Directors, Tax Rate and Budgets	WATER LEVELS	RAINFALL	FORMS	CONTACT U
SAN ANGELO WELLFIELD	NEWS	LAB INFORMATION	DROUGHT MONITOR(external)	RULES / MA

The District

The District was created by an order of the Texas Water Commission on June 9, 1982, and organized under the terms and provisions of Article XVI, Section 59 of the Texas Constitution and Chapters 35 and 36 of the Texas Watder Code. We were formed to "formulate, promulgate, and enforce rules and regulations for the purpose of conserving, preserving, prevention of waste, protecting, and recharging" the waters of all aquifers within the District boundaries. In short, our mission is to protect your groundwater.

We cover approximately 1.7 million acres over an stretch that includes all of Mason County and portions of McCulloch, San Saba, Concho, Menard, and Kimble Counties. The elected board is comprised of five directors.

The Board generally meets on the second Thursday at least quarterly at the District office, located on the northeast side of the square in Brady. For information on board meetings and posted agendas, go to Texas Register and type in the agency name (Hickory Underground Water Conservation Dist No. 1). Scroll to the end of the form and hit the "search" button

We are working on a new interactive map to meet all your needs. Please, take a few minutes and visit the site below.

This is an interactive Map App with various layers including all the wells with links to logs, faults, depth to top of Hickory, etc.

This is a new ALL IN ONE APP Map. We recently added two Ellenburger layers: one with points and one with contour lines created from those points. This is still a work in progress so it is not 100% accurate.

If you're using the Surface Geology layer, you can use this jpg as a more in-depth legend. The heights of the rows are not scaled to thicknesses. Geologic Units and Groundwater Potential

Check it out and give us feedback please.

Scribe Instructions on using the mapping app

A public hearing and regular meeting will be May 9, 2024 at 6 p.m at 111 E. Main, Brady (District Office). Agenda Public Hearing and Regular Board Meeting

This public hearing is to review and discuss the newly revised Management Plan. This plan was pre-approved by the TWDB.

REVISED MANAGEMENT PLAN FOR REVIEW

REVISED MANAGEMENT PLAN APPENDIX A FOR REVIEW

REVISED MANAGEMENT PLAN APPENDIX B FOR REVIEW

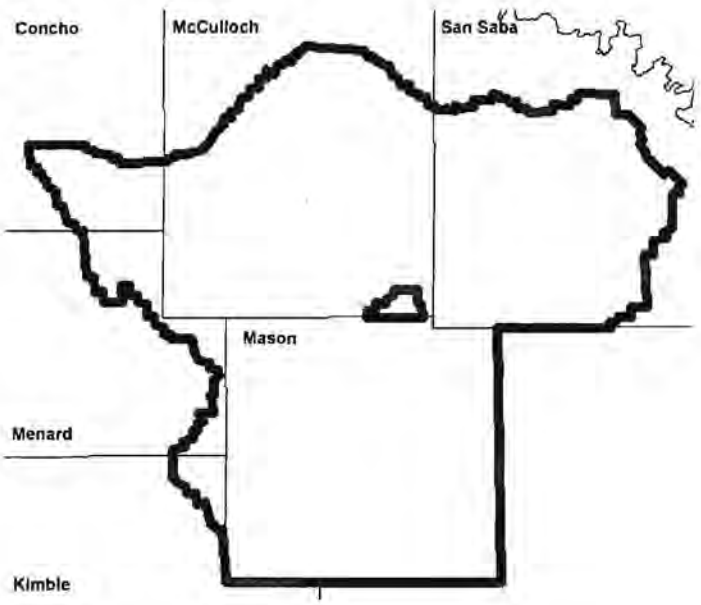
REVISED MANAGEMENT PLAN APPENDIX C FOR REVIEW

REVISED MANAGEMENT PLAN APPENDIX D FOR REVIEW

Contact us

The Board ensures that control of District groundwater remains in the hands of local citizens in the District.

The District employs three staff members: David Huie is our Manager, Angelina Bonetti Deans is the Assistant Manager, and Ronnie Moore is our Lab and Field Technician.



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DAVID G. HUIE, MANAGER

APPENDIX G

Evidence of letters to Surface Water Entities and Region F

Hickory UWCD Management Plan

From: Hickory UWCD No. 1 (hickoryuwcd@yahoo.com)

To: monica.masters@lcra.org; scottm@ucratx.org; mcuwd@verizon.net; citymanager@centex.net; ecorbell@bradytx.us

Date: Monday, May 13, 2024 at 09:30 AM CDT

On May 9, 2024, the Hickory UWCD convened in a public hearing alongside its regular board meeting to examine the Revised Management Plan. At this meeting, the Board voted to officially adopt the plan.

The plan and its appendices can be accessed by using the following links. The plan in its entirety even using a Zip progam was too large to attach.
The Management Plan:
https://hickoryuwcd.org/HICKORYMANAGEMENTPLAN.PDF

Appendix A:
https://hickoryuwcd.org/HICKORYMPAPPENDIXA.PDF

Appendix B:
https://hickoryuwcd.org/HICKORYMPAPPENDIXB.PDF

Appendix C:
https://hickoryuwcd.org/HICKORYMPAPPENDIXC.PDF

Appendix D:
https://hickoryuwcd.org/HICKORYMPAPPENDIXD.PDF

Appendix E and F:
https://hickoryuwcd.org/HICKORYMPAPPENDIXEANDF.pdf

Appendix G will be the proof of this email to UCRA, LCRA, Menard County WCD, City of San Saba and City of Brady.

If you have questions, comments, or would like a hard copy or a different format, please, don't hesitate to email me or call me at 325-597-2785.

Thank you,
Angelina Deans
Asst. Mngr.

Hickory Underground Water Conservation District No. 1
PO Box 1214 * 111 E. Main
Brady, TX 76825
325-597-2785 phone
http://www.hickoryuwcd.org