December 21, 2020

Mr. Jeff Walker
Executive Administrator
Texas Water Development Board
1700 North Congress Avenue
P.O. Box 13231
Austin, TX. 78711-3231

Re: HTGCD 2021 Management Plan

Dear Mr. Walker:

Please find enclosed our 2021 Management Plan as adopted by the HTGCD Board of Directors at a Public Hearing on December 3, 2020. We have also enclosed the appropriate public hearing postings, the resolution adopting the plan, and a copy of the notifications to surface water entities in the District.

A digital copy of the Plan has been sent to Mr. Stephen Allen in your Groundwater Division.

Please pass on our appreciation for the dedication of the TWDB staff members with whom we worked on the project, particularly Stephen Allen and Robert Bradley. They were instructive, prompt, and courteous, and certainly reflect well on the agency.

Sincerely,

Charlie Flatten
General Manager

Hays Trinity Groundwater Conservation District

STAFF & BOARD

Charlie Flatten
General Manager

Philip Webster
Hydrogeologist

Keaton Hoelscher
Geo-Technician

Laura Thomas
Office Administrator

Holly Fults
President
District 3

Linda Kaye Rogers
Vice President
District 4

John Worrall
Treasurer/Secretary
District 1

Doc Jones
District 5

Toby Shelton
District 2

Hays Trinity Groundwater Conservation District

MANAGEMENT PLAN

Adopted by Board: December 3, 2020
Approved by TWDB: (tbd)

Board of Directors
Holly Fults, President: *District 3*
Linda Kaye Rogers, Vice President: *District 4*
John Worrall, Treasurer/Secretary: *District 1*
Doc Jones, Director: *District 5*
James Shelton, Director: *District 2*

District Staff
Charlie Flatten, General Manager
Laura Thomas, Office Administrator
Philip Webster, Hydrogeologist
Keaton Hoelscher, Geo Technician

Hays Trinity Groundwater Conservation District
P.O. Box 1648, Dripping Springs, Texas 78620
14101 Hwy. 290 W., Bldg. 100, Suite 212, Austin Texas 78737
Tel. (512) 858-9253
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Prepared by the Hays Trinity Groundwater Conservation District with valuable assistance from The Texas Water Development Board

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TIME PERIOD FOR THIS PLAN

This plan complies with the requirements of Texas Administrative Code (TAC): Title 31 Natural Resources and Conservation, Part 10 Texas Water Development Board, Chapter 356 Groundwater Management, Subchapter E Groundwater Management Plan approval 31 TAC §356. This plan becomes effective upon adoption by the Hays Trinity Groundwater Conservation District Board of Directors (Board) and approval as administratively complete by the Texas Water Development Board (TWDB). This plan will be in effect for five years from the date of TWDB approval in accordance with TWC §36.1072(e). After five years, this plan will be reviewed for conflict with the applicable regional water plans and the State Water Plan and shall be readopted with or without amendments. The plan may be revised at any time in order to avoid conflict or as necessary to address any new or revised data, Groundwater Availability Model (GAM) updates, or District management strategies.

DISTRICT MISSION

Given the critical importance of water to life and of that part of the water cycle called groundwater to local families, agriculture, commerce, stream flows and wildlife habitat, the Hays Trinity Groundwater Conservation District works to conserve, preserve, recharge and prevent waste of groundwater within western Hays County. To help accomplish these goals, the District is charged to gather information needed for sound decisions, to provide that information to citizens and local agencies, and to ensure that groundwater is used efficiently and at sustainable rates.

GENERAL DESCRIPTION OF THE DISTRICT

The Hays Trinity Groundwater Conservation District (HTGCD or District) is a political subdivision of the State of Texas. It was created in Chapter 1331, Acts of the 76th Legislature, Regular Session, 1999 and in Act of May 27, 2001, 77th Legislature, Regular Session, Chapter 966, Part 3, 2001 Texas General Laws 1880 (S.B. 2) (collectively, enabling legislation). The District was confirmed by popular election on May 3, 2003. The District's enabling legislation and Texas Water Code Chapter 36 authorize the District to make and enforce rules that are reasonably consistent with this management plan and the District's guiding principles. The District encompasses the western 55.15 percent (from TWDB), approximately 370 square miles, of Hays County (Figure 1). The District is divided into five single member districts for Board of Directors' representation, each with a population, according to the 2010 Census, of approximately 7,300 (Figure 2). The Capitol Area Council of Governments (CAPCOG) estimates a 2020 District population of 50,537[1].

The District is bounded in the west by Blanco County, to the southwest by Comal County, to the north by western Travis County and to the southeast by eastern Hays County. It should be noted that the Edwards Aquifer Authority (EAA) overlays the southern portion of eastern Hays County with authority over the Edwards Aquifer (Balcones Fault Zone) (Figure 3). Boundaries and drilling development in neighboring counties or districts are critical to HTGCD groundwater management. Unregulated pumping in Travis County for example has lowered the water table in Hays County and may be responsible for dewatering the Middle Trinity Aquifer along the northeast margin of the HTGCD.

[1] Using address points as the allocation method

SINGLE MEMBER BOARD DISTRICTS AND TERM EXPIRATION DATES

The Board of Directors in fiscal year 2021 is composed of:

- District 1: John Worrall .... Term expires November 2022
- District 2: James Shelton .... Term expires November 2024*
- District 3: Holly Fults .... Term expires November 2022
- District 4: Linda Kaye Rogers .... Term expires November 2024*
- District 5: Doc Jones .... Term expires November 2022

*See Sec. 8843.056 Special Districts Local Laws Code regarding elections following federal decennial census.

Special District Local Laws Code – Chapter 8843 Sec.8843.051, Composition of Board; Terms (b):

Directors serve staggered four-year terms.

Effective September 1, 2013

Special District Local Laws Code – Chapter 8843 Sec.8843.053, Election Date

On the uniform election date in November of each even-numbered year, the appropriate number of directors shall be elected.

Effective September 1, 2013

Groundwater Management Plan - Record

HTGCD Board Adoption	TWDB Approval
2005 Plan: August 4, 2005	October 7, 2005
2011 Plan: March 20, 2011	May 23, 2011
2016 Plan: January 21, 2016	February 19, 2016

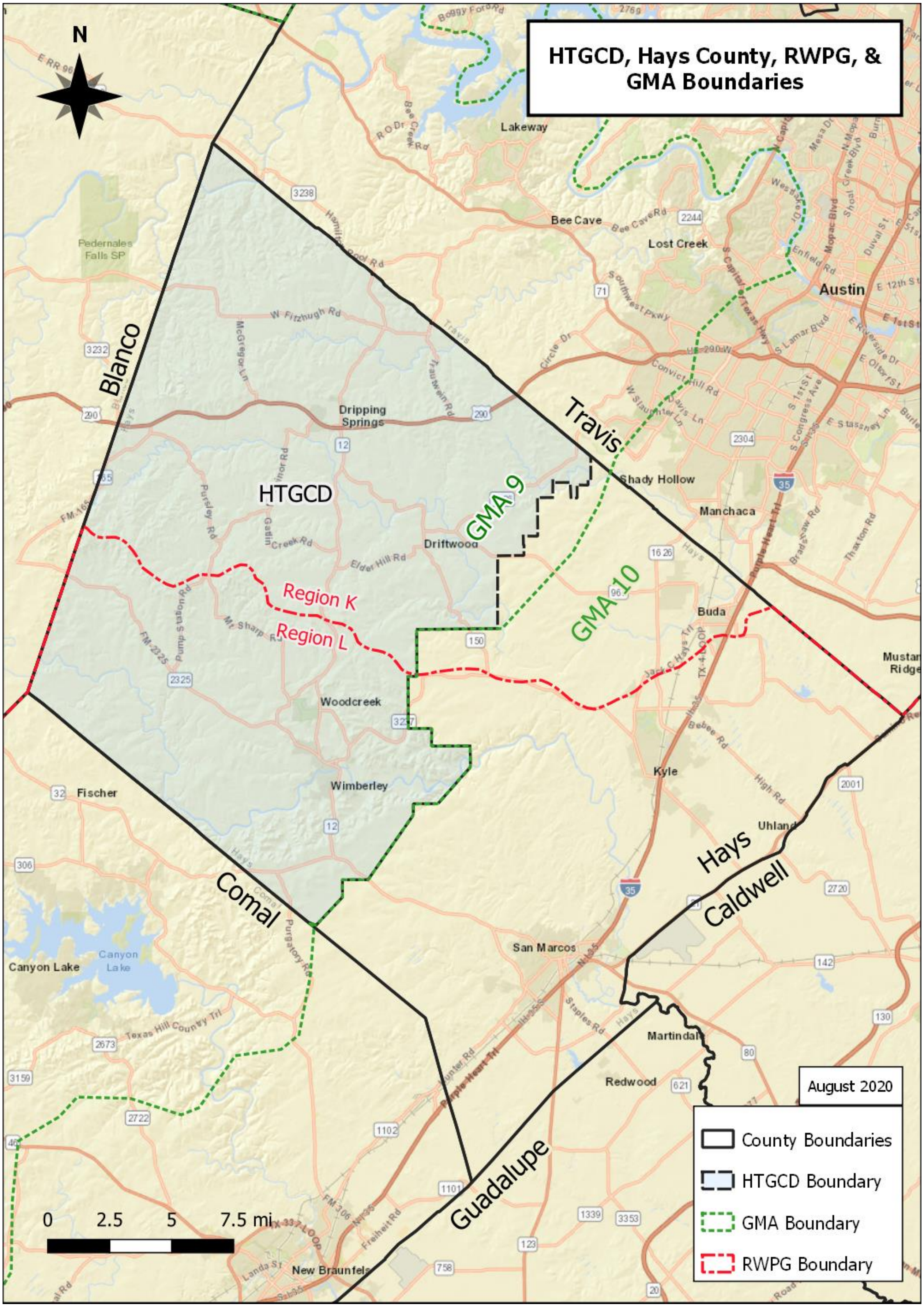

Figure 1: HTGCD, Hays County, RWPG, & GMA Boundaries

Map data provided by TWDB GIS Datasets, ESRI, & HTGCD Staff.

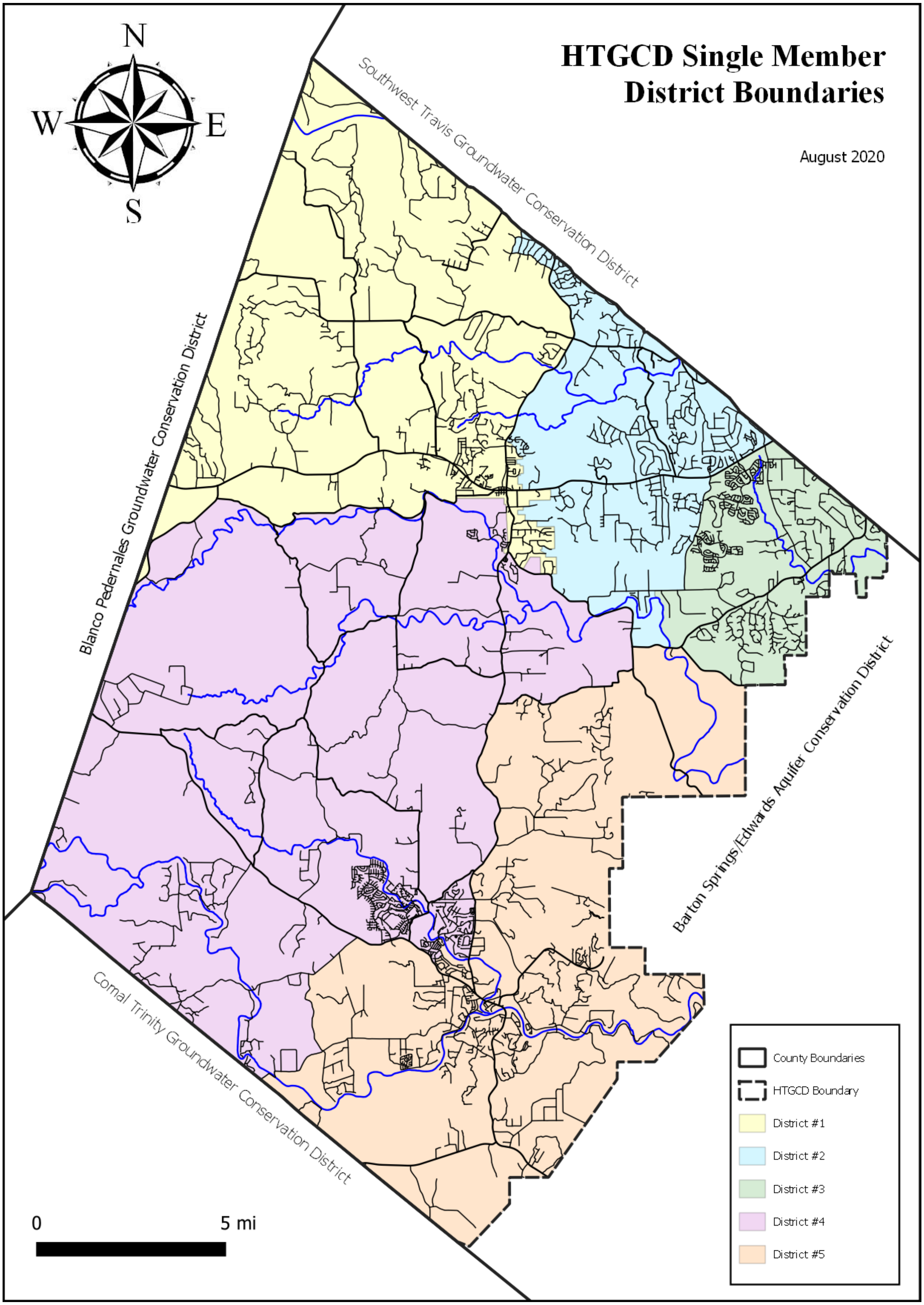

Figure 2: Single Member District Boundaries

Map data provided by Hays County Development Services, ESRI, TxDOT, & HTGCD Staff.

STATEMENT OF GUIDING PRINCIPLES

The District has a goal of sustainable management of the Trinity Aquifer including a reasonable balance between groundwater supply for the community and maintaining base flow contribution to streams that preserve a sound ecological environment. The guiding principles will serve as a basis for the development and adoption of District policies and rules to achieve these goals. Guiding principles include but may not be limited to:

- Manage the use of the aquifer for the benefit of the people of the District while maintaining sufficient quantity of water in the aquifers to maintain spring and stream flows during periods of drought
- Maintain and prevent water quality degradation in surface water and groundwater
- Consider preservation of historic use of groundwater
- Prevent waste of groundwater
- Minimize the reduction of artesian pressure
- Promote groundwater conservation and drought-response action through voluntary measures for exempt wells not regulated by the District
- HTGCD rules with applicable penalties to enforce well production curtailment and conservation for non-exempt permit holders during declared drought stages
- Encourage the use of rainwater collection systems and other collection and retention systems
- Cooperate with surface water providers to facilitate economically sustainable management of groundwater resources and equitable distribution of surface and groundwater resources
- Consider mandatory conservation and drought response actions for non-exempt wells regulated by the District specifically designed for action during “drought of record”
- Promote artificial recharge of the aquifer through such means as proper brush management, re-establishing deep rooted native grasses and creation of surface water runoff collection/infiltration dams
- Continue to develop groundwater production limits based on scientific study of the aquifer, modeled available groundwater, and a focus on areas/zones of critical depletion

ACTIONS, PROCEDURES, PERFORMANCE AND AVOIDANCE NECESSARY TO EFFECTUATE THE GROUNDWATER MANAGEMENT PLAN

The District shall use this plan as a guide for policies and actions undertaken by the District. To address potential groundwater quantity and quality issues, the District is committed to, and will actively pursue, the groundwater management strategies identified in this groundwater management plan. The District rules, policies, and activities will be coordinated with the management plan to effectively manage and regulate:

- Well drilling and spacing
- Groundwater production within the District
- Water quality in groundwater and surface water
- The potential transfer of water out of the District

In following this management plan, the District may develop rules, policies, and activities to:

- Encourage conservation practices and efficient water use
- Guide the development of drought contingency and management plans
- Collect and interpret water level, hydrogeologic and drilling data
- Provide for the District's management and regulation of identified critical groundwater depletion areas within the District
- Promote the development and use of rainwater systems to relieve demands on groundwater

To the greatest extent practicable, while upholding the intent of the District's Mission, management plan and rules, (posted on HTGCD website http://haysgroundwater.com/files/Rules/2020_Rules_04062020.pdf), the District will strive to cooperate with and coordinate its management plan and regulatory policies with adjacent groundwater districts, regional water planning groups, TWDB, Hays County, local municipalities, and adjacent counties with aquifers that are hydraulically connected to aquifers within the District's jurisdiction.

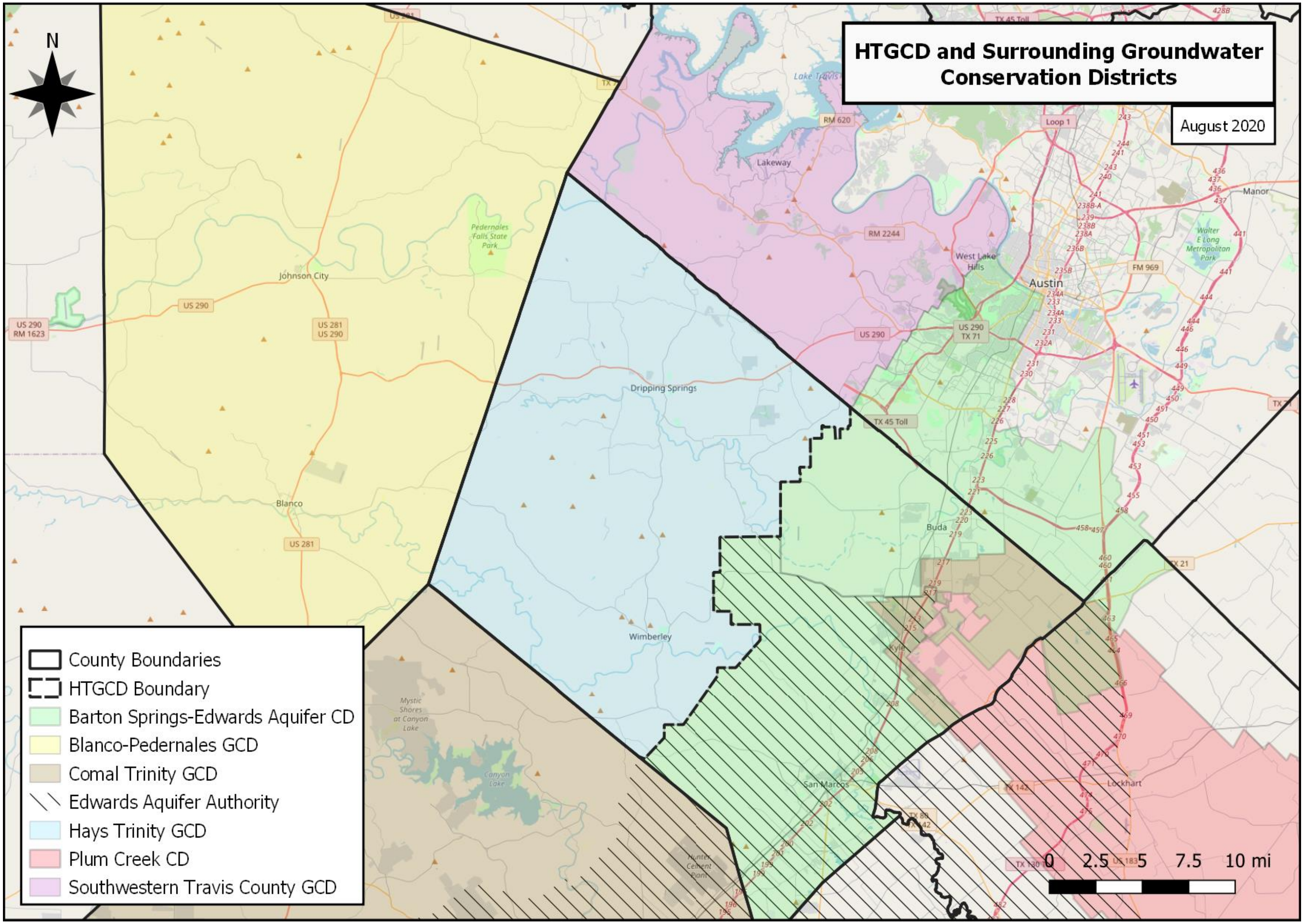

Figure 3: HTGCD and Surrounding Groundwater Conservation Districts.
Map Provided by TWDB GIS Datasets, ESRI, OpenStreetMap, & HTGCD Staff

DISTRICT PLANNING APPROACH

Hays County is one of the few counties divided by two Regional Water Planning Groups: the Lower Colorado Region (Region K) in the north, and the South Central Texas Region (Region L) in the south. The County is also divided by two groundwater management areas: Groundwater Management Area 9 in the west and Groundwater Management 10 in the east. In addition to the Hays Trinity Groundwater Conservation District, the County also includes three other groundwater conservation districts: the Edwards Aquifer Authority, the Plum Creek Conservation District, and the Barton Springs/Edwards Aquifer Conservation District (Figure 3). The drainage divide between the Colorado and Guadalupe River basins defines the shared boundary of regions K and L within Hays County. Based on Geographic Information Systems (GIS) analysis conducted by Turner, Collier and Braden during the original 2005 preparation of this plan, the jurisdiction of the District covers approximately 76 percent of the Region K area and 38 percent of the Region L area within Hays County (Figure 1). In contrast to the whole county, the area of the District itself (370 square miles) is divided between Region K and L in the following ratio: 61 percent (226 square miles) Region K and 39 percent (144 square miles) Region L (Figure 4). The HTGCD is a participating member of Groundwater Management Area 9 (GMA9) and its regional planning approach is in consultation with the other member districts. In addition, the District is located within the Hill Country Priority Groundwater Management Area, which is an area designated under Texas Water Code Chapter 35 as an area experiencing or expected to experience critical groundwater shortages (Cross and Bluntzer, 1990).

The District is required to use the best available data in developing the management plan. Accordingly, in the adoption of this plan the District has used:

- Groundwater Management Plan Data Package:
  1) Estimated Historical Groundwater Use & 2017 State Water Plan Datasets (June 2017), TWDB
  2) GAM Run 19-026, HTGCD Management Plan (March 2017), TWDB
- TWDB, “GAM Task 10-005” (GMA9, Trinity Aquifer), 2010, Hutchison
- TWDB, “GAM Run 16-023 MAG
- Groundwater Availability Model for the Hill Country Portion of the Trinity Aquifer System, Texas, 2011, Jones, Anaya, Wade, and others, TWDB 337
- Planning information from the 2017 State Water Plan (TWDB)
- Adjoining groundwater conservation districts’ adopted groundwater management plans (BPGCD, 2018; CCGCD, 2020; HCUWCD, 2018; BSEACD, 2018; HGCD, 2016);
- Hydrogeological Atlas of the Hill Country Trinity Aquifer, Blanco, Hays, and Travis Counties Central Texas (Wierman and others, 2010)
- Data from regional surface water providers such as the West Travis County Public Utility Authority and the Lower Colorado River Authority
- Site-specific data developed by the District

This plan serves as a basis for the development and revision of existing rules and adoption of new District rules. The Board adopted District rules on August 8, 2001, which have been amended periodically through 2020.

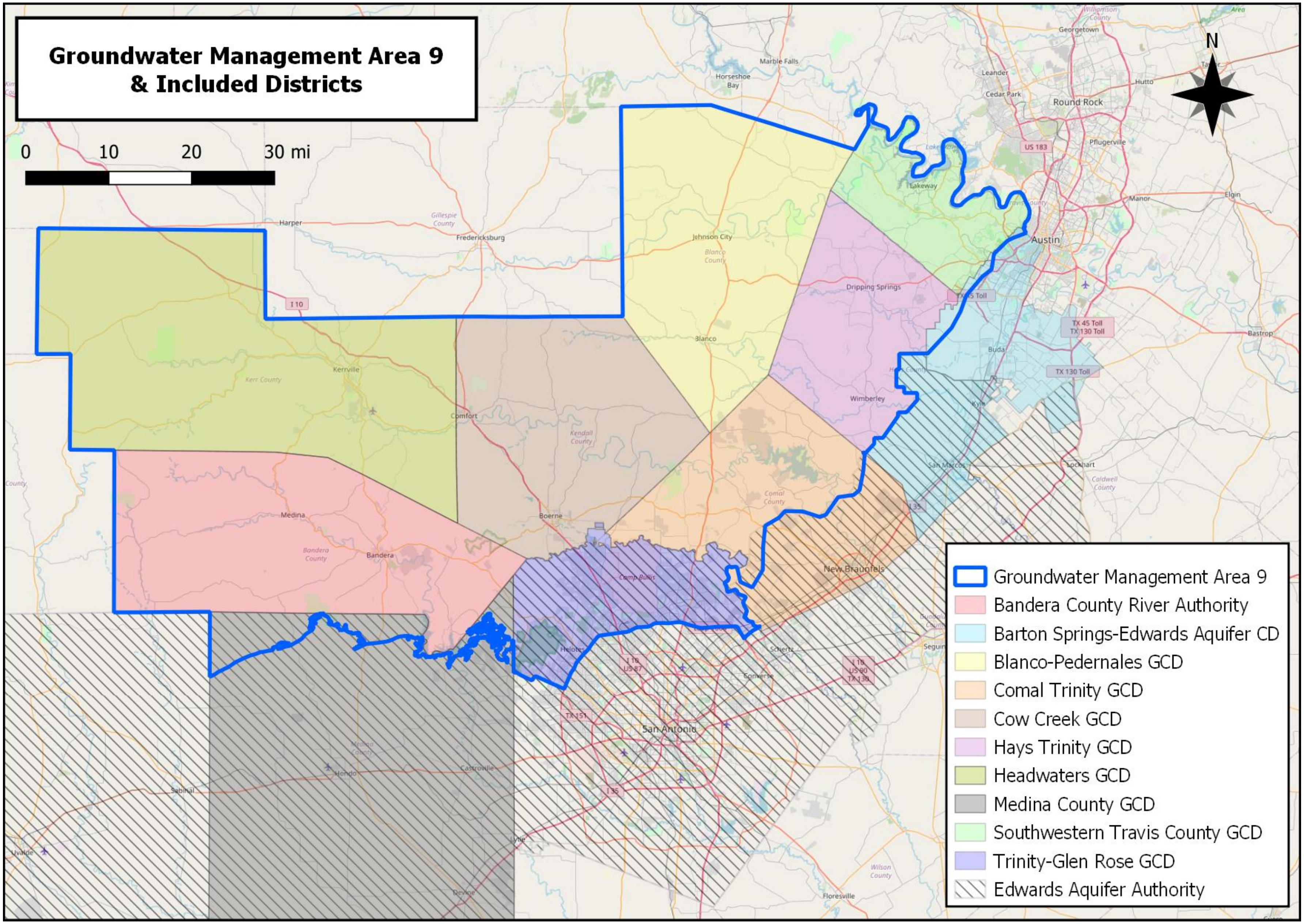

Figure 5: Groundwater Management Area 9 Boundary. Map data provided by TWDB GIS Datasets & OpenStreetMap.

Topography and Drainage

Elevation in the District ranges from a low of about 700 feet above sea level where the Blanco River leaves the District to approximately 1,600 feet above sea level, along ridge summits of the Guadalupe River-Colorado River drainage divide.

The District is drained by two major river basins, the Colorado River basin in the north and the Guadalupe River basin in the south. Several smaller watersheds, including the Pedernales River, which drains the northern tip of the county, and Barton, Bear, and Onion Creeks, which drain the north-central part of the county, comprise the Colorado River watershed. The Blanco River basin is nested within the larger Guadalupe River basin. The Blanco River joins the San Marcos River approximately three miles east of San Marcos before joining the Guadalupe River near Gonzales, Texas.

The District's major geomorphic feature is the eroded margin of the Edwards Plateau: an elevated structure comprised of Cretaceous Period limestone, marl, and dolomite extending from the Balcones Escarpment to the high western interior plains of Texas. The eroded margin of the plateau is bounded by the Balcones Escarpment to the southeast and the undisturbed portions of the plateau to the west. The District's major structural geologic feature is the San Marcos Arch, a SE-NW plunging antiform nose of the Llano Uplift (Adkins, 1932). The Llano Uplift is a positive Paleozoic feature located northwest of the District that influenced the deposition of Lower Cretaceous sediments (Sellards, 1932).

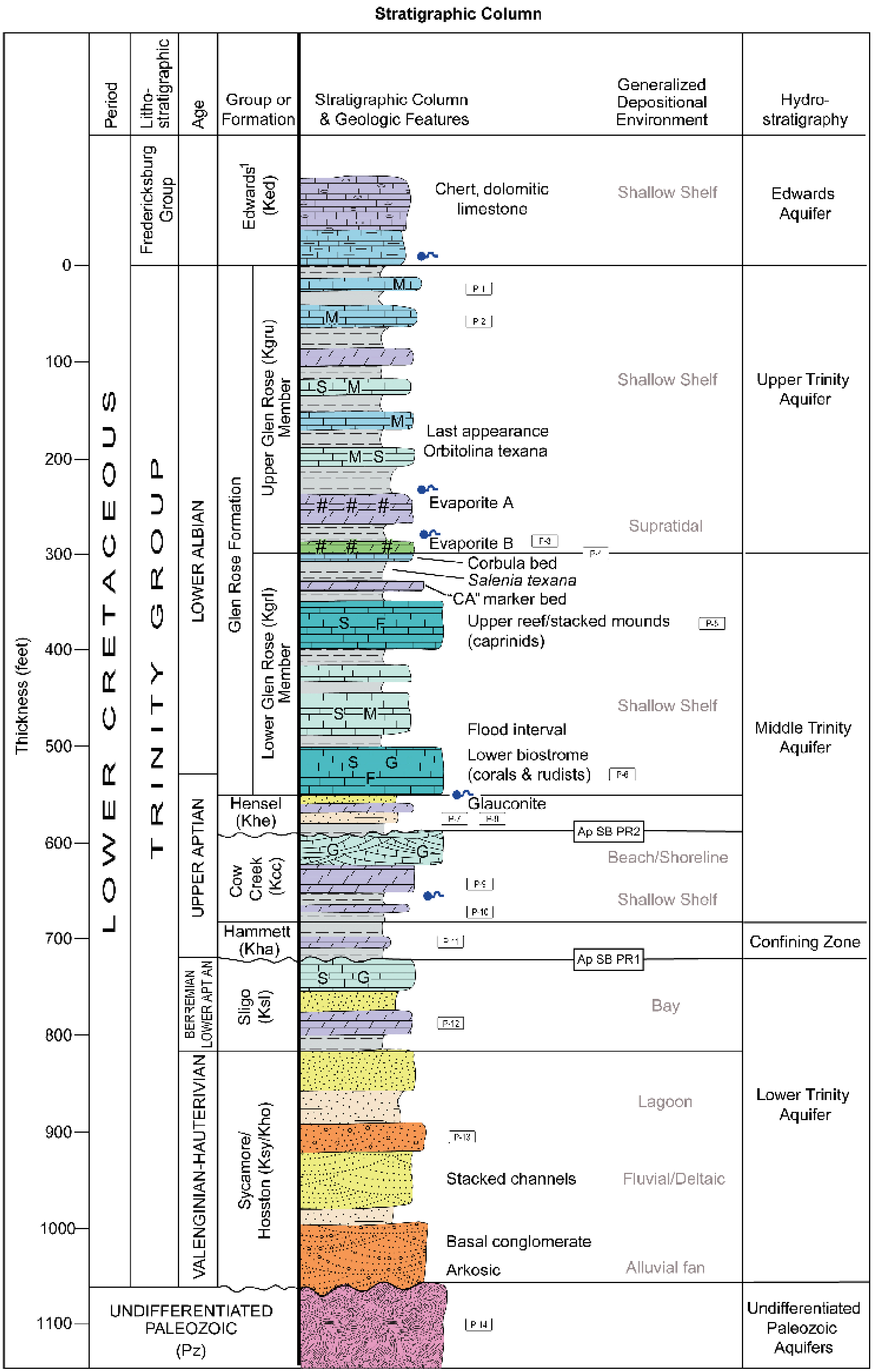

Figure 6: Stratigraphic and Hydrostratigraphic Section of the Trinity Group in Hays County (Wierman and others, 2010).

GROUNDWATER RESOURCES OF THE DISTRICT

Trinity Aquifer System

The Trinity Aquifer is the sole aquifer providing groundwater to District residents. It is divided into three hydrostratigraphic units, the Upper, Middle, and Lower Trinity (Figure 6). Together, these aquifers behave as a more or less semi-confined or leaky aquifer system (Ashworth, 1983; Muller and McCoy, 1987). Each of these aquifers has a characteristic hydrostatic pressure head (water level). The Lower Trinity Aquifer has the lowest hydrostatic head while the Middle and Upper Trinity aquifers have respectively higher heads. This relationship of water levels can be interpreted to mean that groundwater moves downward at a very slow rate through the low-permeability strata (aquitards) to the aquifers below, while typically moving laterally at higher rates (Muller and McCoy, 1987; Muller, 1990).

The Trinity Aquifer is recognized as a major aquifer by TWDB (Ashworth and Hopkins, 1995). A major aquifer produces large quantities of water over a large area. In local areas, the Trinity Aquifer acts like a minor aquifer in that it yields a small amount of water over a large area or a large amount of water over a small area. Yields in the aquifer can vary considerably over short distances due to heterogeneities in the water bearing formations, fracture-controlled flow, and dissolution features, as well as lithology (Mace and others, 2000). The Middle Trinity Cow Creek Formation is the primary groundwater producer in western Hays County. Two important artesian springs, Pleasant Valley Spring and Jacobs Well Spring, are believed to be sourced from the Cow Creek. Groundwater production from Trinity Aquifer wells in the District is used primarily for municipal, rural domestic, and livestock uses although there has been a marked increase in use for vineyard cultivation over the past decade.

Upper and Middle Trinity Aquifers

Aquifer thickness for the combined Upper and Middle Trinity aquifers within the District ranges from 400 to 600 feet but varies according to topography and geology. The section thickens basinward, from west to east.

The Upper Trinity Aquifer is composed of the upper member of the Glen Rose Limestone (Ashworth, 1983). In Hays County, the upper member consists of alternating beds of marl, dolomitic shale, dolomite, and nodular limestone. In addition, the basal section contains two distinct evaporite zones composed of dolomite, dolomitic mudstone, and anhydrite beds (Stricklin and others, 1971; Bluntzer, 1992). The Middle Trinity Aquifer in Hays County is composed of (from youngest to oldest) the lower member of the Glen Rose Limestone, the Hensel Formation, and the Cow Creek Formation (Figure 6) (Ashworth, 1983). The division between the Upper and Lower Glen Rose Limestone / Upper and Middle Trinity Aquifers, is defined by a laterally continuous limestone bed of "*Corbula martinae*" fossils (Whitney, 1952; Stricklin and others, 1971; Bluntzer, 1992). In some hilltop areas, the Upper Trinity Aquifer (Upper Glen Rose Formation) is capped by an erosional remnant of the Edwards Group. The primary sources of recharge to the Trinity Aquifer are from rainfall on the outcrop and infiltration through creek bottoms along losing sections of headwater creeks (DeCook, 1960; Mace and others, 2000). The outcrops that receive the most direct recharge are composed of the Glen Rose Limestone and Hensel Formation. Beds of relatively low-permeability marl sediments within the upper member of the Glen Rose Limestone impede downward percolation of interstream recharge and provide for baseflow and springflow to the mostly gaining perennial streams that drain the Hill Country (Mace and others, 2000). Recent surface studies have identified fracturing in the more competent limestone and dolomite units. These structural features have been shown to provide pathways for vertical fluid migration, most notably in the Onion Creek and Cypress Creek watersheds (Hunt and others, 2016; Watson and others, 2018, Gary and others, 2019). The extent of the Upper Trinity aquifer is limited areally and generally behaves as a shallow perched system that is unreliable during dry conditions. The Middle Trinity aquifer may behave locally as an unconfined aquifer, but more typically the Lower Glen Rose and Cow Creek, behave as confined to semi-confined aquifers.

Ashworth (1983) reports that in some areas, “caverns formed by the solution of limestone and evaporite by groundwater are common in the Trinity formations, particularly in the Glen Rose Limestone. These caverns are characteristically influenced by the jointing structure of the limestone and may extend both vertically and laterally for great distances and provide major conduits for the flow of ground water. When caverns grow to such a size as to no longer support their overburden, they collapse thus forming sinkholes that are visible from the surface as circular depressions that may transmit large quantities of surface water to a passage below ground. Sinkholes are a common occurrence in streambeds flowing over the Glen Rose Limestone and provide a passageway for a substantial amount of recharge to the aquifer.”

Lower Trinity Aquifer

The Lower Trinity Aquifer in Hays County is a confined aquifer separated from the Middle Trinity Aquifer by the Hammett formation, which acts as a confining bed (aquitard) and typically ranges in thickness from 30 to 60 feet. Below the Hammett shale are the Lower Trinity Aquifer members: the Sligo Formation, a sandy, dolomitic limestone of 50 to 70 feet in thickness; and the Hosston/Sycamore, sandstone, shale, dolomite and conglomerate formation of 150 to 250 feet in thickness (Figure 6) (Stricklin and others, 1971). The Lower Trinity yields small to large quantities of fresh to slightly saline water (Bluntzer, 1992). Isotope age dating of waters from the different aquifers in the Trinity have shown the Lower Trinity water to be much older than the Middle Trinity water (Wierman and others, 2010). Over the past 10-15 years the Lower Trinity Aquifer has taken on a greater role in providing groundwater to residents of western Hays County. Production is primarily from Hosston coarse, siliciclastic conglomerate. Water quality may be poor with high total dissolved solids (TDS) concentrations and sulfate concentrations.

Regional Groundwater Flow

According to Ashworth (1983), “Water entering the Trinity Aquifers generally moves slowly down-dip to the south and southeast. Regional water-level measurements indicate an average water-table gradient of 20 to 25 feet per mile. In areas of continuous pumpage, however, the groundwater will flow towards these points of discharge. Locally, groundwater movement is also toward the points of natural discharge through springs.”

Groundwater flow in the District generally follows the structural dip of the Trinity rocks from northwest to southeast until intersecting the northeast striking Balcones Fault Zone (BFZ). Down-dropped fault blocks along the BFZ created a juxtaposition of younger Edwards Aquifer bedrock against older Trinity rocks (Wierman and others, 2010). The Wimberley and Tom Creek are the two major fault zones within the District that increase in throw along strike. This pattern is consistent with a relay ramp structural feature that, if the throw is enough to offset the hydrostratigraphic units, groundwater flow will be redirected along strike of the fault zones (Wierman and others, 2010; Hunt and others, 2015).

Along the District’s eastern boundary, the Upper and Middle Trinity aquifers contribute groundwater to the Edwards Aquifer along the BFZ. Hydraulic and chemical studies have focused on the Glen Rose Limestone as the main source of Trinity Aquifer flow to the Edwards (BFZ) Aquifer (Long, 1962; Walker, 1979; Senger and Kreitler, 1984; Veni, 1994; Mace and others, 2000). The volume of Trinity Aquifer water that recharges the Edwards (BFZ) Aquifer is not well understood, but most estimates indicate that it constitutes a small percentage of total recharge to the Edwards (BFZ) Aquifer (Lowry, 1955; Woodruff and Abbott, 1986; LBJ-Guyton Associates, 1995; Mace and others, 2000). Mace and others (2000) note that “part of this groundwater moves into the Edwards through faults, and part continues to flow in the Trinity Aquifer beneath the Edwards." Recent exploration drilling in the area (2013-2015) has encountered substantial flows of groundwater in the Middle Trinity, Cow Creek Formation. The Trinity Hill Country GAM was calibrated with 12 percent and 14 percent of the precipitation recharge to the Upper and Middle Trinity aquifers, respectively, discharging to the Edwards (BFZ) Aquifer (Mace, 2003).

TWDB rules require that groundwater conservation district management plans address specifically defined estimates and projections relating to present and projected water use. Definitions of these categories of estimates and projections are taken from 31 TAC §356.1–356.10 and from the TWDB planning division data table definitions.

PLANNING

Definitions of Planning Estimates and Projections

- <u>Amount of Groundwater Being Used</u>: The quantity of groundwater withdrawn or flowing from an aquifer naturally or artificially on an annual basis.

- <u>Artificial Recharge</u>: Increased recharge accomplished by the modification of the land surface, streams, or lakes to increase seepage or infiltration rates or by the direct injection of water into the subsurface through wells.

- <u>Projected Water Demands</u>
  WATER DEMAND- Quantity of water projected to meet the overall necessities of a water user group in a specific future year. (*From the 2017 State Water Plan Glossary* See 2017 State Water Plan Chapter 3 for more detail.) **Additional explanation**: These are water demand volumes as projected for specific Water User Groups in the 2017 Regional Water Plans. This is not groundwater pumpage or demand based on any existing water source. This demand is how much water each Water User Group is projected to require in each decade over the planning horizon.

- <u>Projected Surface Water Supplies</u>
  EXISTING [surface] WATER SUPPLY- Maximum amount of [surface] water available from the existing sources for use during drought of record conditions that is physically and legally available for use by a water user group. (From the 2017 State Water Plan Glossary: See 2017 State Water Plan Chapter 5 for more detail.) **Additional explanation**: These are the existing surface water supply volumes that, without implementing any recommended WMSs, could be used during a drought (in each planning decade) by Water User Groups located within the specific geographic area.

- <u>Projected Water Supply Needs</u>
  NEEDS- Projected water demands in excess of existing water supplies for a water user group or a wholesale provider. (From the 2017 State Water Plan Glossary: See 2017 State Water Plan Chapter 6 for more detail.) **Additional explanation**: These are the volumes of water that result from comparing each Water User Group's projected existing water supplies to its projected water demands. If the volume listed is a negative number, then the Water User Group shows a projected need during a drought if they do not implement any water management strategies. If the volume listed is a positive number, then the Water User Group shows a projected surplus. Note that if a Water User Group shows a need in any

decade, then they are considered to have a potential need during the planning horizon, even if they show a surplus elsewhere.

- Water Management Strategies
  RECOMMEDED WATER MANAGEMENT STRATEGY- A plan or specific project to meet a need for additional water by a discrete water user group, which can mean increasing the total water supply or maximizing an existing supply. (From the 2017 State Water Plan Glossary: See 2017 State Water Plan Chapter 7 for more detail.) **Additional explanation**: These are the specific water management strategies (with associated water volumes) that were recommended in the 2017 Regional Water Plans.

- Modeled Available Groundwater (MAG): The amount of water that the TWDB executive administrator determines may be produced on an average annual basis to achieve a desired future condition.

- Recharge: The amount of water that infiltrates to the water table of an aquifer (from Chapter 36 – Subchapter A - Rule 356.2) Recharge may originate from various sources including precipitation directly onto a formation, seepage or infiltration to an aquifer from the land surface, streams, or lakes or indirectly by way of leakage from another formation.

- Modeled Available Groundwater (MAG) Estimates**:** Code/statute: The following review of the HTGCD MAG complies with 31 TAC 356.52 (a)(5)(A) and TWC 36.1071 (e)(3)(A); DFC established under Section 36.108.

- Desired Future Conditions: Desired Future Conditions are defined in Title 31, Part 10, 356.10 (6) of the Texas Administrative Code as “the desired, quantified condition of groundwater resources (such as water levels, spring flows, or volumes) within a management area at one or more specified future times as defined by participating groundwater conservation districts within a groundwater management area as part of the joint planning process” (TWDB Groundwater Resources Division). The Hays Trinity Groundwater Conservation District is part of Groundwater Management Area 9; The Hill Country Trinity Aquifer is the sole aquifer within the District. On July 26, 2010 GMA 9 adopted the following Desired Future Conditions (DFC): “…allow for an increase in average regional drawdown of approximately 30 feet through 2060 consistent with Scenario 6 in TWDB Draft GAM Task 10-005.” Within the District, average drawdown is calculated at 19.2 feet.

Resulting Average Water Level Decline in All Layers of Trinity after 50 years (from 387 simulations)

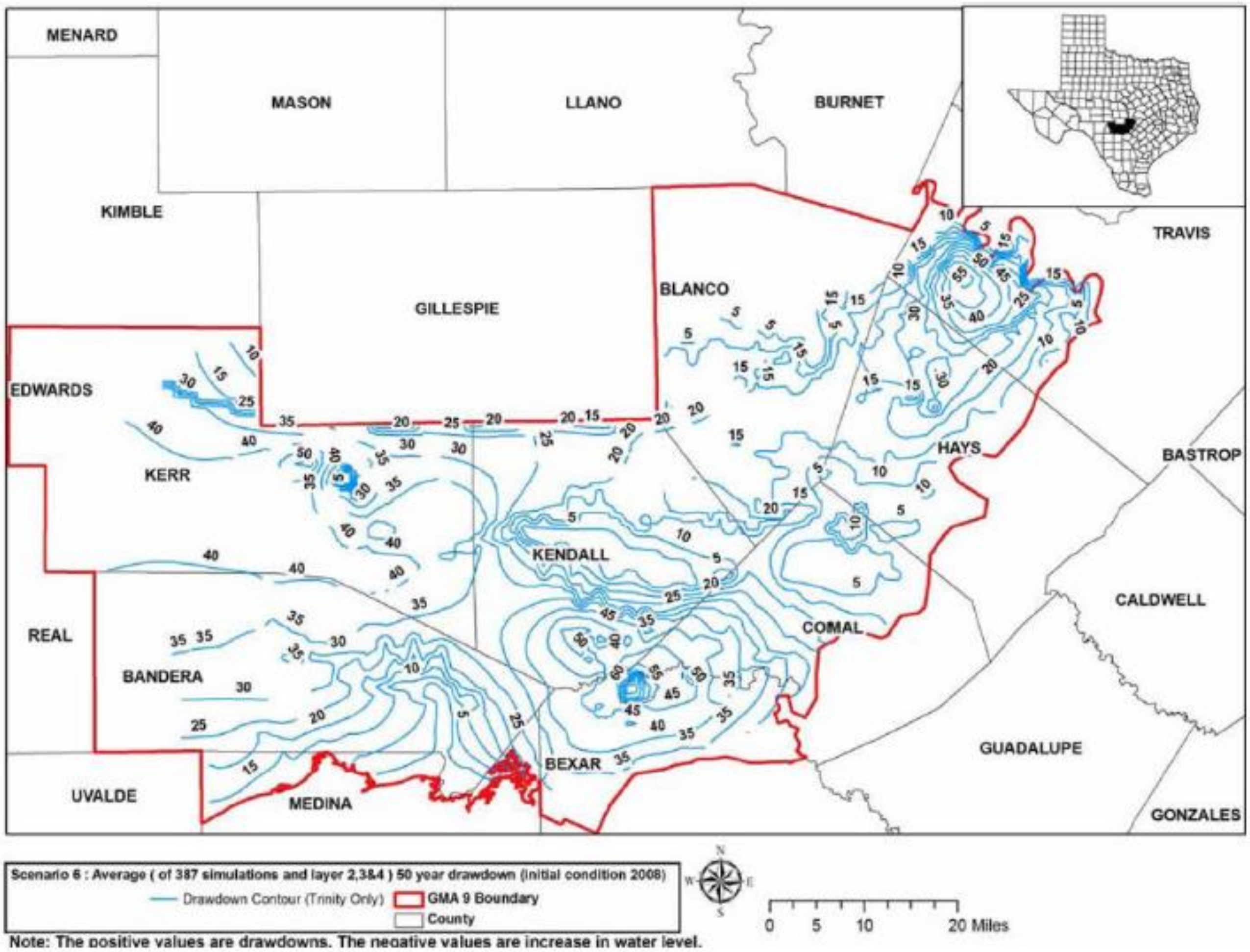

Figure 7: Average Water Level Drawdown Contour Map: Scenario 6, GMA9

Modeled Available Groundwater (MAG): The MAG is the total amount of groundwater, including both permitted and exempt uses that can be produced from the aquifer in an average year that achieves a DFC. The MAG for the HTGCD was derived from the Hill Country Trinity Groundwater Availability Model (Version 2.01) run by the TWDB. A groundwater model is a regional groundwater flow model based on the USGS MODFLOW codes that has been accepted by the TWDB for groundwater planning purposes. MODFLOW is the most widely used program in the world for simulating groundwater flow.

GAM RUN 16-023 MAG establishes the Modeled Available Groundwater for the HTGCD. A copy of the complete MAG report can be found in Appendix B with values for years 2010, 2020, 2030, 2040, 2050, and 2060. For 2010, the Trinity MAG for the District was 9,109 ac-ft/year. This amounts to about 10% of the GMA 9 MAG of 93,052 ac-ft/year for the Trinity Aquifer; for 2060 the District figure is 9,094 ac-ft/year. As the totals vary slightly with each model run, the HTGCD Board adopted 9,100 ac-ft/year as the District MAG.

The District has a goal of sustainable management of the Trinity Aquifer. Sustainability in a desired future condition is expressed as maintaining a certain DFC in perpetuity (Petrossian and others, 2007). Sustainability is defined by the USGS as "… the development and use of groundwater in a manner that can be maintained for an indefinite time without causing unacceptable environmental, economic or social consequences". The HTGCD undertakes the management of the MAG over the planning period as a sustainable goal.

The following table (Table 1) shows total estimated pumpage over a 11-year period, 2009 – 2019, compared with the MAG. The table is divided into estimated exempt and reported non-exempt pumping for the period. In addition, the District has added "non-reported" non-exempt pumping in an attempt to approximate actual groundwater production by recognizing multiple small, "non-permitted" users. Year-end 2019 indicates an estimated "Net Available Groundwater" (MAG-Total pumpage) value of 1,390 ac-ft. By 2060 or earlier, the table projects that the DFC is achieved with total pumpage reaching 9,094 ac-ft/year.

Table 1. Available Groundwater HTGCD – Trinity Aquifer (ac-feet/year).

	Year-End 2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		2060
Modeled Available Groundwater (1)		9,109	9,109	9,109	9,109	9,109	9,109	9,109	9,109	9,109	9,109		9,094
													Projected
Exempt Use: Domestic/Agricultural	3,300 (2)	3,322	3,358	3,398	3,448	3,495	3,542	3,577	3,616	3,663	3,716 (4)	2,068	5,784 (3)
Non-Exempt Use: Permitted (5)	1,860	1,877	2,442	2,451	2,854	2,989	3,310	3,326	3,545	3,741	3,903	-593	3,310
Non-Exempt Use: No Permit -Estimated (6)	100	100	100	100	100	100	100	100	100	100	100		0
Non-Exempt Use: Reporting - No Permit (7)	482	364	306	235	19	2	3	4	0	0	0		0
Sub-Total Committed	5,742	5,663	6,206	6,184	6,421	6,586	6,955	7,007	7,261	7,504	7,719		
Net Available Groundwater (MAG-Sub-Total)		3,446	2,903	2,926	2,688	2,523	2,154	2,102	1,848	1,605	1,390		
Actual Production Reported: Acre Feet	1,987	1,796	2,004	1,691	1,599	1,532	1,537	1,586	1,815	1,904	1,940		

2009 = 99 Well Construction Notifications or 37AF
2010 = 59 Well Construction Notifications or 22 AF
2011 = 96 Well Construction Notifications or 36 AF
2012 = 107 Well Construction Notifications or 40 AF
2013 = 135 Well Construction Notifications or 50 AF
2014 = 126 Well Construction Notifications or 47 AF
2015 = 127 Well Construction Notifications or 47 AF
2016 = 95 Well Construction Notifications or 35 AF
2017 = 105 Well Construction Notifications or 39 AF
2018 = 126 Well Construction Notifications or 47 AF
2019 = 144 Well Construction Notifications or 53 AF
2020 = 0 Well Construction Notifications or 0 AF
2021 = 0 Well Construction Notifications or 0 AF
2022 = 0 Well Construction Notifications or 0 AF
2023 = 0 Well Construction Notifications or 0 AF
2024 = 0 Well Construction Notifications or 0 AF

(1) 9,109 AF/YR is an average value of values provided by the TWDB for years 2010-2060. GAM Run 16-023 MAG calculations.
(2) Approved by the HTGCD Board of Directors on April 25, 2011.
(3) Used HDR's NA Case 5,784 (Water-Wastewater Plan for Hays County, 2011); Not reserved for exempt use
(4) Newly Registered Exempt Use wells in 2019 (144 x 330 gpd x 365) / 325,851
(5) Total AF permitted for pumping in existing operational permits
(6) Non-Exempt Use: not permitted and not reporting; Goal: permit users and move 100 AF towards 0 AF
100 AF calculated: Identified & Under Investigation = 50 cases @ 2 AF each = 100 AF
(7) Non-Exempt Use: reporting but not permitted; Goal: permit users and move 4 AF towards 0 AF

TWDB GAM Run 19-026, January 2, 2020
Hill Country portion of the Trinity Aquifer System

Summary

"Texas State Water Code, Section 36. 1071, Subsection (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 TWDB." In compliance with the Texas State Water

Code, the HTGCD received GAM Run 19-026, from the TWDB in May 2015. Please refer to a more detailed discussion in the GAM report in Index B.

Results:

The Hill Country portion of the Trinity Aquifer System GAM results for selected groundwater budget components can be found in Table 2 (Bond, 2020). The Hickory Aquifer GAM results for selected groundwater budget components can be found in Table 3 (Bond, 2020).

Table 2. Summarized Information for the Hill Country portion of the Trinity Aquifer (Bond, 2020). All values are reported in acre-feet per year and rounded to the nearest acre-foot.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Trinity Aquifer	26,105
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Trinity Aquifer	22,439
Estimated annual volume of flow into the district within each aquifer in the district	Trinity Aquifer	17,716
Estimated annual volume of flow out of the district within each aquifer in the district	Trinity Aquifer	11,610
Estimated net annual volume of flow between each aquifer in the district	From the Trinity Aquifer to the Edwards (Balcones Fault Zone) Aquifer	7,440*

* in the Hays Trinity Groundwater Conservation District, groundwater generally flows east from the Trinity Aquifer to the Edwards (Balcones Fault Zone) Aquifer and the confined parts of the Trinity Aquifer that underlie the Edwards (Balcones Fault Zone) Aquifer.

Table 3. Summarized Information for the Hickory Aquifer (Bond, 2020). All values are reported in acre-feet per year and rounded to the nearest acre-foot.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Hickory Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Hickory Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Hickory Aquifer	2,798
Estimated annual volume of flow out of the district within each aquifer in the district	Hickory Aquifer	4,336
Estimated net annual volume of flow between each aquifer in the district	From overlying units into the Hickory Aquifer	1,603
	To underlying units from the Hickory Aquifer	66

Limitations:

"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." "Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow…" "Because the application of the groundwater models was designed to address regional-scale questions, the results are most effective on a regional scale." (Bond, 2020)

"They –models- can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions." (The National Research Council, 2007)

Estimated Historical Water Use in the District – HTGCD

The TWDB provided Historical Water Use Survey (WUS) data (Appendix A). The data for years 2002-2017 was taken from total Hays County numbers (county-based) and modified by the TWDB with an apportioning multiplier (55.15%) to create new values that represent district geographic boundaries (HTGCD was calculated to include 55.15% of Hays County).

Groundwater Use in the District

The District has compared the detailed WUS dataset (available online) with in-house values taken from reported non-exempt well pumpage and estimated exempt well pumpage. The TWDB yearly totals, shown in Appendix A, Report 1, are high for the following suggested causes:

1. WUS dataset includes Hays County-based data from aquifers that do not occur within HTGCD boundaries – Edwards and Trinity/Edwards Plateau. The apportionment inflates actual water use in the District where pumpage is limited to the Trinity Aquifer.
2. WUS distributes values for Mining and Steam Electric activities that do not occur within the District.

The HTGCD concludes that the WUS county-wide data is appropriate for Hays County and regional planning but that values taken from local pumpage reports and estimates is more representative of District historical groundwater use. Estimated District pumpage for the period 2009-2019 is shown in Table 1. Total 2013 groundwater pumpage for example, is estimated at 5,147-acre feet/year. TWDB water use for 2013 is 7,670-acre-feet/year as shown in the WUS report.

Surface Water Use in the District

The sole provider of raw surface water to the District during 2019 was the Lower Colorado River Authority (LCRA). All of the surface water originates from the Highland Lakes. The sole agency transporting treated surface water to customers in the District was West Travis County Public Utility Agency (WTCPUA). Only that portion of western Hays County within Region K planning area is served by surface water. There were no surface water supplies provided to the local Region L planning area, although there may have been minor amounts taken from the Blanco River for limited use. There are several major providers in eastern Hays County that service communities along the I-35 corridor.

The LCRA “290 Pipeline” began water service to the Dripping Springs area in 2002. At that time, the LCRA purchased the Hill Country Water Supply Corporation. In November 2010, the LCRA announced its intent to divest itself of 32 water and wastewater systems, including the West Travis County Systems. In 2011-2012, the system was purchased by the newly formed WTCPUA. The WTCPUA is a publicly owned water and wastewater utility that serves western Travis and northern Hays Counties. As of August 2020, it provides service for 8,219 retail water customers and 9,159 wholesale water customers. In 2014 the WTCPUA had one retail customer and six wholesale customers either partly or entirely within the HTGCD boundary. As of August 2020, the 290 Pipeline provides surface water to the Dripping Springs Water Supply Corporation (DSWSC); and had 4,854 retail water customers and 5,514 wholesale water customers.

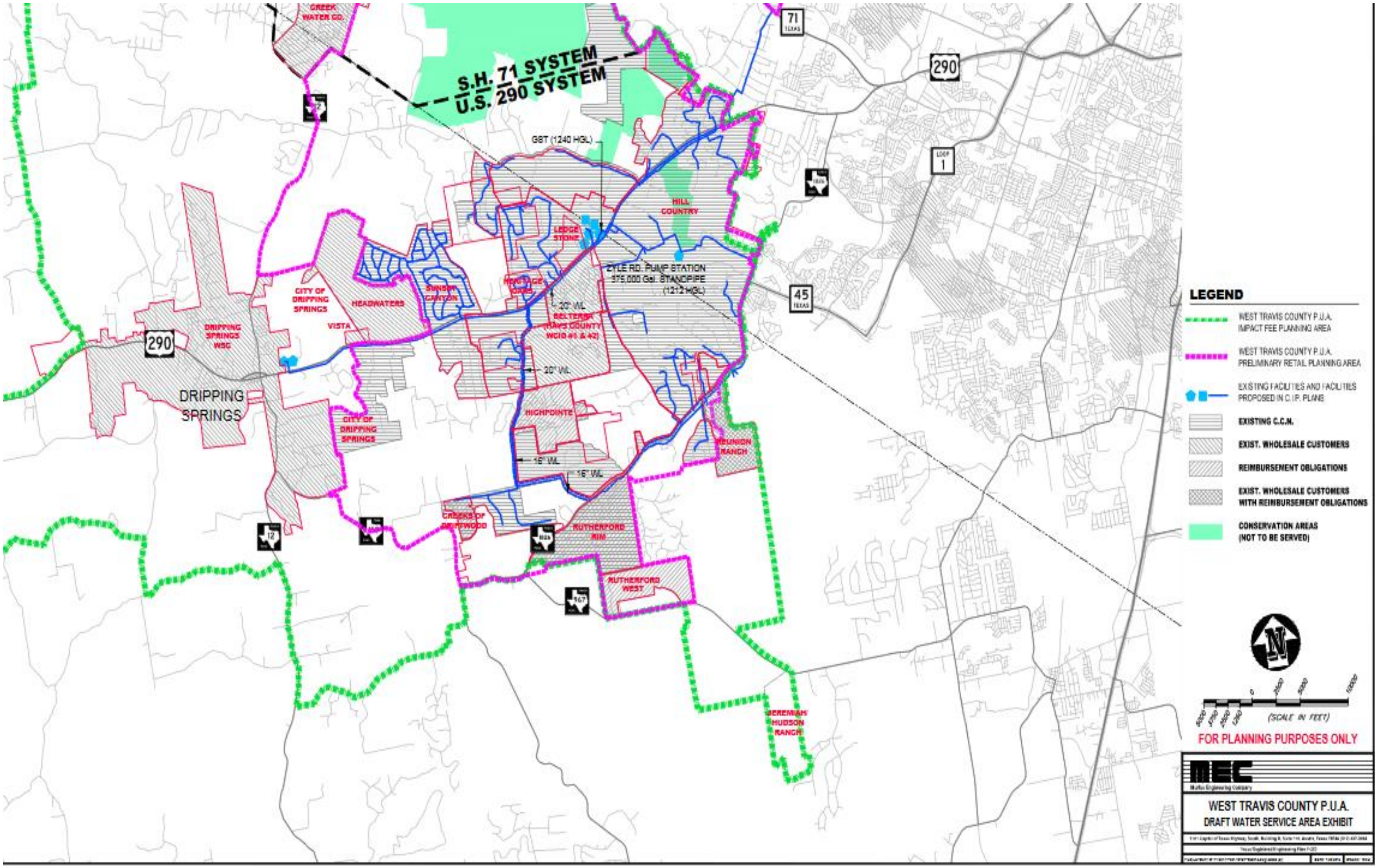

Figure 8: WTCPUA Boundaries

Map provided by WTCPUA website

Table 4 shows total surface water usage reported in the District during 2019. The data was obtained from the WTCPUA. The 2,627 acre-feet (rounded up) total surface water used in the District during 2019 is far less than the values listed in TWBD's Historical Water Use Survey (Appendix A). The discrepancy may be due to the large volume of surface water supplied to customers in eastern Hays County. An apportionment based on geographic area (55.15%) would not be a true accounting of surface water use.

Table 4: WTCPUA – 2019 Summary of Total Billed Consumption by Customer: Acre-Feet / Year

	Total (1)	Estimate within District (2)
Retail Water		
HPR/290	1,427	786 (at the 55.15% factor)
Wholesale Water		
City of Dripping Springs	27.3	27.3
Deer Creek	172.2	172.2
DSWSC	679	679
Hays WCID 1	430	430
Hays WCID 2	417	417
Reunion Ranch	85.5	17
Headwaters MUD	98	98
Total Acre-Feet/Year	**3,336**	**2,626.5**

(1) Data from West Travis County Public Utility Agency, Billing Summary Report by customer, courtesy of Jennifer Riechers, General Manager
(2) Estimated Percentage within HTGCD from Agency maps.

For data on historical surface water use in the District, Dripping Springs Water Supply Corporation (DSWSC) provided **Table 5**. The table covers the period 2009 – 2020 and identifies "Surface Water Supplier" and "Total Water Used". Prior to 2012 the LCRA provided both raw and treated water to DSWSC. After 2012, treated water was provided by WTCPUA. During 2013 for example, DSWSC's contract for firm water was for 1120 acre-feet/year; they used only 403 acre-feet.

Table 5: DSWSC Surface Water Use

	Surface Water Supplier	**Total Used- gallons**	**Acre-Feet**
2009	LCRA raw, LCRA treated	87,786,163	269
2010	LCRA raw, LCRA treated	105,898,201	325
2011	LCRA raw, LCRA treated	154,318,719	474
2012	LCRA raw, WTCPUA treated	155,340,050	477
2013	LCRA raw, WTCPUA treated	131,360,239	403
2014	LCRA raw, WTCPUA treated	146,797,396	450
2015	LCRA raw, WTCPUA treated	177,616,750	545
2016	LCRA raw, WTCPUA treated	207,973,750	638
2017	LCRA raw, WTCPUA treated	221,774,757	681
2018	LCRA raw, WTCPUA treated	207,245,813	636
2019	**LCRA raw, WTCPUA treated**	**234,613,101**	**720**
2020	**LCRA raw, WTCPUA treated**	**144,185,100**	**442 (through August)**

Note: above data provided by DSWSC

Projected Surface Water Supplies within the District - HTGCD

TWDB Report 2, Appendix A shows projected surface water supplies derived from the TWDB 2017 State Water Plan covering the period 2020 - 2070. These values are the maximum amount of surface water available from existing sources for use during drought of record conditions that are physically and legally available for use ("Definitions" pages 13-14). Values for water user groups outside District boundaries are not included in Report 2. For this report, Hays County-wide water user group (WUG) data values (county-other, irrigation and livestock) are modified using the multiplier (55.15%). WUG values for municipalities, water supply corporations, and utility districts represent projected District supplies. Surface water supplies for the Colorado WUG Basin are primarily from Highland Lakes reservoirs. There are no supplies indicated for the Guadalupe WUG Basin other than minor amounts for irrigation and livestock. Total projected surface water supplies for the District are 8,461 acre-feet/year for 2020 and 9,715 acre-feet/year for 2070.

Projected Total Demand for Water within the District - HTGCD

TWDB Report 3, Appendix A, is derived from the TWDB 2017 State Water Plan data covering the period 2020 - 2070. Hays County-wide data was apportioned to the District by the TWDB using the multiplier described above. Total water demand within the District is projected to increase from 10,795 acre-feet/year in 2020 to 39,900 acre-feet/year in 2070. The water demand is the "quantity of water projected to meet the overall necessities of a water user group in a specific future year"… "This demand is how much water each water user group is projected to require in each decade over the planning horizon." (Definitions)

Projected Water Supply Needs - Hays County

Report 4, Appendix A, is derived from the TWDB 2017 State Water Plan data. All values are shown as Hays County totals and are not broken out by surface and groundwater. As stated in the report, "negative values (in red) reflect a projected water supply need, positive values a surplus." Data values are modified using the multiplier (55.15%). 2020 total values are shown as negative 580 acre-feet/year in 2020 and increase to a negative 57,222 acre-feet/year by 2070.

Projected Water Management Strategies – Hays County

The TWDB supplied Report 5 is included in Appendix A. It is derived by the TWDB from the 2017 State Water Plan data and covers the period – 2020 - 2070. All values are reported as Hays County totals. The source or origin of the water is broken out by each user. Within the HTGCD all listed users incorporate strategies that specify drought management, conservation, Trinity Aquifer supply expansion, or out of District surface or groundwater supplies. The sum of water management strategies for County Wide "County Other" using the 0.5515 factor is 14,073 acre-feet/year in 2020 and 88,522 acre-feet/year in 2070.

Given the projected population increase (**Table 6**), economic growth and water demand in Hays County, it will require innovative water management strategies to meet future community needs. Groundwater supply in western Hays County is limited to the Trinity Aquifer. The Modeled Available Groundwater for the Trinity Aquifer in the District is estimated at 9,100 acre-feet/year. As recognized by the Hays Trinity Groundwater Conservation District 2019 Annual Report, District permits and estimated exempt use are approaching 7,900 acre-feet/year. According to information found in the 2017 State Water Plan, the most profound needs looking into the future will be faced by municipal utilities. Into 2070, the West Travis County PUA plans to meet those demand shortfalls with a combination of Conservation (7,674 acre-feet/year), water from the LCRA's new Lane City Reservoir (5,800 acre-feet/year), and Drought Management (3,302 acre-feet/year). Current pumpage (Table 1) and projected exempt and non-exempt forecast pumpage, leave no room for additional groundwater resources without a revision of the Hill Country Trinity GAM or the DFC. Groundwater can play an important role in rural domestic and agricultural water supply and in providing adequate base flow to streams and springs; it cannot satisfy the water supply requirements of projected growth. "Primary concern with the Trinity Aquifer is anticipated water-level decline during drought conditions due to increased demand… water levels in the Dripping Springs area of Hays County could decline more than 100' by 2040." (Region K, 2016 Initially Prepared Plan)

Table 6. Capital Area Council of Governments HTGCD population forecast.

Water User Group	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, HAYS (partial)	12,369	7,314	14,969	19,911	43,626	73,538
DEER CREEK RANCH WATER	331	392	451	494	529	569
DRIPPING SPRINGS WSC	11,000	18,500	24,000	31,000	39,500	44,000
HAYS COUNTY WCID 1	3,647	3,647	3,647	3,647	3,647	3,647
HAYS COUNTY WCID 2	1,224	1,608	2,041	2,433	3,041	3,732
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	12,788	15,985	17,981	22,131	26,281	30,431
WIMBERLEY WSC	9,178	12,964	17,573	23,336	29,848	37,259
TOTAL	**50,537**	**60,410**	**80,662**	**102,952**	**146,472**	**193,176**

Rainwater collection, land management, water reuse, conservation and drought management planning are necessary District, municipal, and community strategies. Other strategies, such as desalination, aquifer storage and recovery, and weather modification may have to come from other Districts. Overdrafting the Trinity Aquifer during a severe drought by temporarily mining aquifer storage is a "slippery slope" given uncertain recharge and possible head-loss. The aquifer may not recover to pre-drought levels. Referring to the 2017 State Water Plans for Regions K and L, added surface water supplies appear to be the primary water management strategy. For western Hays County the additional supplies could include transferring groundwater from "underutilized" neighboring aquifers to local municipal growth centers.

"Hays County is currently securing water agreements for future supply to meet the needs of the Wimberley/Woodcreek area (Region L), the Dripping Springs area (Region K), and the Hays County-Other category (both Regions L and K)… The County is including a Hays County Pipeline Project as a facilities expansion in order to help move these future supplies into and around the county… There are two pipeline route options being considered," (SCTRWPA Region L, 2016 Initially Prepared Plan, Vol.2, 2015):

1) Option A: 19 mile, 36" diameter………15,314 acre-feet/year
2) Option B: 18 mile, 36" diameter transmission pipeline…….15,321 acre-feet/year.

How Recharge to the Groundwater Resources of the District May Be Increased

The District will solicit ideas and information and investigate natural or artificial recharge enhancement opportunities that are brought to the District's attention. Such projects may include, but are not limited to: cleanup or site protection projects at any identified significant recharge feature, encouragement of prudent brush control practices and re-establishment of native grasses and vegetation, non-point source pollution mitigation projects, aquifer storage and recovery projects, development of recharge ponds or small reservoirs, and the encouragement of appropriate and practical erosion and sedimentation control at construction projects located near surface streams.

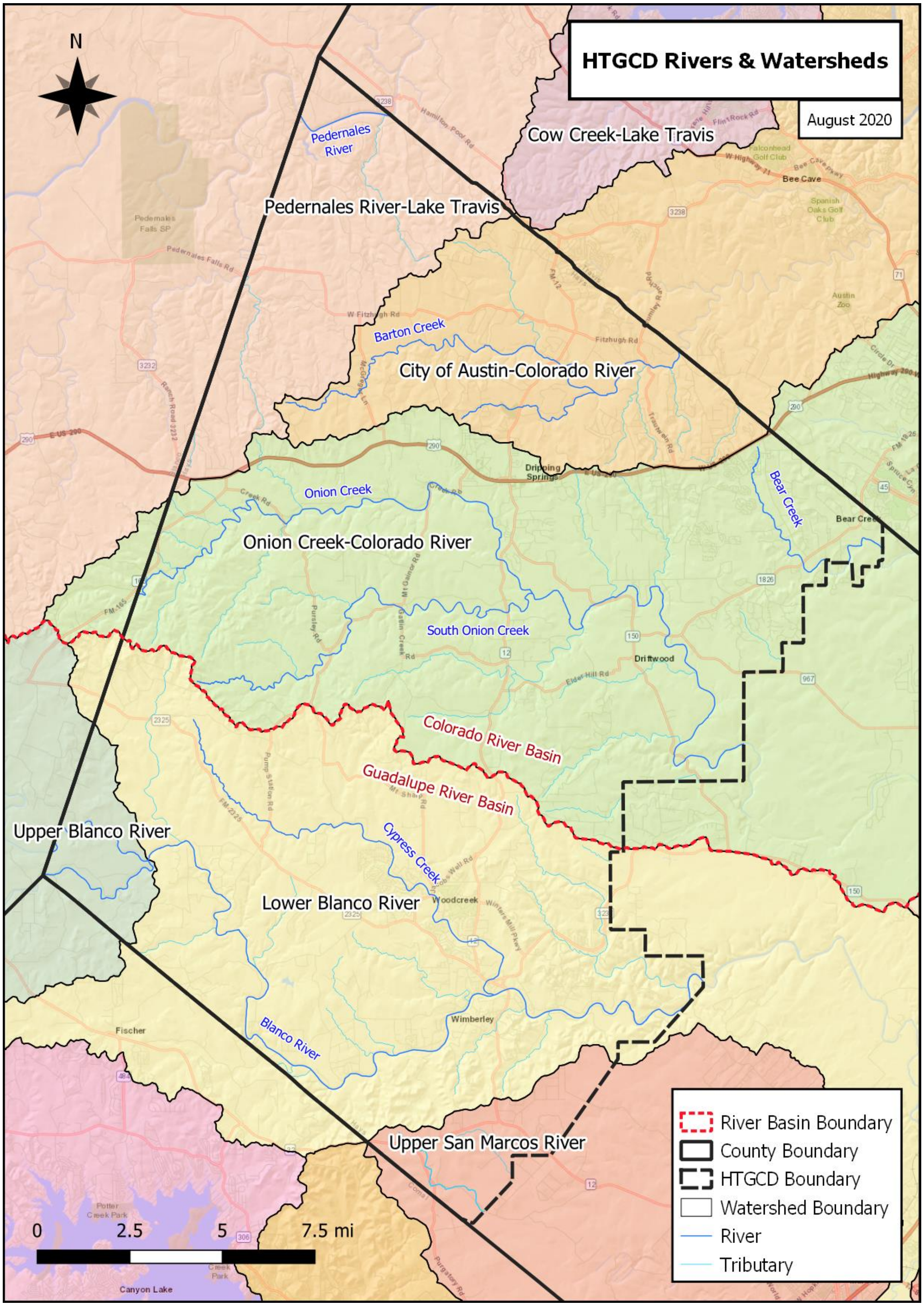

Figure 9: Guadalupe-Blanco River Basin, from GBRA.
Map data provided by TWDB GIS Datasets, ESRI, & HTGCD Staff.

DETAILS ON HOW THE DISTRICT WILL MANAGE GROUNDWATER SUPPLIES

Implementing the Plan

- The District will work to implement the provisions of this plan and will use the plan as a guide for making policy and shaping District activities.
- Planning and operations of the District and agreements entered into by the District will be consistent with this plan.
- The District will cooperate with appropriate state, regional and local water management agencies, and other governmental entities in managing groundwater resources in accord with this plan.
- The management period for this plan is five years. The District shall review and re-adopt this plan, with or without revisions, at least once every five years in accordance with Texas Water Code Chapter 36.1072(e). Any amendment to this plan shall be in accordance with Chapter 36.1073.

District Rules

- The District will adopt rules relating to the prevention of waste, permitting of wells and the production of groundwater for wells within the District. Rules are posted on district's website: http://haysgroundwater.com/files/Rules/2020_Rules_04062020.pdf.
- Any rules adopted by the District shall be pursuant to the District's enabling legislation, Texas Water Code Chapter 36, and the provisions of this plan. All rules will be adhered to and enforced. The promulgation and enforcement of the rules will be based on the best technical evidence available.
- In regulating or limiting groundwater production, the District may consider preserving historic use prior to August 8, 2001 (the effective date of the District's formation) to the extent practicable and consistent with this plan.
- Rules will be critically reviewed and revised to remain current with management plans and direction.

Enforcing Rules

- The District will encourage cooperative and voluntary Rule compliance, but if Rule enforcement becomes necessary, the enforcement will be legal, fair, and impartial.
- The District shall treat all citizens fairly.
- Citizens may apply to the District for discretion in enforcement of the rules on grounds of adverse economic effect or unique local conditions. In granting of discretion to any rule, the Board shall consider the potential for adverse effect on adjacent landowners, spring and surface flow, and potential future groundwater users. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

Managing Groundwater

- The District will administer groundwater supplies with the goal of sustainable management of the Trinity Aquifer MAG, based on the approved DFC, and including a specific focus on base flow contribution to streams and springs. To accomplish this:
- The District will collect, interpret, and use the best available scientific data to determine the most effective regulatory and conservation measures.
- Groundwater within the District will be managed using the most current aquifer data on water availability and groundwater storage conditions.

- During its decision-making process, the District will use information from GAMs, including later versions developed by the TWDB for the Trinity Aquifer system.
- The District will monitor groundwater conditions through its groundwater level monitoring program and will continue to maintain and update the District's database.
- The District will undertake and cooperate with investigations of the groundwater resources within the District as necessary and will make the results of investigations available to the public.
- The District will participate in regional water quality activities with other governmental agencies.
- The District will provide information and promote activities and studies with the goal of conserving and preventing waste of groundwater.

Groundwater Priorities

The District understands that to effectively manage the quantity of groundwater available for future use consistent with the District's guiding principles, groundwater use must be prioritized. The following list of priorities will be used to guide decision making when developing conservation measures, drought contingency planning, and future new groundwater use permitting. Highest priority uses are listed first, followed by lesser priority uses. It must be noted that the list is not absolute and site-specific factors may be considered in the decision-making process.

1. Emergency Locations—Emergency locations include hospitals, critical care facilities, emergency clinics, nursing homes, police and fire departments, and Emergency Medical Services.
2. Domestic Use—The use of groundwater for personal needs or for household purposes such as drinking, bathing, heating, cooking, sanitation, household pets, or cleaning excluding pools/ponds and in-ground sprinkler systems.
3. Livestock—Domesticated horses, cattle, goats, sheep, swine, poultry, ostriches, emus, rheas, exotic deer and antelope, and other similar animals involved in farming or ranching operations.
4. Crop Irrigation—Crop irrigation utilizing drip irrigation systems or other water conserving irrigation practices that minimize evaporative losses (may include nurseries).
5. Commercial—The use of groundwater to supply water to properties or establishments that are in business to
   a. build, supply, or sell products; provide goods, services, or repairs; and that use water in those processes; or
   b. supply water to the business establishment primarily for employee and customer conveniences (flushing of toilets, sanitary purposes, or limited landscape watering).
6. Industrial w/o Mining—Use of groundwater primarily in the building, production, manufacturing, or alteration of products or goods, or to wash, cleanse, cool, or heat such goods or products.
7. Crop Irrigation—Crop irrigation utilizing spray irrigation systems.
8. Irrigation - Ornamental—Use of groundwater to supply water for application to plants or land to promote growth of ornamental plants, turf, or trees.
9. Irrigation – Recreation—Use of groundwater to supply water for golf courses and recreation/sports fields.
10. Car Washes—Use of groundwater for car washes or other high water use cleaning applications.

11. Vanity Ponds/Non-Commercial Fishpond—Use of groundwater to supplement water levels in vanity ponds and non-commercial fishponds.
12. Water Quality Treatment Ponds where other sources of water are available.
13. Mining/Quarry—Dewatering and/or washing activities using groundwater at mining and/or quarry operations.

Critical Groundwater Depletion Areas (Management Zones)

To better manage groundwater resources, the District may establish critical groundwater depletion areas, or management zones, for all sources of groundwater within the District. In each management zone the District may:

1. Develop a DFC, specific to the area, that is responsive to the depletion issue
2. Calculate modeled available groundwater for the specific area
3. Determine and implement the proportional reduction of groundwater use for all classes of groundwater use that are established by the District.

Section 36.116 of the Texas Water Code provides that the District may use the management zones to adopt different rules for each:

1. Aquifer,
2. Aquifer subdivision,
3. Geologic formation, or
4. Geographic area in which any part of 1 through 3 above may occur within the District.

In March of 2020, the District Board of Directors created a stakeholder consensus Jacobs Well Groundwater Management Zone to protect hydrostatic pressure in the Jacobs Well springshed. District Rule 15 designates cutback triggers based on Jacob's Well spring flow. When flows from Jacob's Well average six-cfs or less during any 10-day period, the District Board declares appropriate drought stage.

Aquifer Management

For the purpose of managing groundwater use within the District, HTGCD will define sustainable use of the Trinity Aquifer as the use of an amount of groundwater in the District as a whole or any management zone established by the District that does not exceed:

1. The approved Hill Country Trinity Modeled Available Groundwater (MAG)
2. The District's management goal to maintain base flow contribution to local streams and rivers during a repeat of the drought of record.
3. Any other criteria established by the District as being a threshold of use beyond which further use of the aquifer or aquifer subdivision may result in a specified undesirable or injurious condition.

The District will use the latest TWBD estimates of groundwater recharge, movement, and availability within the District in exercising the statutory responsibility of managing the groundwater in the District. As more information on groundwater conditions in the District becomes available, the District may use that information to refine the specific methodology by which the District will seek to sustainably manage the groundwater in the District.

Groundwater Depletion vs. Sustainability

"To determine groundwater availability, planning groups used one of two policies: sustainability, in which an aquifer can be pumped indefinitely; or planned depletion in which an aquifer is drained over a period of time" (Water for Texas, 2012 State Water Plan).

- The District is opposed to planned depletion (mining) of the Trinity Aquifer as a groundwater management policy. The HTGCD reaffirms its goal of sustainable groundwater management based on an approved and publicly reviewed DFC.

Analysis of Existing and New Data

- Development or analysis of new or existing surface water, groundwater, or aquifer data may result in changes to the groundwater availability volumes, with a corresponding change in production limits from the affected aquifers.

Drought Contingency

- A contingency plan to cope with the effects of water supply deficits due to climatic or other conditions has been developed by the District and will be updated by the Board as new data become available.
- In developing revisions to the drought contingency plan, the District will consider the economic effect of conservation measures upon all water resource user groups, the local implications of the degree and effect of changes in water storage conditions, the unique Hydrogeologic conditions of the Aquifer and the appropriate conditions under which to implement the contingency plan.

METHODOLOGY FOR TRACKING PROGRESS IN ACHIEVING MANAGEMENT GOALS

The District General Manager will prepare and present an Annual Report to the Board of Directors on District performance describing the achievement of management goals and objectives. The presentation of the report will occur annually during a Board meeting once the year's data has been collected and processed. The first and subsequent years will commence on the date of approval of this management plan by TWDB. The report will include the number of instances in which each of the activities specified in the District's management objectives was engaged in during the fiscal year. The Board will maintain the Annual Report on file for public inspection at the District's offices upon adoption. This methodology will apply to all management goals contained within this plan. Note that a shortened version (District Goals, Management Objectives and Performance Standards) of the Annual Report will be available on the HTGCD website.

DISTRICT GOALS, MANAGEMENT OBJECTIVES AND PERFORMANCE STANDARDS

1. **Providing the Most Efficient Use of Groundwater**
   The District will educate the general public on the most efficient uses of groundwater. A District education, outreach, and information-sharing program, covering local groundwater issues, will be continued and strengthened. It will be designed to inform the public and public officials in Hays County

and to add to the geotechnical database of the local water well drilling industry. The program will cover all listed Management goals.

1.1. Management Objective

Each year, the District will hold at least one educational event.

Performance Standard

Each year, a summary of the District educational event will be included in the Annual Report.

2. **Controlling and Preventing Waste of Groundwater**

2.1. Management Objectives

The District will take complaints, from any concerned citizen or entity in the district, about cases of waste or possible waste.

Performance Standard

In each Annual Report, the District will include a discussion of the recent issues with waste and recommend any amendments to the rules to prevent the waste of groundwater.

3. **Controlling and Preventing Subsidence**

The District has considered the vulnerability of the District to subsidence associated with groundwater withdrawals from aquifers in the District, including a review of TWDB's subsidence risk assessment report (LRE Water and others 2017). Essentially, the structurally rigid geologic framework of the region has a low to moderate risk, and there has been no evidence of subsidence in the District occurring as a result of past groundwater withdrawals. Therefore, this goal is not applicable to the District.

4. **Addressing conjunctive surface water management issues.**

The HTGCD supports conjunctive use of groundwater and surface-water throughout the District. Wierman and others (2010) recently published *Hydrogeologic Atlas of the Hill Country Trinity Aquifer* which demonstrates the strong interconnection of groundwater and surface water. From a review of the tables prepared by the TWDB and contained in this management plan (Appendix A), it appears clear that there are not sufficient groundwater resources to support the projected population growth projection in Hays County. Therefore, conservation measures and alternative supplies such as rainwater collection, surface water, reservoir construction, desalinization, and water reuse must be studied and developed. The District will cooperate with surface water providers that wish to provide water to portions of the District that have insufficient groundwater resources. State water law, policy, and management frameworks do not recognize the interconnectedness of ground and surface water resources. Texas regulations, laws, and institutions will have to evolve in order to recognize the interconnectedness of groundwater and surface water resources so that these resources can be conjunctively managed to sustain Texas and her economies. District rules and policies concerning conjunctive use will evolve as State water law, policies and management frameworks evolve.

4.1. Management Objective

The District promotes the use of surface water or other alternatives to groundwater in growing areas where groundwater demand is projected to lower the water tables and to reduce stream and spring flow to unacceptable levels.

Performance Standard

The District will strive to meet with the planning departments of major surface water providers within the District at least once per year. The District will provide a summary of these meetings and their outcomes in the Annual Report.

5. **Addressing Natural Resource Issues that Impact the Use and Availability of Groundwater or Are Impacted by the Use of Groundwater**

The term "natural resource issues" is defined (31 TAC 356.10(15)) as "issues related to environmental and other concerns that may be affected by a district's Plan and Rules, such as impacts on endangered species, soils, oil and gas production, mining, air and water quality degradation, agriculture, and plant and animal life." In the District, springs and seeps flowing from outcrop areas of the Upper Trinity Aquifer provide water for local habitat and contribute to base flow to nearby creeks and rivers throughout the GCD. These aquifers are known for low productivity and intermittent availability. They also have zones of poorer quality water that should be isolated from aquifers and zones of significantly better-quality groundwater.

The District recognizes that the residents of the Hill Country take great pride in the rural character of the land and insist on the protection of the environment and related ecosystems. For this reason, the District has a goal of sustainable management of the Trinity Aquifer contribution to stream leakage and stream/spring baseflow during a repeat of the drought of record, and in critical depletion areas, a rate of stream/spring baseflow that maintains a sound ecological environment. The District will plan, develop, and participate in studies related to groundwater quality, availability, and the environment. This will include working jointly with universities, government agencies, private groups, and the public to collect and interpret data from area springs and streams.

5.1. Management Objective

Each year, the District will make at least one endorsement or contribution to ongoing studies of geologic, environmental, or hydrogeologic studies being performed in the district area.

Performance Standard

Each year, a summary of the District's contributions or endorsements of ongoing studies will be included in the Annual Report

6. **Addressing Drought Conditions**

A review of historical rainfall in Hays County, together with analyses provided by TWDB and regional agencies, requires effective planning and management of groundwater resources.

6.1 Management Objective

The District has developed a ***Drought Contingency Plan***[2] to protect and conserve groundwater during critical drought conditions. The plan will be updated as additional data becomes available.

Performance Standard

The District will post a copy of the plan on the HTGCD website and will include an updated Drought Contingency plan, available to end-users, in the Annual Report.

6.2 Management Objective

Each quarter, the District will check the National Weather Service-Climate Prediction Center website http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml for updates of the Palmer Drought Index. The District will download the updated Palmer Drought Severity Index (PDSI) map and check for periodic updates on www.waterdatafortexas.org/drought.

Performance Standard

Quarterly, the District will assess the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps will be included with copies of the quarterly briefing in the District Annual Report to the Board of Directors.

[2] See Website

6.3 Management Objective

Each year, the District will collect monthly water level data from a network of monitoring wells. See Figure 10 for HTGCD monitoring well locations.

Performance Standard

Each year, a report of the District water level collection activities, including a table of the water levels measured in District monitoring wells, will be included in the Annual Report.

6.4 Management Objective

Each year, the District will monitor data collected from the U.S. Geological Survey water-flow monitoring stations on the Blanco River, Pedernales River, Onion Creek, and at Jacob's Well.

Performance Standard

Each year, the District will review the prior year's monitoring data with local, state, or federal organizations and prepare a summary to be included in the Annual Report.

7. **Addressing Conservation**

The 2017 State Water Plan identifies drought management and conservation as projected management strategies for western Hays County.

7.1 Management Objective

Each year, the District will submit one article for publication regarding water conservation to at least one newspaper of general circulation in Hays County.

Performance Standard

Each year, a copy of the article submitted for publication will be included in the Annual Report**.**

8. **Addressing Recharge Enhancement**

Due to the geologic and hydrostratigraphic structure of the Trinity Aquifer, the implementation of significantly effective recharge enhancement to the primary source aquifer may not be practical. Current interpretation of geologic data suggest that downward leakage within the Trinity Group is limited, and the majority of recharge takes place west of the bounds of the HTGCD near the sedimentary wedge-edge of the water bearing rock units through diffuse infiltration. Given the location of suspected recharge and its nature, neither general land management nor focused enhancement practices may be feasible. Therefore, until additional hydrogeologic data is available, this goal is not applicable to the operations of this District.

9. **Addressing Rainwater Harvesting**

The District is committed to promoting water sources that reduce demand on groundwater in the central Texas region. As such, the HTGCD is committed to promoting rainwater harvesting as a source of municipal and residential use.

9.1 Management Objective

Each year, the District will make at least one endorsement or contribution to programs that encourage, install, educate, or assist individuals in the implementation of rainwater harvesting systems in the District area.

Performance Standard

Each year, the District will provide records of contributions or promotions of rainwater harvesting events or companies in its Annual Report.

10. **Addressing Precipitation Enhancement**

The HTGCD does not have the expertise or the funding capacity to pursue rainfall enhancement practices. Therefore, this goal is not applicable to the operations of this District.

11. **Addressing Brush Control**

The District encourages proper land management practices in accordance with current agricultural extension standards. Proper land management promotes recharge and protects against surface water quality degradation. As such, the District will promote and educate the public on proper land management practices.

11.1 <u>Management Objective</u>

The District will attend or contribute to at least one event each year that promotes and educates the public on proper land management practices.

<u>Performance Standard</u>
Each year, the District will provide records of contributions or promotions of land management events or companies in its Annual Report.

12. **Addressing Desired Future Conditions (DFC)**

The HTGCD is an active member of the Groundwater Management Area 9 (GMA-9) and a participant in the group's DFC planning and monitoring program. The GMA-9 DFC was approved by the TWDB in July 2016. The GMA-9 wide DFC is an average of 30-feet of drawdown over 50-years. The HTGCD specific DFC is an average of 19-feet over that time span.

An ongoing monitoring program is essential to ensure DFC compliance. HTGCD maintains an aggressive groundwater-level monitoring program that began in 1999 and records changes in water levels over time throughout western Hays County. The program currently includes 34 wells (Figure 10). Water levels are measured monthly in most wells. The District monitors 16 wells with transducers and 10 with a telemetry system to provide continuous and real-time recordings of water level fluctuations. Hydrographs are created for each well and are posted online. Examples of hydrographs in program wells are shown in figures 11 and 12. The well monitor database was made available to Blanton & LBG Guyton Associates for their analyses of DFC conditions.

12.1 <u>Management Objective</u>

The HTGCD is working within the framework of GMA 9 to upgrade and maintain a well database map and files that will identify all District monitoring wells in the management area. The District will work with GMA-9 and their consultants on an acceptable method to analyze and report drawdown levels relative to the DFC. Deliverables may include potentiometric surface maps of the Middle and Lower Trinity Aquifers and selected hydrographs plus other documents generated by the consultants.

<u>Performance standard</u>

Each year, the District will review the average drawdown of at least two Trinity Aquifer monitor wells, one in each Planning Region, against the DFC projected average regional drawdown for western Hays County. The HTGCD shall provide a summary in its Annual Report.

12.2 <u>Management Objective</u>

The Managed Available Groundwater (MAG) for the Trinity Aquifer in the District is derived from the DFC and requires frequent review against estimated pumpage.

<u>Performance Standard</u>

The HTGCD shall prepare an annual report of MAG estimated pumpage to monitor District compliance. A summary shall be presented to the HTGCD Board and made available to the public and included in the Annual Report.

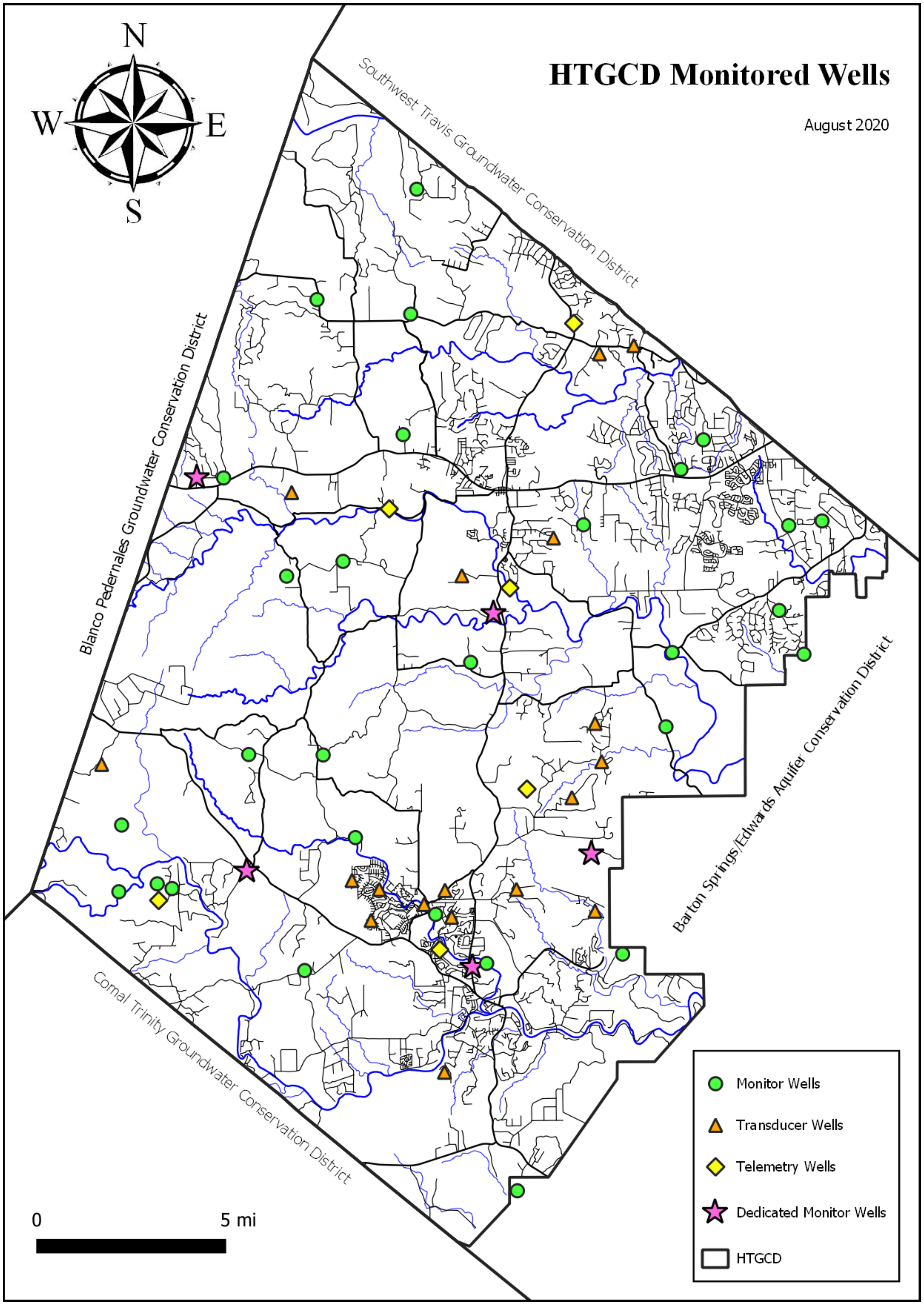

Figure 10: HTGCD Monitored Water Wells (2020)

Map data provided by ESRI, TxDOT, & HTGCD Staff.

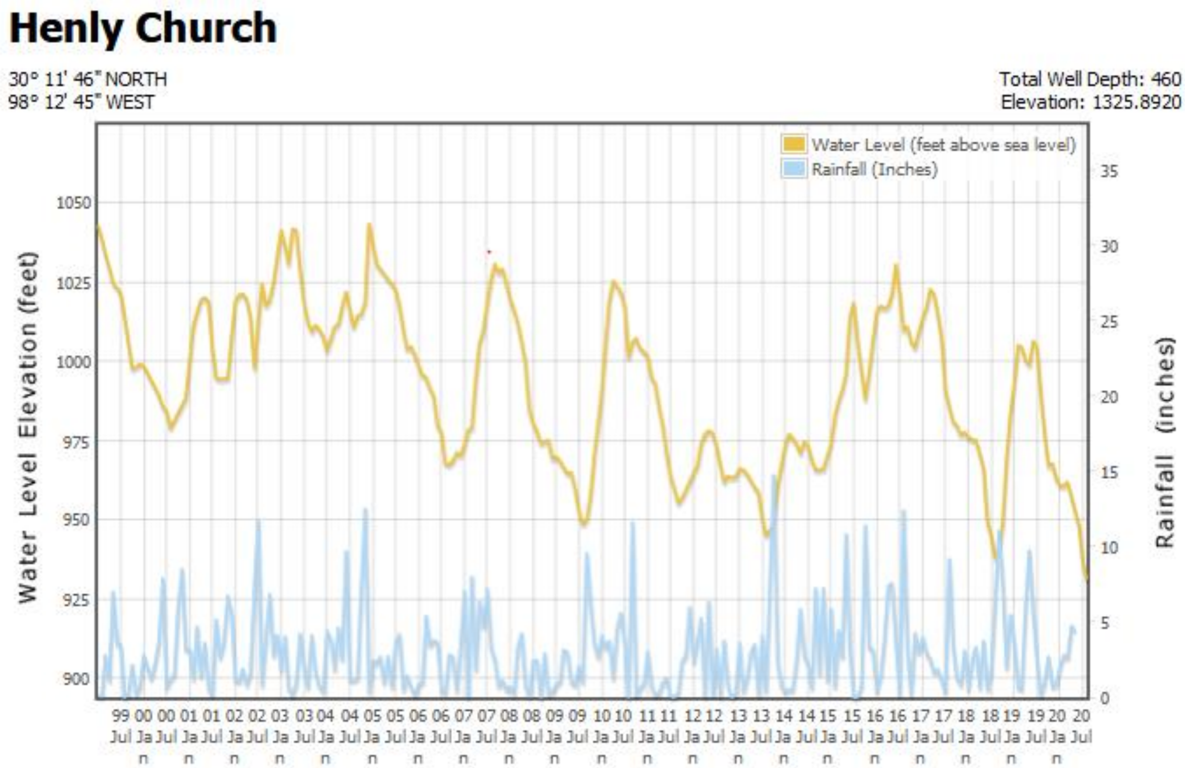

Figure 11: Hydrograph of the Henly Baptist Church monitoring well (1999 – 2020)

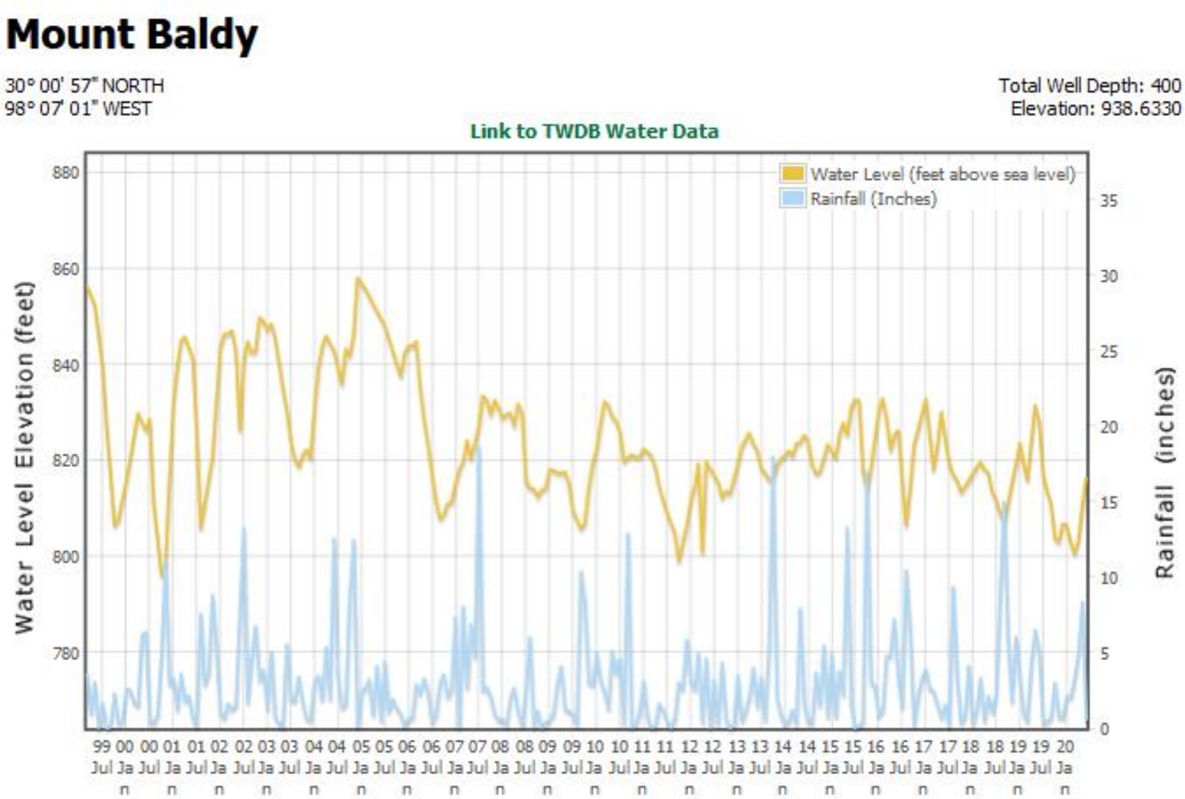

Figure 12: Hydrograph of the Mount Baldy monitoring well (1999 – 2020)

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APPENDICES

Appendix A

Estimated Historical Groundwater Use And 2017 State Water Plan Datasets: Hays Trinity Groundwater Conservation District

Report 1.	Estimated Historical Groundwater Use, 2017: (checklist item 2) from the TWDB Historical Water Use Survey (WUS)
Report 2.	Projected Surface Water Supplies, 2017: (checklist item 6)
Report 3.	Projected Water Demands, 2017: (checklist item 7)
Report 4.	Projected Water Supply Needs, 2017: (checklist item 8)
Report 5.	Projected Water Management Strategies, 2017: (checklist item 9) from the 2017 Texas State Water Plan (SWP)

Appendix B

TWDB GAM Run 16-023 MAG: Modeled Available Groundwater For The Aquifers In Groundwater Management Area 9, February 28, 2017, Jones (https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR16-023_MAG.pdf)

TWDB GAM Run 19-026: Hays Trinity Groundwater Conservation District Groundwater Management Plan, January 2020, Bond (https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR19-026.pdf)

TWDB Checklist

Estimated Historical Groundwater Use And 2017 State Water Plan Datasets:

Hays Trinity Groundwater Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Section
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(512) 463-7317

November 6, 2020

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 2017 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 2017 SWP data available as of 11/6/2020. 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 2017 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 2017 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 2018. TWDB staff anticipates the calculation and posting of these estimates at a later date.

HAYS COUNTY *55.15% (multiplier)* All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2017	GW	5,655	83	190	0	205	43	6,176
	SW	8,895	0	0	558	100	1,365	10,918
2016	GW	5,758	77	146	0	233	49	6,263
	SW	7,471	1	0	767	14	1,710	9,963
2015	GW	4,970	99	165	0	143	48	5,425
	SW	7,641	0	0	877	104	1,645	10,267
2014	GW	5,094	103	206	420	343	47	6,213
	SW	7,313	0	0	0	0	1,775	9,088
2013	GW	6,612	99	206	549	253	44	7,763
	SW	7,225	0	0	0	3	1,537	8,765
2012	GW	7,288	107	272	0	360	38	8,065
	SW	7,353	2	0	0	45	1,352	8,752
2011	GW	7,781	94	185	0	487	55	8,602
	SW	7,391	2	0	0	5	1,290	8,688
2010	GW	7,266	84	372	0	362	55	8,139
	SW	4,821	2	192	0	5	1,511	6,531
2009	GW	6,634	86	365	0	404	167	7,656
	SW	4,826	0	188	0	0	1,573	6,587
2008	GW	6,676	97	358	0	395	165	7,691
	SW	4,385	1	181	0	15	3,517	8,099
2007	GW	5,699	77	185	0	676	173	6,810
	SW	3,845	3	5	0	111	2,137	6,101
2006	GW	6,780	103	191	0	133	169	7,376
	SW	3,516	1	0	0	2	1,891	5,410
2005	GW	5,845	99	191	0	78	155	6,368
	SW	2,913	3	0	0	15	1,871	4,802
2004	GW	5,675	87	191	0	69	108	6,130
	SW	2,650	5	0	0	174	2,324	5,153
2003	GW	5,744	83	309	0	55	107	6,298
	SW	3,394	0	0	0	137	1,314	4,845
2002	GW	5,667	87	402	0	8	127	6,291
	SW	2,757	1	0	0	118	1,324	4,200

Projected Surface Water Supplies
TWDB 2017 State Water Plan Data

HAYS COUNTY *55.15% (multiplier)* All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
~~K~~	~~AUSTIN~~	~~COLORADO~~	~~COLORADO RUN-OF-RIVER~~	~~13~~	~~127~~	~~249~~	~~631~~	~~1,519~~	~~2,749~~
~~K~~	~~BUDA~~	~~COLORADO~~	~~CANYON LAKE/RESERVOIR~~	~~1,381~~	~~1,292~~	~~1,181~~	~~1,041~~	~~882~~	~~701~~
K	COUNTY-OTHER, HAYS	COLORADO	HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	773	773	773	773	773	773
K	DRIPPING SPRINGS	COLORADO	HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	506	506	506	506	506	506
K	DRIPPING SPRINGS WSC	COLORADO	HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	133	280	461	691	953	1,126
K	LIVESTOCK, HAYS	COLORADO	COLORADO LIVESTOCK LOCAL SUPPLY	106	106	106	106	106	106
K	WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	COLORADO	HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	4,521	4,521	4,521	4,521	4,521	4,521
~~L~~	~~BUDA~~	~~GUADALUPE~~	~~CANYON LAKE/RESERVOIR~~	~~299~~	~~388~~	~~499~~	~~639~~	~~798~~	~~979~~
~~L~~	~~COUNTY LINE WSC~~	~~GUADALUPE~~	~~CANYON LAKE/RESERVOIR~~	~~226~~	~~197~~	~~161~~	~~113~~	~~57~~	~~0~~
L	COUNTY-OTHER, HAYS	GUADALUPE	CANYON LAKE/RESERVOIR	2,138	2,138	2,138	2,138	2,138	2,138
~~L~~	~~CRYSTAL CLEAR WSC~~	~~GUADALUPE~~	~~CANYON LAKE/RESERVOIR~~	~~323~~	~~317~~	~~319~~	~~329~~	~~340~~	~~354~~
~~L~~	~~GOFORTH SUD~~	~~GUADALUPE~~	~~CANYON LAKE/RESERVOIR~~	~~1,050~~	~~1,050~~	~~1,050~~	~~1,050~~	~~1,050~~	~~1,050~~
L	IRRIGATION, HAYS	GUADALUPE	GUADALUPE RUN-OF-RIVER	72	72	72	72	72	72
~~L~~	~~KYLE~~	~~GUADALUPE~~	~~CANYON LAKE/RESERVOIR~~	~~5,743~~	~~5,743~~	~~5,743~~	~~5,743~~	~~5,743~~	~~5,732~~
L	LIVESTOCK, HAYS	GUADALUPE	GUADALUPE LIVESTOCK LOCAL SUPPLY	113	113	113	113	113	113
~~L~~	~~MAXWELL WSC~~	~~GUADALUPE~~	~~CANYON LAKE/RESERVOIR~~	~~101~~	~~92~~	~~87~~	~~85~~	~~84~~	~~84~~
~~L~~	~~MAXWELL WSC~~	~~GUADALUPE~~	~~GUADALUPE RUN-OF-RIVER~~	~~153~~	~~139~~	~~131~~	~~128~~	~~127~~	~~127~~
~~L~~	~~SAN MARCOS~~	~~GUADALUPE~~	~~CANYON LAKE/RESERVOIR~~	~~9,998~~	~~9,998~~	~~9,998~~	~~9,997~~	~~9,997~~	~~9,997~~
~~L~~	~~STEAM ELECTRIC POWER, HAYS~~	~~GUADALUPE~~	~~CANYON LAKE/RESERVOIR~~	~~1,359~~	~~1,359~~	~~1,359~~	~~1,359~~	~~1,359~~	~~1,359~~
L	UHLAND	GUADALUPE	CANYON LAKE/RESERVOIR	99	133	175	229	290	360
	Sum of Projected Surface Water Supplies (acre-feet)			**8,461**	**8,642**	**8,865**	**9,149**	**9,472**	**9,715**

Projected Water Demands
TWDB 2017 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.

HAYS COUNTY

55.15% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
~~K~~	~~AUSTIN~~	~~COLORADO~~	~~13~~	~~127~~	~~249~~	~~631~~	~~1,519~~	~~2,749~~
~~K~~	~~BUDA~~	~~COLORADO~~	~~1,769~~	~~2,508~~	~~3,420~~	~~4,564~~	~~5,860~~	~~7,338~~
~~K~~	~~CIMARRON PARK WATER COMPANY~~	~~COLORADO~~	~~249~~	~~241~~	~~234~~	~~230~~	~~229~~	~~229~~
K	COUNTY-OTHER, HAYS	COLORADO	1,714	2,038	2,548	3,131	3,628	4,121
K	DRIPPING SPRINGS	COLORADO	479	537	610	704	813	938
K	DRIPPING SPRINGS WSC	COLORADO	533	680	861	1,091	1,353	1,652
~~K~~	~~GOFORTH SUD~~	~~COLORADO~~	~~85~~	~~130~~	~~185~~	~~255~~	~~334~~	~~425~~
K	IRRIGATION, HAYS	COLORADO	59	59	59	59	59	59
K	LIVESTOCK, HAYS	COLORADO	121	121	121	121	121	121
K	MANUFACTURING, HAYS	COLORADO	191	219	248	273	296	322
K	MINING, HAYS	COLORADO	466	593	751	797	912	1,044
~~K~~	~~MOUNTAIN CITY~~	~~COLORADO~~	~~57~~	~~56~~	~~54~~	~~54~~	~~54~~	~~54~~
~~K~~	~~PLUM CREEK WATER COMPANY~~	~~COLORADO~~	~~163~~	~~264~~	~~283~~	~~300~~	~~312~~	~~322~~
K	WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	COLORADO	4,093	5,758	7,795	10,343	13,226	16,508
~~L~~	~~BUDA~~	~~GUADALUPE~~	~~299~~	~~388~~	~~499~~	~~639~~	~~798~~	~~979~~
~~L~~	~~COUNTY LINE WSC~~	~~GUADALUPE~~	~~181~~	~~231~~	~~298~~	~~383~~	~~478~~	~~587~~
L	COUNTY-OTHER, HAYS	GUADALUPE	1,138	1,260	2,517	3,460	6,518	9,914
~~L~~	~~CREEDMOOR-MAHA WSC~~	~~GUADALUPE~~	~~10~~	~~12~~	~~15~~	~~19~~	~~23~~	~~28~~
~~L~~	~~CRYSTAL CLEAR WSC~~	~~GUADALUPE~~	~~632~~	~~717~~	~~827~~	~~973~~	~~1,143~~	~~1,338~~
~~L~~	~~GOFORTH SUD~~	~~GUADALUPE~~	~~1,384~~	~~1,753~~	~~2,220~~	~~2,818~~	~~3,504~~	~~4,287~~
L	IRRIGATION, HAYS	GUADALUPE	358	355	352	349	345	342
~~L~~	~~KYLE~~	~~GUADALUPE~~	~~5,156~~	~~7,680~~	~~9,133~~	~~9,119~~	~~9,108~~	~~9,104~~
L	LIVESTOCK, HAYS	GUADALUPE	226	226	226	226	226	226
L	MANUFACTURING, HAYS	GUADALUPE	59	67	76	84	91	99
~~L~~	~~MAXWELL WSC~~	~~GUADALUPE~~	~~117~~	~~122~~	~~131~~	~~144~~	~~160~~	~~179~~
~~L~~	~~MOUNTAIN CITY~~	~~GUADALUPE~~	~~24~~	~~30~~	~~38~~	~~48~~	~~60~~	~~73~~
~~L~~	~~NIEDERWALD~~	~~GUADALUPE~~	~~59~~	~~75~~	~~96~~	~~122~~	~~151~~	~~185~~
~~L~~	~~PLUM CREEK WATER COMPANY~~	~~GUADALUPE~~	~~736~~	~~1,068~~	~~1,048~~	~~1,032~~	~~1,019~~	~~1,009~~
~~L~~	~~SAN MARCOS~~	~~GUADALUPE~~	~~11,934~~	~~13,941~~	~~16,430~~	~~19,485~~	~~23,205~~	~~27,655~~
~~L~~	~~STEAM ELECTRIC POWER, HAYS~~	~~GUADALUPE~~	~~403~~	~~532~~	~~1,093~~	~~1,493~~	~~2,034~~	~~2,770~~
~~L~~	~~UHLAND~~	~~GUADALUPE~~	~~99~~	~~133~~	~~175~~	~~229~~	~~290~~	~~360~~
L	WIMBERLEY	GUADALUPE	626	800	1,018	1,300	1,622	1,990
L	WIMBERLEY WSC	GUADALUPE	450	657	919	1,247	1,617	2,039

L	WOODCREEK	GUADALUPE	282	311	349	399	458	525
		Sum of Projected Water Demands (acre-feet)	**10,795**	**13,681**	**18,450**	**23,584**	**31,285**	**39,900**

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

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

HAYS COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
K	AUSTIN	COLORADO	0	0	0	0	0	0
K	BUDA	COLORADO	161	-667	-1,690	-2,974	-4,429	-6,088
K	CIMARRON PARK WATER COMPANY	COLORADO	0	8	15	19	20	20
K	COUNTY-OTHER, HAYS	COLORADO	983	394	-530	-1,587	-2,489	-3,382
K	DRIPPING SPRINGS	COLORADO	27	-31	-104	-198	-307	-432
K	DRIPPING SPRINGS WSC	COLORADO	0	0	0	0	0	-126
K	GOFORTH SUD	COLORADO	0	0	0	0	0	0
K	IRRIGATION, HAYS	COLORADO	333	333	333	333	333	333
K	LIVESTOCK, HAYS	COLORADO	2	2	2	2	2	2
K	MANUFACTURING, HAYS	COLORADO	236	185	134	88	46	0
K	MINING, HAYS	COLORADO	-531	-761	-1,047	-1,131	-1,340	-1,579
K	MOUNTAIN CITY	COLORADO	0	0	0	0	0	0
K	PLUM CREEK WATER COMPANY	COLORADO	0	0	0	0	0	0
K	WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	COLORADO	728	-937	-2,974	-5,522	-8,405	-11,687
L	BUDA	GUADALUPE	0	0	0	0	0	0
L	COUNTY LINE WSC	GUADALUPE	122	45	-56	-187	-336	-500
L	COUNTY-OTHER, HAYS	GUADALUPE	3,101	2,881	601	-1,109	-6,654	-12,812
L	CREEDMOOR-MAHA WSC	GUADALUPE	0	0	0	0	0	0
L	CRYSTAL CLEAR WSC	GUADALUPE	84	-13	-118	-243	-388	-551
L	GOFORTH SUD	GUADALUPE	2,763	2,340	1,810	1,133	358	-525
L	IRRIGATION, HAYS	GUADALUPE	88	94	100	106	112	118
L	KYLE	GUADALUPE	1,176	-1,348	-2,801	-2,787	-2,776	-2,783
L	LIVESTOCK, HAYS	GUADALUPE	0	0	0	0	0	0
L	MANUFACTURING, HAYS	GUADALUPE	573	558	542	528	515	501
L	MAXWELL WSC	GUADALUPE	176	144	120	101	83	64
L	MOUNTAIN CITY	GUADALUPE	4	-1	-7	-17	-29	-42
L	NIEDERWALD	GUADALUPE	-49	-65	-85	-111	-140	-174
L	PLUM CREEK WATER COMPANY	GUADALUPE	248	-185	-184	-185	-184	-184
L	SAN MARCOS	GUADALUPE	1,867	-140	-2,629	-5,685	-9,405	-13,855
L	STEAM ELECTRIC POWER, HAYS	GUADALUPE	4,646	4,411	3,394	2,668	1,688	353
L	UHLAND	GUADALUPE	0	0	0	0	0	0
L	WIMBERLEY	GUADALUPE	218	44	-174	-456	-778	-1,146
L	WIMBERLEY WSC	GUADALUPE	233	26	-236	-564	-934	-1,356
L	WOODCREEK	GUADALUPE	716	687	649	599	540	473

Sum of Projected Water Supply Needs (acre-feet)	**-580**	**-4,148**	**-12,635**	**-22,756**	**-38,594**	**-57,222**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

HAYS COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
AUSTIN, COLORADO (K)							
DROUGHT MANAGEMENT	DEMAND REDUCTION [HAYS]	1	13	25	63	152	275
		1	**13**	**25**	**63**	**152**	**275**
BUDA, COLORADO (K)							
DIRECT REUSE - BUDA	DIRECT REUSE [HAYS]	2,240	2,240	1,740	1,740	1,740	1,740
DROUGHT MANAGEMENT	DEMAND REDUCTION [HAYS]	177	251	342	456	586	734
EDWARDS / MIDDLE TRINITY ASR	TRINITY AQUIFER ASR [HAYS]	0	600	600	600	600	600
HCPUA PIPELINE - REGION K RECOMMENDED	CARRIZO-WILCOX AQUIFER [GONZALES]	0	667	1,690	2,467	2,467	2,467
MUNICIPAL CONSERVATION - BUDA	DEMAND REDUCTION [HAYS]	88	206	434	552	709	888
SALINE EDWARDS ASR	EDWARDS AQUIFER ASR [TRAVIS]	0	100	100	100	100	100
SALINE EDWARDS ASR (SALINE)	EDWARDS-BFZ AQUIFER [TRAVIS]	0	400	400	400	400	400
		2,505	**4,464**	**5,306**	**6,315**	**6,602**	**6,929**
COUNTY-OTHER, HAYS, COLORADO (K)							
BRUSH CONTROL	COLORADO RUN-OF-RIVER [HAYS]	425	425	425	425	425	425
DROUGHT MANAGEMENT	DEMAND REDUCTION [HAYS]	466	554	693	852	987	1,121
EDWARDS / MIDDLE TRINITY ASR	TRINITY AQUIFER ASR [HAYS]	0	200	200	200	200	200
HAYS COUNTY PIPELINE - REGION K RECOMMENDED	CARRIZO-WILCOX AQUIFER [GONZALES]	0	2,000	2,000	2,000	2,000	2,000
SALINE EDWARDS ASR	EDWARDS AQUIFER ASR [TRAVIS]	0	100	100	100	100	100
SALINE EDWARDS ASR (SALINE)	EDWARDS-BFZ AQUIFER [TRAVIS]	0	100	100	100	100	100
		891	**3,379**	**3,518**	**3,677**	**3,812**	**3,946**
DRIPPING SPRINGS, COLORADO (K)							
DROUGHT MANAGEMENT	DEMAND REDUCTION [HAYS]	96	107	122	141	163	188
HAYS COUNTY PIPELINE - REGION K RECOMMENDED	CARRIZO-WILCOX AQUIFER [GONZALES]	0	0	0	0	134	407
MUNICIPAL CONSERVATION - DRIPPING SPRINGS	DEMAND REDUCTION [HAYS]	48	67	98	141	195	262
WATER PURCHASE	HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	0	31	104	198	173	0

	[RESERVOIR]						
		144	**205**	**324**	**480**	**665**	**857**
DRIPPING SPRINGS WSC, COLORADO (K)							
DROUGHT MANAGEMENT	DEMAND REDUCTION [HAYS]	107	136	172	218	271	330
HAYS COUNTY PIPELINE - REGION K RECOMMENDED	CARRIZO-WILCOX AQUIFER [GONZALES]	0	1,000	1,000	1,000	866	593
MUNICIPAL CONSERVATION - DRIPPING SPRINGS WSC	DEMAND REDUCTION [HAYS]	54	124	152	187	232	283
		161	**1,260**	**1,324**	**1,405**	**1,369**	**1,206**
GOFORTH SUD, COLORADO (K)							
DROUGHT MANAGEMENT	DEMAND REDUCTION [HAYS]	21	33	46	64	84	106
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [HAYS]	0	0	0	0	0	0
		21	**33**	**46**	**64**	**84**	**106**
MINING, HAYS, COLORADO (K)							
DIRECT REUSE - BUDA	DIRECT REUSE [HAYS]	0	0	500	500	500	500
EDWARDS / MIDDLE TRINITY ASR	TRINITY AQUIFER ASR [HAYS]	0	100	100	100	100	100
EXPANSION OF CURRENT GROUNDWATER SUPPLIES - TRINITY AQUIFER	TRINITY AQUIFER [HAYS]	531	761	1,047	1,047	1,047	1,047
		531	**861**	**1,647**	**1,647**	**1,647**	**1,647**
PLUM CREEK WATER COMPANY, COLORADO (K)							
DROUGHT MANAGEMENT	DEMAND REDUCTION [HAYS]	8	13	14	15	16	16
HAYS/CALDWELL PUA PROJECT	CARRIZO-WILCOX AQUIFER [CALDWELL]	0	37	39	42	43	45
		8	**50**	**53**	**57**	**59**	**61**
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY, COLORADO (K)							
DROUGHT MANAGEMENT	DEMAND REDUCTION [HAYS]	819	1,152	1,559	2,069	2,645	3,302
HAYS COUNTY PIPELINE - REGION K RECOMMENDED	CARRIZO-WILCOX AQUIFER [GONZALES]	0	1,000	1,000	1,000	1,000	1,000
LCRA - LANE CITY RESERVOIR	LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE) [RESERVOIR]	0	500	2,700	3,000	5,800	5,800
MUNICIPAL CONSERVATION - WEST TRAVIS COUNTY PUA	DEMAND REDUCTION [HAYS]	405	1,070	2,064	3,501	5,348	7,674
		1,224	**3,722**	**7,323**	**9,570**	**14,793**	**17,776**
COUNTY LINE WSC, GUADALUPE (L)							
BRACKISH WILCOX GROUNDWATER FOR CRWA	CARRIZO-WILCOX AQUIFER [WILSON]	0	0	0	187	335	500
CRWA SIESTA PROJECT	DIRECT REUSE [BEXAR]	0	0	25	0	0	0
CRWA SIESTA PROJECT	SAN ANTONIO RUN-OF-RIVER [WILSON]	0	0	31	0	0	0
REUSE - KYLE/COUNTY LINE WSC	DIRECT REUSE [HAYS]	34	35	36	37	38	39
		34	**35**	**92**	**224**	**373**	**539**
COUNTY-OTHER, HAYS, GUADALUPE (L)							
GBRA - MBWSP - CONJUNCTIVE USE	CARRIZO-WILCOX	0	0	0	1,169	6,714	5,276

(OPTION 3A) - CARRIZO DEVELOPMENT	AQUIFER [GONZALES]						
GBRA - MBWSP - CONJUNCTIVE USE W/ASR (OPTION 3A)	CARRIZO-WILCOX AQUIFER ASR [GONZALES]	0	0	0	0	0	6,332
TWA TRINITY AQUIFER DEVELOPMENT	TRINITY AQUIFER [COMAL]	0	0	0	0	0	1,263
VISTA RIDGE PROJECT	CARRIZO-WILCOX AQUIFER [BURLESON]	3,781	5,000	5,000	5,000	5,000	5,000
		3,781	**5,000**	**5,000**	**6,169**	**11,714**	**17,871**

CRYSTAL CLEAR WSC, GUADALUPE (L)

CRWA WELLS RANCH PROJECT PHASE II	CARRIZO-WILCOX AQUIFER [GUADALUPE]	75	261	317	0	0	0
HAYS/CALDWELL PUA PROJECT	CARRIZO-WILCOX AQUIFER [CALDWELL]	124	296	243	577	597	621
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [HAYS]	0	0	0	0	0	22
		199	**557**	**560**	**577**	**597**	**643**

GOFORTH SUD, GUADALUPE (L)

GBRA - MBWSP - CONJUNCTIVE USE W/ASR (OPTION 3A)	CARRIZO-WILCOX AQUIFER ASR [GONZALES]	0	0	0	0	0	525
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [HAYS]	0	0	0	0	0	2
		0	**0**	**0**	**0**	**0**	**527**

KYLE, GUADALUPE (L)

HAYS/CALDWELL PUA PROJECT	CARRIZO-WILCOX AQUIFER [CALDWELL]	0	1,163	2,616	2,602	2,591	2,598
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [HAYS]	0	0	0	53	266	480
REUSE - KYLE/COUNTY LINE WSC	DIRECT REUSE [HAYS]	2,329	3,591	4,318	4,284	4,172	4,063
		2,329	**4,754**	**6,934**	**6,939**	**7,029**	**7,141**

MOUNTAIN CITY, GUADALUPE (L)

DROUGHT MANAGEMENT - MOUNTAIN CITY	DEMAND REDUCTION [HAYS]	1	0	0	0	0	0
EDWARDS / MIDDLE TRINITY ASR	TRINITY AQUIFER ASR [HAYS]	0	44	44	44	44	44
LOCAL TRINITY AQUIFER DEVELOPMENT	TRINITY AQUIFER [HAYS]	60	60	60	60	60	60
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [HAYS]	0	0	0	0	0	1
		61	**104**	**104**	**104**	**104**	**105**

NIEDERWALD, GUADALUPE (L)

DROUGHT MANAGEMENT - NIEDERWALD	DEMAND REDUCTION [HAYS]	3	0	0	0	0	0
GBRA - MBWSP - CONJUNCTIVE USE (OPTION 3A) - CARRIZO DEVELOPMENT	CARRIZO-WILCOX AQUIFER [GONZALES]	49	65	85	111	0	0
GBRA - MBWSP - CONJUNCTIVE USE W/ASR (OPTION 3A)	CARRIZO-WILCOX AQUIFER ASR [GONZALES]	0	0	0	0	140	174
		52	**65**	**85**	**111**	**140**	**174**

PLUM CREEK WATER COMPANY, GUADALUPE (L)

HAYS/CALDWELL PUA PROJECT	CARRIZO-WILCOX AQUIFER [CALDWELL]	0	148	146	143	142	140
LOCAL TRINITY AQUIFER DEVELOPMENT	TRINITY AQUIFER [HAYS]	0	185	185	185	185	185
		0	**333**	**331**	**328**	**327**	**325**
SAN MARCOS, GUADALUPE (L)							
GBRA - MBWSP - CONJUNCTIVE USE (OPTION 3A) - CARRIZO DEVELOPMENT	CARRIZO-WILCOX AQUIFER [GONZALES]	0	0	2,379	3,470	0	0
GBRA - MBWSP - CONJUNCTIVE USE W/ASR (OPTION 3A)	CARRIZO-WILCOX AQUIFER ASR [GONZALES]	0	0	0	0	4,580	5,716
HAYS/CALDWELL PUA PROJECT	CARRIZO-WILCOX AQUIFER [CALDWELL]	0	0	0	1,964	4,575	7,889
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [HAYS]	179	778	1,122	1,684	2,506	3,587
REUSE - SAN MARCOS	DIRECT REUSE [HAYS]	1,932	2,886	3,959	5,206	6,654	8,339
		2,111	**3,664**	**7,460**	**12,324**	**18,315**	**25,531**
UHLAND, GUADALUPE (L)							
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [HAYS]	0	0	0	0	3	13
		0	**0**	**0**	**0**	**3**	**13**
WIMBERLEY, GUADALUPE (L)							
GBRA - MBWSP - CONJUNCTIVE USE (OPTION 3A) - CARRIZO DEVELOPMENT	CARRIZO-WILCOX AQUIFER [GONZALES]	0	0	174	456	778	1,033
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [HAYS]	10	55	78	123	187	272
TWA TRINITY AQUIFER DEVELOPMENT	TRINITY AQUIFER [COMAL]	0	0	0	0	0	113
		10	**55**	**252**	**579**	**965**	**1,418**
WIMBERLEY WSC, GUADALUPE (L)							
GBRA - MBWSP - CONJUNCTIVE USE (OPTION 3A) - CARRIZO DEVELOPMENT	CARRIZO-WILCOX AQUIFER [GONZALES]	0	0	236	564	934	1,223
TWA TRINITY AQUIFER DEVELOPMENT	TRINITY AQUIFER [COMAL]	0	0	0	0	0	133
		0	**0**	**236**	**564**	**934**	**1,356**
WOODCREEK, GUADALUPE (L)							
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [HAYS]	10	25	31	41	57	76
		10	**25**	**31**	**41**	**57**	**76**
Sum of Projected Water Management Strategies (acre-feet)		**14,073**	**28,579**	**40,651**	**51,238**	**69,741**	**88,522**

GAM Run 16-023 MAG: Modeled Available Groundwater for the Aquifers in Groundwater Management Area 9

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

STATE OF TEXAS
IAN C. JONES
GEOLOGY
No. 477
LICENSED
PROFESSIONAL GEOSCIENTIST

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

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

EXECUTIVE SUMMARY:

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

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

REQUESTOR:

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

DESCRIPTION OF REQUEST:

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

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

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

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

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

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

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

METHODS:

As defined in Chapter 36 of the Texas Water Code, "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to manage groundwater production to achieve the desired future condition(s). The other factors districts must consider include annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits.

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

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

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

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

PARAMETERS AND ASSUMPTIONS:

Trinity and Edwards-Trinity (Plateau) Aquifers

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

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

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

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

Minor aquifers of the Llano Uplift Area

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

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

- Perennial rivers and reservoirs were simulated using the MODFLOW-USG river package. Springs were simulated using the MODFLOW-USG drain package.

- There is no historic pumping information available for the Ellenburger-San Saba and Hickory aquifers of Kendall County. Consequently, we used uniformly distributed pumping to simulate the desired future condition and determine the modeled available groundwater.

RESULTS:

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

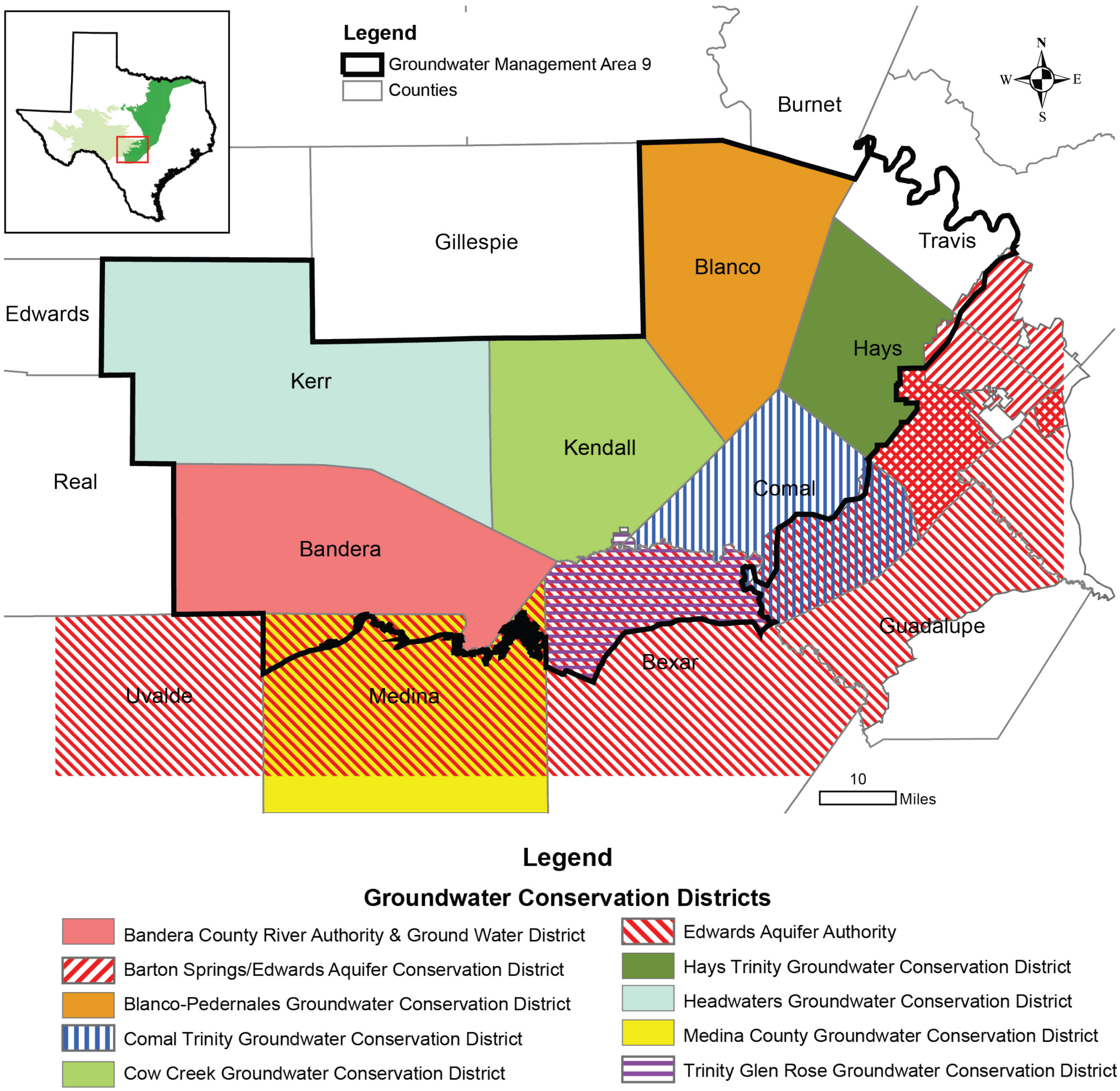

FIGURE 1. MAP SHOWING THE GROUNDWATER CONSERVATION DISTRICTS IN GROUNDWATER MANAGEMENT AREA 9. NOTE: THE BOUNDARIES OF THE EDWARDS AQUIFER AUTHORITY OVERLAP WITH THE MEDINA COUNTY, TRINITY GLEN ROSE, AND COMAL TRINITY GROUNDWATER CONSERVATION DISTRICTS AND THE BARTON SPRINGS/EDWARDS AQUIFER CONSERVATION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

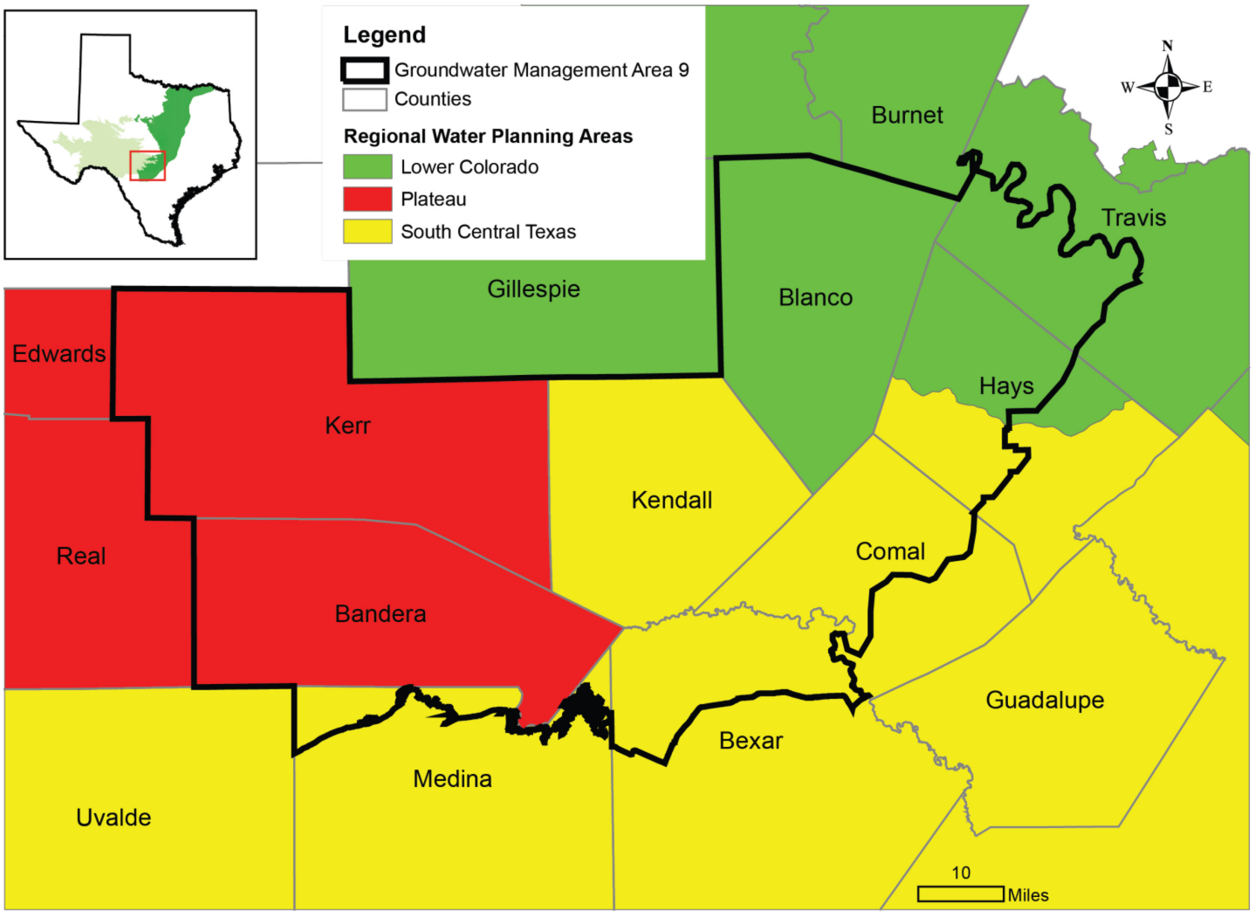

FIGURE 2. MAP SHOWING REGIONAL WATER PLANNING AREAS IN GROUNDWATER MANAGEMENT AREA 9.

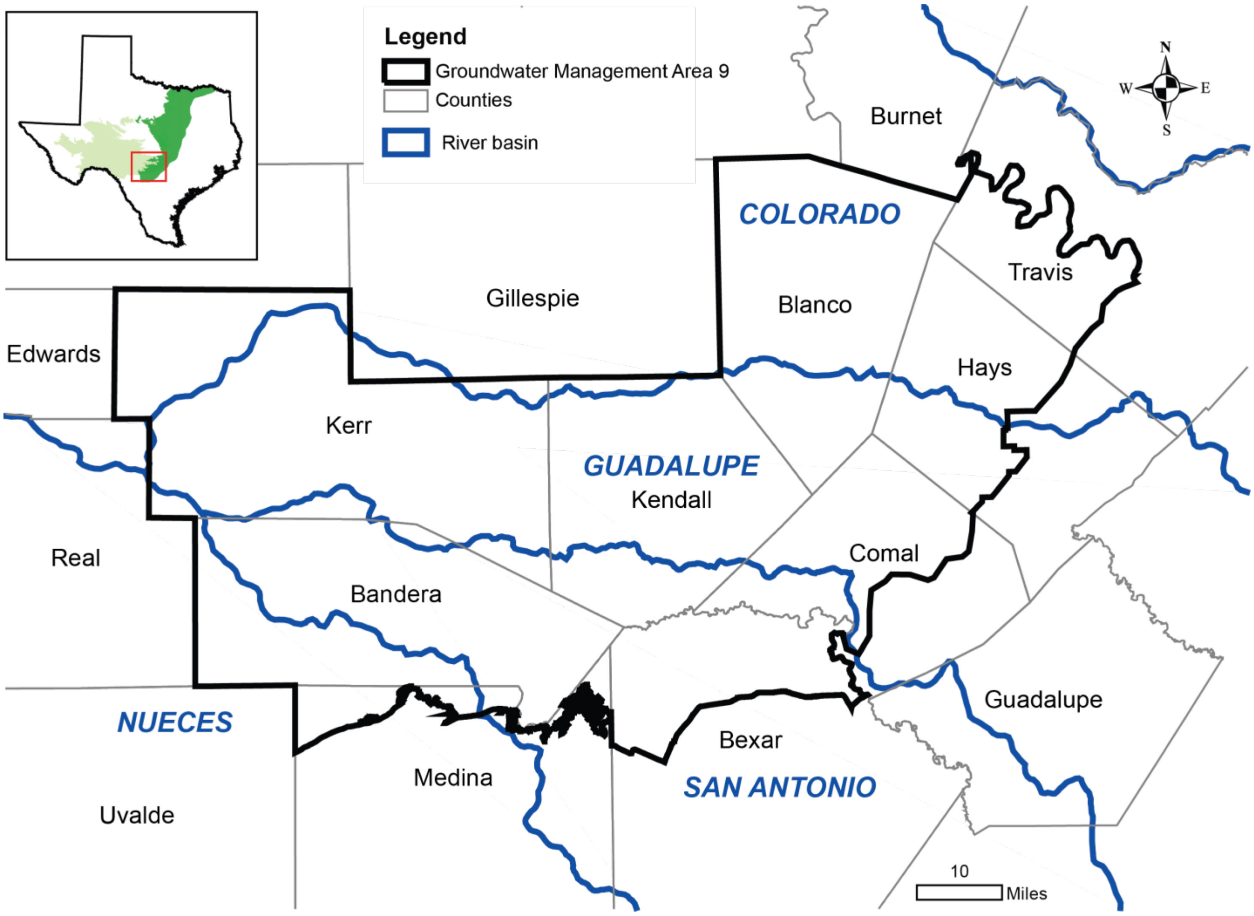

FIGURE 3. MAP SHOWING RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 9. THESE INCLUDE PARTS OF THE COLORADO, GUADALUPE, SAN ANTONIO, AND NUECES RIVER BASINS.

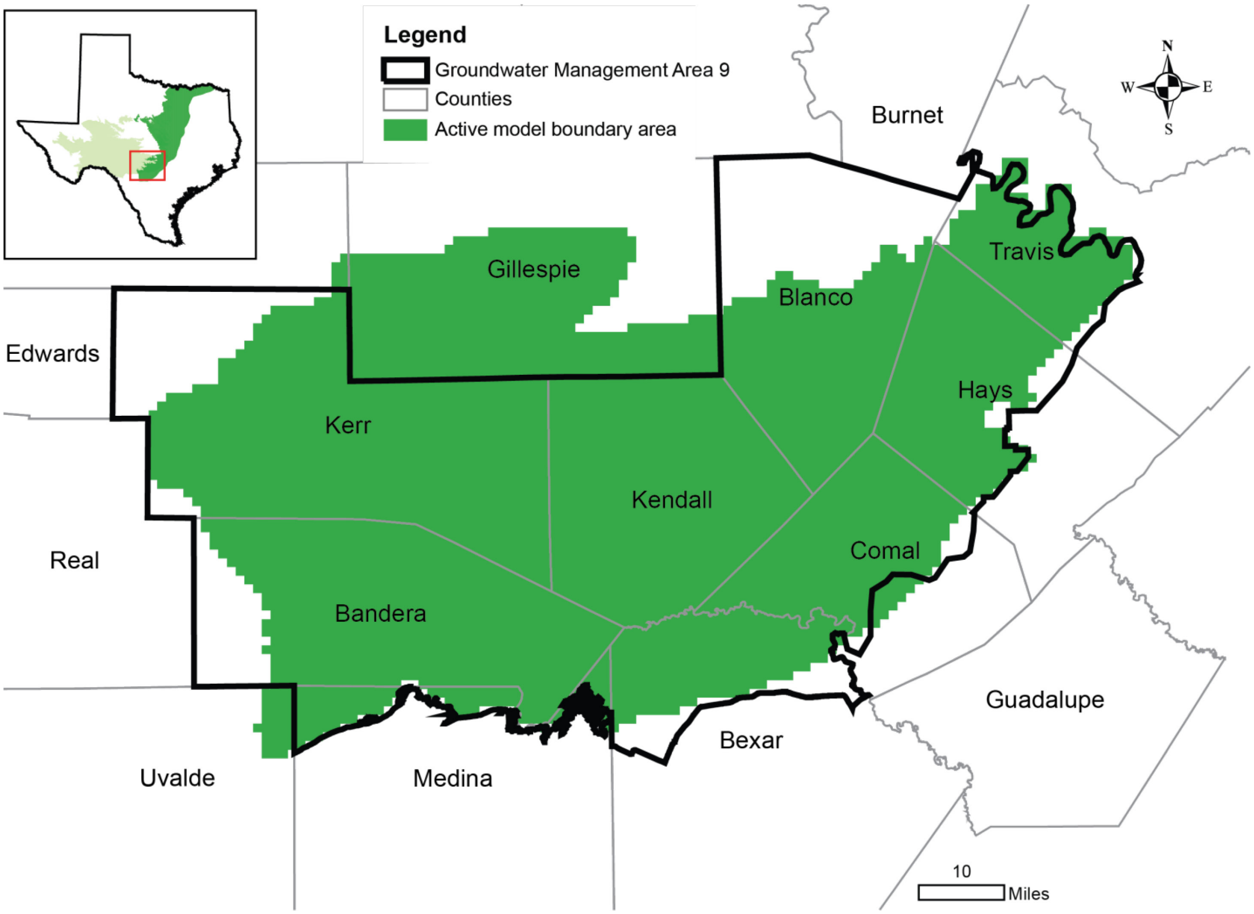

FIGURE 4. MAP SHOWING THE AREAS COVERED BY THE TRINITY AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE HILL COUNTRY PORTION OF THE TRINITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 9.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 9 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.

District	County	Year					
		2010	2020	2030	2040	2050	2060
Bandera County River Authority & Groundwater District Total	Bandera	7,284	7,284	7,284	7,284	7,284	7,284
Barton Springs/Edwards Aquifer Conservation District Total	Hays	22	22	22	22	22	22
Blanco-Pedernales Groundwater Conservation District Total	Blanco	2,573	2,573	2,573	2,573	2,573	2,573
Comal Trinity Groundwater Conservation District Total	Comal	10,076	10,076	10,076	10,076	10,076	10,076
Cow Creek Groundwater Conservation District Total	Kendall	10,622	10,622	10,622	10,622	10,622	10,622
Hays Trinity Groundwater Conservation District Total	Hays	9,109	9,098	9,095	9,094	9,094	9,094
Headwaters Groundwater Conservation District Total	Kerr	16,435	14,918	14,845	14,556	14,239	14,223
Medina County Groundwater Conservation District Total	Medina	2,500	2,500	2,500	2,500	2,500	2,500

TABLE 1. CONTINUED.

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

TABLE 2. MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 9 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Year					
			2010	2020	2030	2040	2050	2060
Bandera	J	Guadalupe	76	76	76	76	76	76
		Nueces	903	903	903	903	903	903
		San Antonio	6,305	6,305	6,305	6,305	6,305	6,305
		Total	**7,284**	**7,284**	**7,284**	**7,284**	**7,284**	**7,284**
Bexar	L	San Antonio	24,856	24,856	24,856	24,856	24,856	24,856
		Total	**24,856**	**24,856**	**24,856**	**24,856**	**24,856**	**24,856**
Blanco	K	Colorado	1,322	1,322	1,322	1,322	1,322	1,322
		Guadalupe	1,251	1,251	1,251	1,251	1,251	1,251
		Total	**2,573**	**2,573**	**2,573**	**2,573**	**2,573**	**2,573**
Comal	L	Guadalupe	6,906	6,906	6,906	6,906	6,906	6,906
		San Antonio	3,308	3,308	3,308	3,308	3,308	3,308
		Total	**10,214**	**10,214**	**10,214**	**10,214**	**10,214**	**10,214**

TABLE 2. CONTINUED.

County	RWPA	River Basin	Year					
			2010	**2020**	**2030**	**2040**	**2050**	**2060**
Hays	K	Colorado	4,721	4,710	4,707	4,706	4,706	4,706
	L	Guadalupe	4,410	4,410	4,410	4,410	4,410	4,410
		Total	**9,131**	**9,120**	**9,117**	**9,116**	**9,116**	**9,116**
Kendall	L	Colorado	135	135	135	135	135	135
		Guadalupe	6,028	6,028	6,028	6,028	6,028	6,028
		San Antonio	4,976	4,976	4,976	4,976	4,976	4,976
		Total	**11,139**	**11,139**	**11,139**	**11,139**	**11,139**	**11,139**
Kerr	J	Colorado	318	318	318	318	318	318
		Guadalupe	15,646	14,129	14,056	13,767	13,450	13,434
		San Antonio	471	471	471	471	471	471
		Total	**16,435**	**14,918**	**14,845**	**14,556**	**14,239**	**14,223**
Medina	L	Nueces	1,575	1,575	1,575	1,575	1,575	1,575
		San Antonio	925	925	925	925	925	925
		Total	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**

TABLE 2. CONTINUED.

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

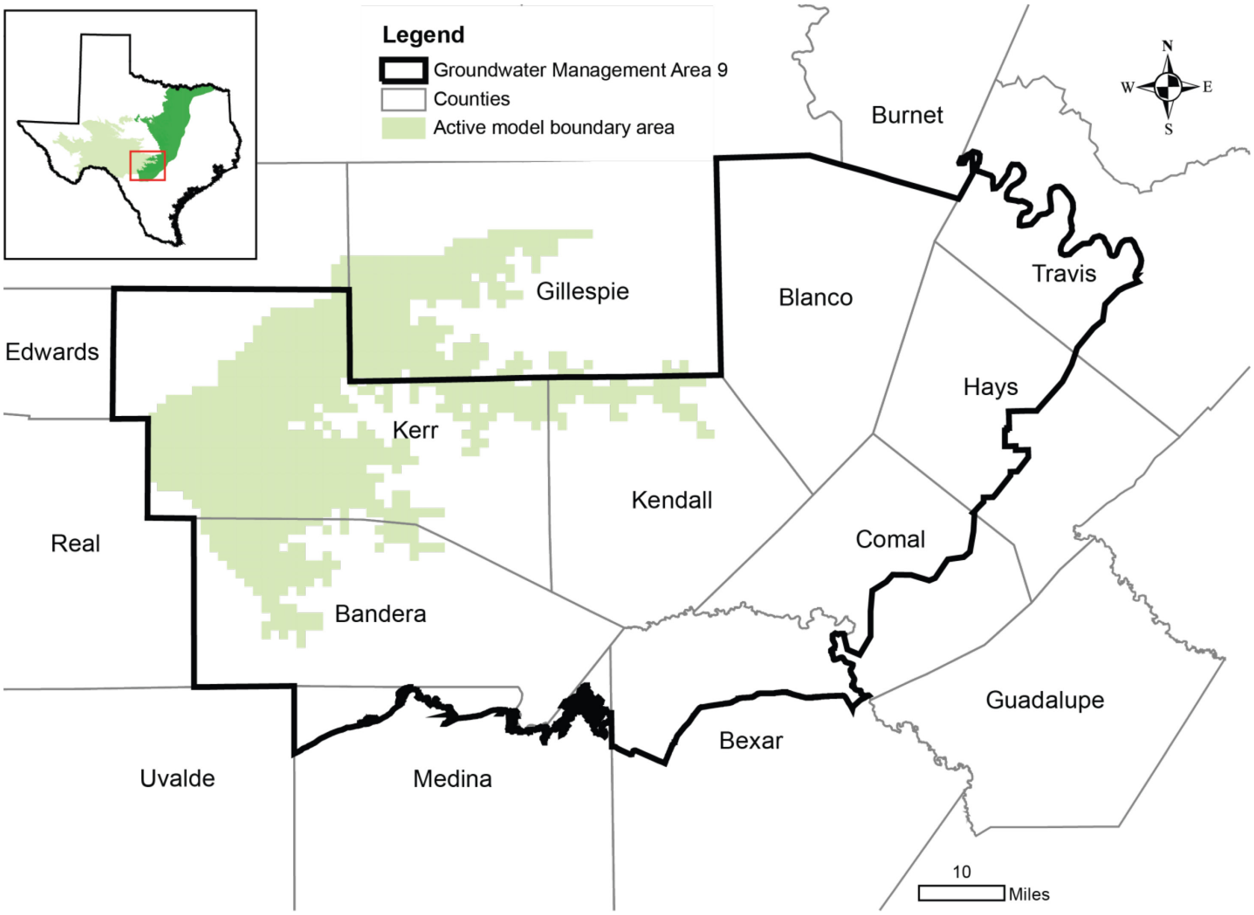

FIGURE 5. MAP SHOWING THE AREAS COVERED BY THE EDWARDS GROUP OF THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE HILL COUNTRY PORTION OF THE TRINITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 9.

TABLE 3. MODELED AVAILABLE GROUNDWATER FOR THE EDWARDS GROUP OF THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GROUNDWATER MANAGEMENT AREA 9 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT AND COUNTY, FOR EACH DECADE BETWEEN 2010 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

District	County	Year						
		2010	2020	2030	2040	2050	2060	2070
Bandera County River Authority & Groundwater District Total	**Bandera**	**2,009**	**2,009**	**2,009**	**2,009**	**2,009**	**2,009**	**2,009**
Cow Creek Groundwater Conservation District Total	**Kendall**	**199**	**199**	**199**	**199**	**199**	**199**	**199**
Grand Total		**2,208**	**2,208**	**2,208**	**2,208**	**2,208**	**2,208**	**2,208**

TABLE 4. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE EDWARDS GROUP OF THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GROUNDWATER MANAGEMENT AREA 9 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2010 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Year						
			2010	2020	2030	2040	2050	2060	2070
Bandera	Plateau (J)	Guadalupe	81	81	81	81	81	81	81
		Nueces	38	38	38	38	38	38	38
		San Antonio	1,890	1,890	1,890	1,890	1,890	1,890	1,890
		Total	**2,009**	**2,009**	**2,009**	**2,009**	**2,009**	**2,009**	**2,009**
Kendall	South Central Texas (L)	Colorado	69	69	69	69	69	69	69
		Guadalupe	130	130	130	130	130	130	130
		Total	**199**	**199**	**199**	**199**	**199**	**199**	**199**
Grand Total			**2,208**	**2,208**	**2,208**	**2,208**	**2,208**	**2,208**	**2,208**

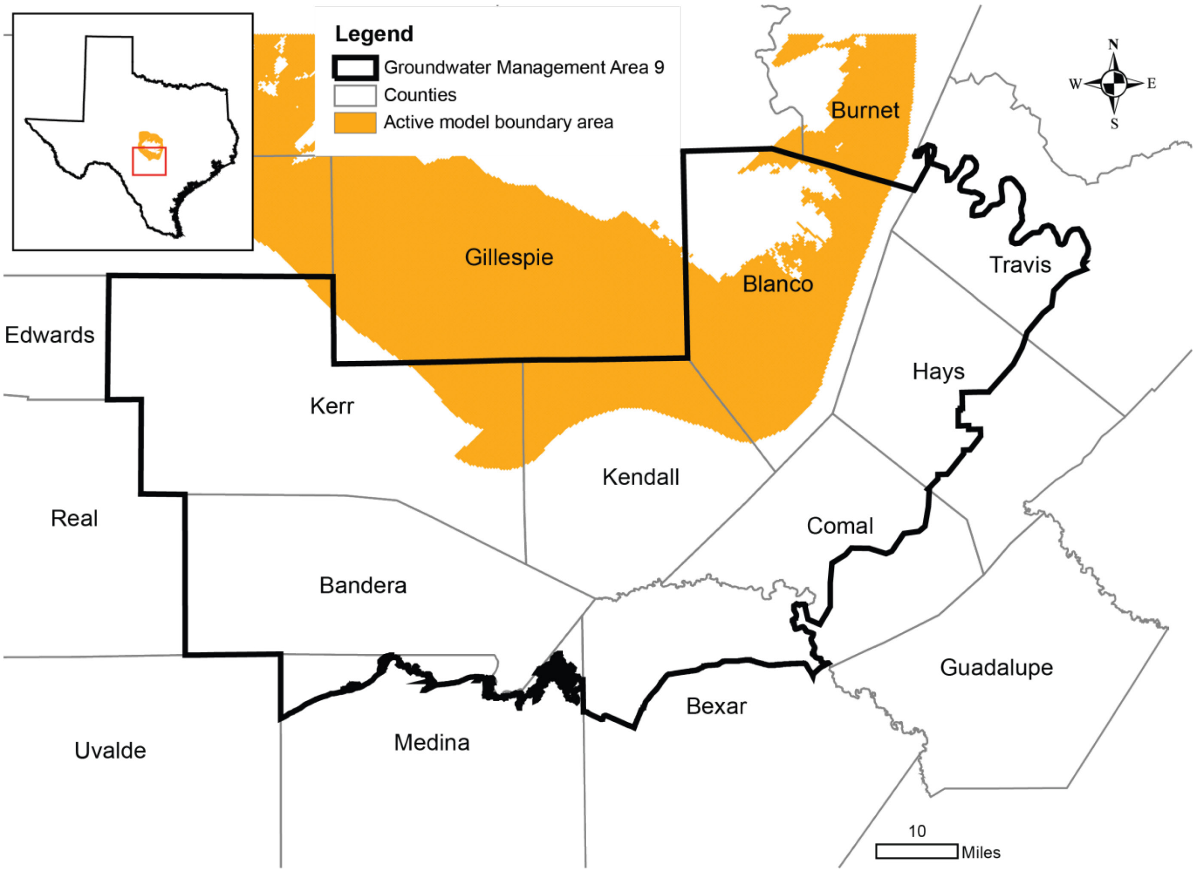

FIGURE 6. MAP SHOWING THE AREAS COVERED BY THE ELLENBURGER-SAN SABA AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE MINOR AQUIFERS OF THE LLANO UPLIFT AREA IN GROUNDWATER MANAGEMENT AREA 9.

TABLE 5. MODELED AVAILABLE GROUNDWATER FOR THE ELLENBURGER-SAN SABA AQUIFER IN GROUNDWATER MANAGEMENT AREA 9 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

District	County	Year						
		2010	2020	2030	2040	2050	2060	2070
Cow Creek Groundwater Conservation District Total	**Kendall**	**75**	**75**	**75**	**75**	**75**	**75**	**75**

TABLE 6. MODELED AVAILABLE GROUNDWATER FOR THE ELLENBURGER-SAN SABA AQUIFER IN GROUNDWATER MANAGEMENT AREA 9 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2010 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Year						
			2010	2020	2030	2040	2050	2060	2070
Kendall	South Central Texas (L)	Colorado	10	10	10	10	10	10	10
		Guadalupe	64	64	64	64	64	64	64
		Total	**75**	**75**	**75**	**75**	**75**	**75**	**75**

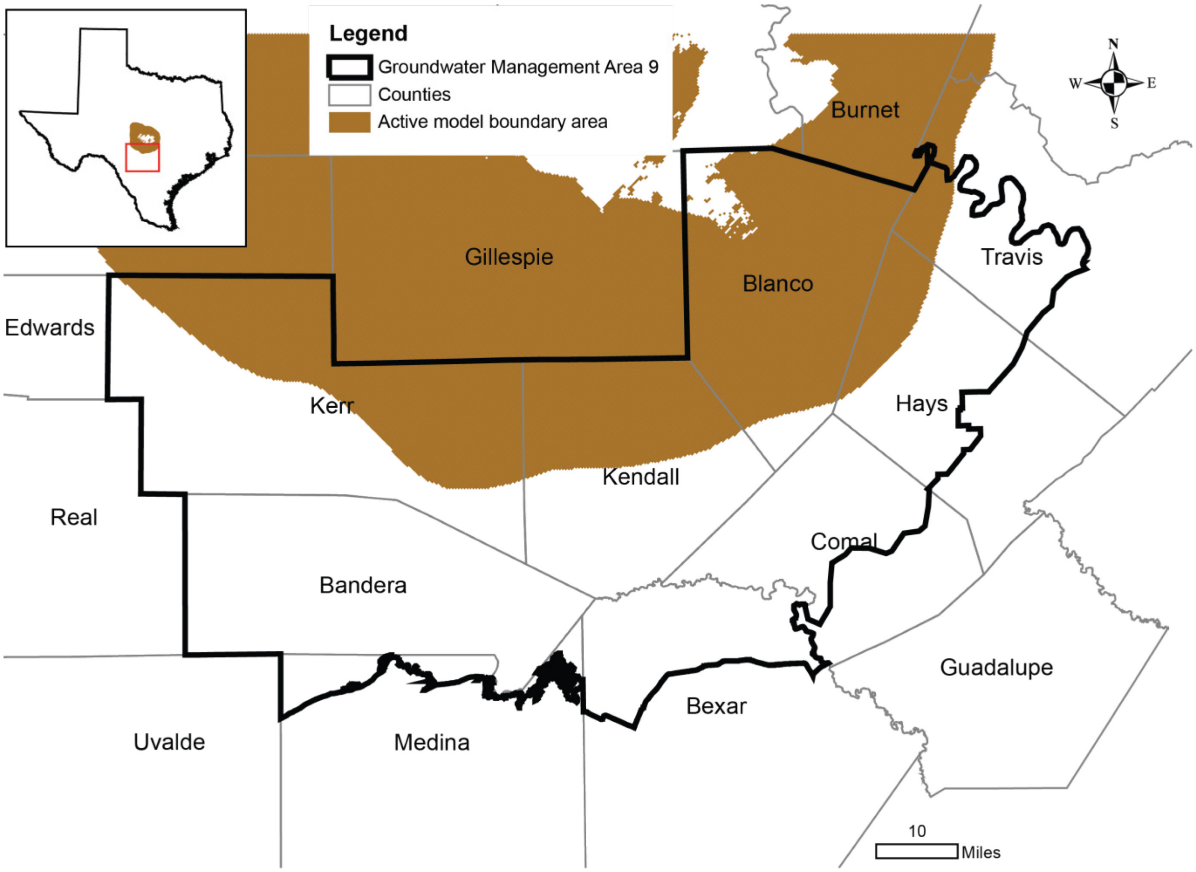

FIGURE 7. MAP SHOWING AREAS COVERED BY THE HICKORY AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE MINOR AQUIFERS OF THE LLANO UPLIFT AREA IN GROUNDWATER MANAGEMENT AREA 9.

TABLE 7. MODELED AVAILABLE GROUNDWATER FOR THE HICKORY AQUIFER IN GROUNDWATER MANAGEMENT AREA 9 SUMMARIZED BY DISTRICT AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

District	County	Year						
		2010	2020	2030	2040	2050	2060	2070
Cow Creek Groundwater Conservation District Total	**Kendall**	**140**	**140**	**140**	**140**	**140**	**140**	**140**

TABLE 8. MODELED AVAILABLE GROUNDWATER FOR THE HICKORY AQUIFER IN GROUNDWATER MANAGEMENT AREA 9 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2010 AND 2070. RESULTS ARE IN ACRE-FEET PER YEAR.

County	RPWA	River Basin	Year						
			2010	2020	2030	2040	2050	2060	2070
Kendall	South Central Texas (L)	Colorado	12	12	12	12	12	12	12
		Guadalupe	128	128	128	128	128	128	128
		Total	**140**	**140**	**140**	**140**	**140**	**140**	**140**

LIMITATIONS:

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

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

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

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

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

Model "Dry" Cells

The predictive model run for this analysis results in water levels in some model cells dropping below the base elevation of the cell during the simulation. In terms of water level, the cells have gone dry. However, as noted in the model assumptions the transmissivity of the cell remains constant and will produce water.

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

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GAM Run 19-026: Hays Trinity Groundwater Conservation District Groundwater Management Plan

Stephen R. Bond, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-475-1520
January 2, 2020

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STEPHEN BOND
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GAM RUN 19-026: HAYS TRINITY GROUNDWATER CONSERVATION DISTRICT GROUNDWATER MANAGEMENT PLAN

Stephen R. Bond, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-475-1520
January 2, 2020

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h) (Texas Water Code, 2011), states that, in developing its groundwater management plan, a groundwater conservation district shall use groundwater availability modeling information provided by the Executive Administrator of the Texas Water Development Board (TWDB) in conjunction with any available site-specific information provided by the district for review and comment to the Executive Administrator.

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

1. the annual amount of recharge from precipitation, if any, to the groundwater resources within the district;

2. for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface-water bodies, including lakes, streams, and rivers; and

3. the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

The groundwater management plan for the Hays Trinity Groundwater Conservation District should be adopted by the district on or before November 21, 2020 and submitted to the Executive Administrator of the TWDB on or before December 21, 2020. The current management plan for the Hays Trinity Groundwater Conservation District expires on February 19, 2021.

We used two groundwater availability models to estimate the management plan information for the aquifers within the Hays Trinity Groundwater Conservation District. Information for the Hickory Aquifer is from version 1.01 of the groundwater availability model for the minor aquifers in the Llano Uplift Region (Shi and others, 2016a and b). Information for the Trinity Aquifer is from the groundwater availability model for the Hill Country portion of the Trinity Aquifer System (Jones and others, 2011).

This report replaces the results of GAM Run 15-005 (Jones, 2015), as this report includes results for the Hickory Aquifer, whereas the previous report did not. The model does not cover the entire Hickory Aquifer within the district boundaries. Please contact Mr. Stephen Allen with the TWDB at (512) 463-7317 or stephen.allen@twdb.texas.gov for additional information on the aquifer in areas not covered by the groundwater availability model.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the groundwater availability models mentioned above were used to estimate information for the Hays Trinity Groundwater Conservation District management plan. Water budgets were extracted for the historical model periods for the Hill Country portion of the Trinity Aquifer System (1981 through 1997) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Water budgets were extracted for the historical model period for the Hickory Aquifer (1981 through 2010) using ZONEBUDGET USG Version 1.00 (Panday and others, 2013). The average annual water budget values for recharge, surface-water outflow, inflow to the district, outflow from the district, and net inter-aquifer flow (lower) for the portion of the aquifer located within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Hickory Aquifer

- We used version 1.01 of the groundwater availability model for the minor aquifers in the Llano Uplift Region to analyze the Hickory Aquifer. See Shi and others (2016a and b) for assumptions and limitations of the model.

- The groundwater availability model for the Llano Uplift Region contains eight active layers (from top to bottom):
    - Layer 1 — the Trinity Aquifer, Edwards-Trinity (Plateau) Aquifer, and younger alluvium deposits
    - Layer 2 — Permian and Pennsylvanian age confining units
    - Layer 3 — the Marble Falls Aquifer and equivalent
    - Layer 4 — Mississippian age confining units
    - Layer 5 — the Ellenburger-San Saba Aquifer and equivalent
    - Layer 6 — Cambrian age confining units
    - Layer 7 — the Hickory Aquifer and equivalent
    - Layer 8 — Precambrian age confining units
- The Hickory Aquifer is the only aquifer from the Llano Uplift Region present in the Hays Trinity Groundwater Conservation District.
- The groundwater availability model does not extend to the official boundary of the Hickory Aquifer within much of the district. The portion of the officially recognized Hickory Aquifer that is east of the Ouachita Thrust Fault is not active in the model because research suggests the fault likely acts as a flow barrier.
- The groundwater availability model contains active model cells that are outside of the official Hickory Aquifer boundary in the southwestern portion of the Hays Trinity Groundwater Conservation District. Lateral groundwater flow occurs from the model cells within the official aquifer boundary to these cells.
- Perennial rivers and reservoirs were simulated using the MODFLOW-USG river package. Springs were simulated using the MODFLOW-USG drain package. However, for this analysis, surface water discharge does not occur from the Hickory Aquifer within the groundwater district boundaries.
- The model was run with MODFLOW-USG (Panday and others, 2013).

Hill Country portion of the Trinity Aquifer System

- We used version 2.01 of the groundwater availability model for the Hill Country portion of the Trinity Aquifer System. See Jones and others (2011) for assumptions and limitations of the groundwater availability model.
- The groundwater availability model includes four layers, representing (from top to bottom):
  - Layer 1 — the Edwards Group of the Edwards-Trinity (Plateau) Aquifer,
  - Layer 2 — the Upper Trinity Aquifer,
  - Layer 3 — the Middle Trinity Aquifer, and
  - Layer 4 — the Lower Trinity Aquifer.
- Layer 1 is not present in the district. An individual water budget for the district was determined for the remaining layers of the Hill Country portion of the Trinity Aquifer System (Layer 2 to Layer 4, collectively).
- The General-Head Boundary (GHB) package of MODFLOW was used to represent flow out of the study area between the Hill Country portion of the Trinity Aquifer and the Edwards (Balcones Fault Zone) Aquifer or the confined parts of the Trinity Aquifer underlying the Edwards (Balcones Fault Zone) Aquifer.
- Only the outcrop area of the Hill County portion of the Trinity Aquifer was modeled, and the down-dip extent that underlies the Edwards (Balcones Fault Zone) Aquifer was not included.
- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

TABLE 1. SUMMARIZED INFORMATION FOR THE HICKORY AQUIFER FOR HAYS TRINITY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Hickory Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Hickory Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Hickory Aquifer	2,798
Estimated annual volume of flow out of the district within each aquifer in the district	Hickory Aquifer	4,336
Estimated net annual volume of flow between each aquifer in the district	From overlying units into the Hickory Aquifer	1,603
	To underlying units from the Hickory Aquifer	66

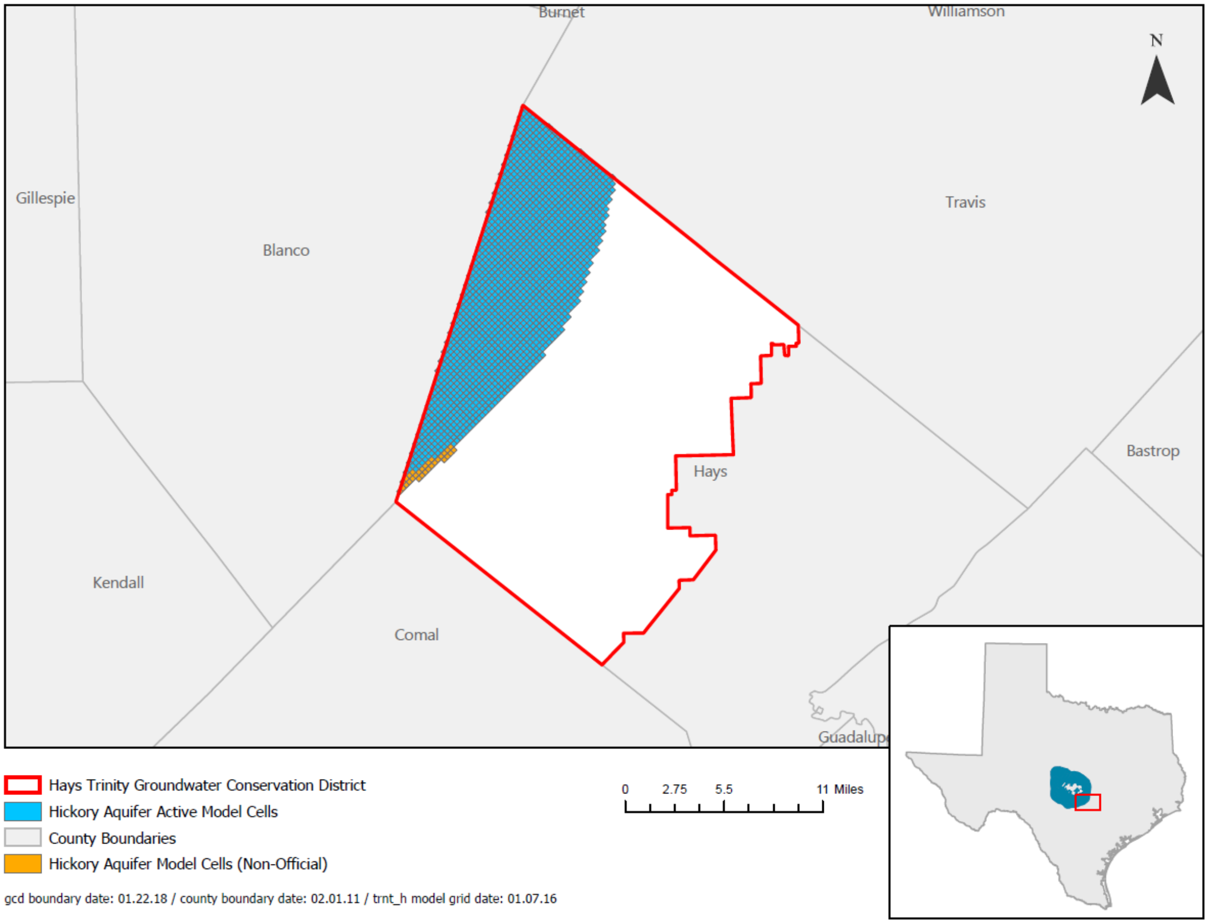


FIGURE 1 AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE HICKORY AQUIFER FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE HICKORY AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 2. SUMMARIZED INFORMATION FOR THE HILL COUNTRY PORTION OF THE TRINITY AQUIFER SYSTEM FOR HAYS TRINITY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Trinity Aquifer	26,105
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Trinity Aquifer	22,439
Estimated annual volume of flow into the district within each aquifer in the district	Trinity Aquifer	17,716
Estimated annual volume of flow out of the district within each aquifer in the district	Trinity Aquifer	11,610
*Estimated net annual volume of flow between each aquifer in the district	From the Trinity Aquifer to the Edwards (Balcones Fault Zone) Aquifer	7,440

* in the Hays Trinity Groundwater Conservation District, groundwater generally flows east from the Trinity Aquifer to the Edwards (Balcones Fault Zone) Aquifer and the confined parts of the Trinity Aquifer that underlie the Edwards (Balcones Fault Zone) Aquifer.

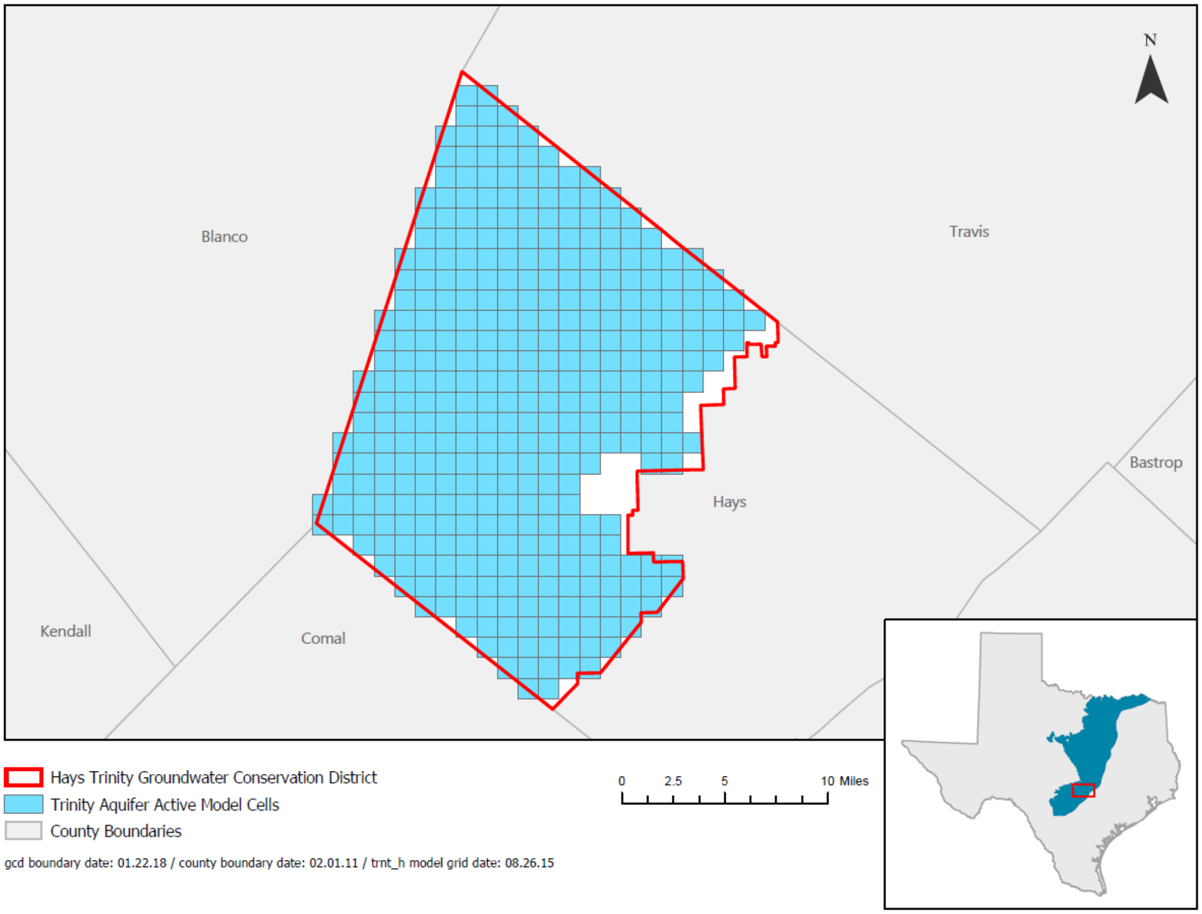


FIGURE 2 AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE HILL COUNTRY PORTION OF THE TRINITY AQUIFER SYSTEM FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE TRINITY AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

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 historical groundwater flow conditions includes the assumptions about the location in the aquifer where historical 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 historical 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. Historical 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:

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

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

Jones, I. C., Anaya, R., and Wade, S. C., 2011, Groundwater availability model: Hill Country portion of the Trinity Aquifer of Texas: Texas Water Development Board Report 377, 165 p.

Jones, I. C., 2015, GAM Run 15-005: Texas Water Development Board, GAM Run 15-005 Report, 10 p., http://www.twdb.texas.gov/groundwater/docs/GAMruns/GR15-005.pdf.

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

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

Shi, J., Boghici, R., Kohlrenken, W., and Hutchison, W.R., 2016a, Conceptual Model Report: Minor Aquifers of the Llano Uplift Region of Texas. Texas Water Development Board Report, 306 p., http://www.twdb.texas.gov/groundwater/models/gam/llano/Llano_Uplift_Conceptual_Model_Report_Final.pdf.

Shi, J., Boghici, R., Kohlrenken, W., and Hutchison, W.R., 2016b, 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., http://www.twdb.texas.gov/groundwater/models/gam/llano/Llano_Uplift_Numerical_Model_Report_Final.pdf.

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

Texas Water Development Board

Groundwater Conservation District Management Plan Checklist, effective December 6, 2012

District name: ☐ **Official review** ☐ **Prereview**

Reviewing staff:

Date plan received:

Date plan reviewed:

A management plan shall contain, unless explained as not applicable, the following elements, 31 TAC §356.52(a):

	Citation of rule	Citation of statute	Present in plan and administratively complete	Source of data	Evidence that best available data was used	Notes
Is a paper hard copy of the plan available?	31 TAC §356.53(a)(1)					
Is an electronic copy of the plan available?	31 TAC §356.53(a)(2)					
1. Is an estimate of the modeled available groundwater in the District based on the desired future condition established under Section 36.108 included?	31 TAC §356.52(a)(5)(A)	TWC §36.1071(e)(3)(A)				p.
2. Is an estimate of the amount of groundwater being used within the District on an annual basis for at least the most recent five years included?	31 TAC §356.52(a)(5)(B); §356.10(2)	TWC §36.1071(e)(3)(B)				p.
For sections 3-5 below, each district must use the groundwater availability modeling information provided by the TWDB in conjunction with available site-specific information provided by the district when developing the required estimates, 31 TAC §356.52(c):						
3. Is an estimate of the annual amount of recharge, from precipitation, if any, to the groundwater resources within the District included?	31 TAC §356.52(a)(5)(C)	TWC §36.1071(e)(3)(C)				p.
4. For each aquifer in the district, is an estimate of the annual volume of water that discharges from the aquifer to springs and any surface water bodies, including lakes, streams and rivers, included?	31 TAC §356.52(a)(5)(D)	TWC §36.1071(e)(3)(D)				p.
5. Is an estimate of the annual volume of flow	31 TAC §356.52(a)(5)(E)	TWC §36.1071(e)(3)(E)				
a) into the District within each aquifer,						p.
b) out of the District within each aquifer,						p.
c) and between aquifers in the District,						p.
if a groundwater availability model is available, included?						
6. Is an estimate of the projected surface water supply within the District according to the most recently adopted state water plan included?	31 TAC §356.52(a)(5)(F)	TWC §36.1071(e)(3)(F)				p.
7. Is an estimate of the projected total demand for water within the District according to the most recently adopted state water plan included?	31 TAC §356.52(a)(5)(G)	TWC §36.1071(e)(3)(G)				p.
8. Did the District consider and include the water supply needs from the adopted state water plan?		TWC §36.1071(e)(4)				p.
9. Did the District consider and include the water management strategies from the adopted state water plan?		TWC §36.1071(e)(4)				p.
10. Did the district include details of how it will manage groundwater supplies in the district	31 TAC §356.52(a)(4)					p.
11. Are the actions, procedures, performance, and avoidance necessary to effectuate the management plan, including specifications and proposed rules, all specified in as much detail as possible, included in the plan?		TWC §36.1071(e)(2)				p.
12. Was evidence that the plan was adopted, after notice and hearing, included? Evidence includes the posted agenda, meeting minutes, and copies of the notice printed in the newspaper(s) and/or copies of certified receipts from the county courthouse(s).	31 TAC §356.53(a)(3)	TWC §36.1071(a)				p.
13. Was evidence that, following notice and hearing, the District coordinated in the development of its management plan with regional surface water management entities?	31 TAC §356.51	TWC §36.1071(a)				p.
14. Has any available site-specific information been provided by the district to the executive administrator for review and comment before being used in the management plan when developing the estimates required in subsections 31 TAC §356.52(a)(5)(C),(D), and (E) ?	31 TAC §356.52(c)	TWC §36.1071(h)				p.

Mark an affirmative response with YES
Mark a negative response with NO
Mark a non-applicable checklist item with N/A

Management goals required to be addressed unless declared not applicable	Management goal (time-based and quantifiable) 31 TAC §356.51	Methodology for tracking progress 31TAC §356.52(a)(4)	Management objective(s) (specific and time-based statements of future outcomes) 31 TAC §356.52 (a)(2)	Performance standard(s) (measures used to evaluate the effectiveness of district activities) 31 TAC §356.52 (a)(3)	Notes
Providing the most efficient use of groundwater 31 TAC 356.52(a)(1)(A); TWC §36.1071(a)(1)	15)	16)	17)	18)	p.
Controlling and preventing waste of groundwater 31 TAC 356.52(a)(1)(B); TWC §36.1071(a)(2)	19)	20)	21)	22)	p.
Controlling and preventing subsidence 31 TAC 356.52(a)(1)(C); TWC §36.1071(a)(3)	23)	24)	25)	26)	p.
Addressing conjunctive surface water management issues 31 TAC 356.52(a)(1)(D); TWC §36.1071(a)(4)	27)	28)	29)	30)	p.
Addressing natural resource issues that impact the use and availability of groundwater and which are impacted by the use of groundwater 31 TAC 356.52(a)(1)(E); TWC §36.1071(a)(5)	31)	32)	33)	34)	p.
Addressing drought conditions 31 TAC 356.52(a)(1)(F); TWC §36.1071(a)(6)	35)	36)	37)	38)	p.
Addressing	39)	40)	41)	42)	
a) conservation,	39a)	40a)	41a)	42a)	p.
b) recharge enhancement,	39b)	40b)	41b)	42b)	p.
c) rainwater harvesting,	39c)	40c)	41c)	42c)	p.
d) precipitation enhancement, and	39d)	40d)	41d)	42d)	p.
e) brush control	39e)	40e)	41e)	42e)	p.
where appropriate and cost effective 31 TAC 356.52(a)(1)(G); TWC §36.1071(a)(7)					
Addressing the desired future conditions established under TWC §36.108. 31 TAC 356.52(a)(1)(H); TWC §36.1071(a)(8)	43)	44)	45)	46)	p.
Does the plan identify the performance standards and management objectives for effecting the plan? 31 TAC §356.52(a)(2)&(3); TWC §36.1071(e)(1)			47)	48)	

Mark required elements that are present in the plan with YES
Mark any required elements that are missing from the plan with NO
Mark plan elements that have been indicated as not applicable to the district with N/A

Notice of Public Hearing of the HAYS TRINITY GROUNDWATER CONSERVATION DISTRICT BOARD OF DIRECTORS

FILED
HAYS COUNTY, TEXAS
7:32 o'clock P M.
NOV 12 2020
Elaine H Cardenas
COUNTY CLERK

December 3, 2020 6:00 PM
Via Teleconference

An urgent public necessity exists requiring the District to alter meeting procedures due to the COVID-19 pandemic. Notice is hereby given to all interested members of the public that the Board of Directors of the Hays Trinity Groundwater Conservation District will hold meetings via telephone conference-call pursuant to Texas Government Code, Section 551.125, and as modified by the Governor of Texas who ordered suspension of various provisions of the Open Meetings Act, Chapter 551, Government Code, effective March 16, 2020, in accordance with the Texas Disaster Act of 1975 (see the Governor's proclamation on March 13, 2020, certifying that the COVID-19 pandemic poses an imminent threat of disaster and declaring a state of disaster for all counties in Texas).

INSTRUCTIONS FOR PARTICIPATION:
Telephone Conference Opens at 5:45 p.m.

Registration as a speaker will require submitting the attached Public Participation Form before the meeting begins. Properly registered speakers must limit Public Comments to 5 minutes for all topics and are made during the Public Comments section of the meeting. Any person participating in the meeting must be recognized and identified by the Presiding Officer each time they speak. The District will accept written comments until Wednesday, December 2, at 4pm. Written comments may be submitted on any item by mail to PO Box 1648, Dripping Springs, TX 78620 or by email to staff3@haysgroundwater.com.

Attendees can attend the meeting via telephone at **+1 (866) 899-4679**, access code: **918-486-741**.

Agenda items may be taken in any order at the discretion of the Board. HTGCD agendas, approved meeting minutes, and any available backup materials are posted on the District website, www.haysgroundwater.com under Quick Links/Agendas/Meeting Year/ Meeting Date.

Public Hearing Items

1. 2021 Groundwater Management Plan approval..Staff

EXECUTIVE SESSION:
The Board of Directors of the Hays Trinity Conservation District reserves the right to adjourn into Executive Session at any time during the course of this meeting to discuss any of the posted matters listed on this agenda, as authorized by the Texas Government Code Chapter 551 including Section 551.071 (Consultation with Attorney) and Section 551.074 (Personnel Matters). No final action or decision will be made in Executive Session.

CERTIFICATE OF POSTING: Texas Government Code, Open Meetings, Section 551.054
The above Notice of Public Hearing was posted on November 11, 2020 on the HTGCD website and District Office. A copy of the notice can also be reviewed at the Hays County Clerk's Office.

Chapter 36 Texas Water Code: Groundwater Conservation Districts:
The District shall provide notice to the county clerk concerning Rulemaking 36.101(d)(2), Joint Planning 36.108(e)(2), and application for a Permit or Permit Amendment 36.404(c)(2)

The District will accept written comments until Wednesday, December 2 at 4pm. Written comments may be submitted on any item by mail to PO Box 1648, Dripping Springs, TX 78620 or by email to staff3@haysgroundwater.com. Oral

The Wimberle

CLASSIFI

additional information regarding your request.

Si desea información en español, puede llamar al 1-888-782-8477.

Public Notice

Public Notice

PUBLIC NOTICE

Hays Trinity Groundwater Conservation District (HTGCD): Notice of Public Hearing. Notice is hereby given that HTGCD will hold a Public Hearing at 6:00 pm Thursday, December 3, 2020, on the HTGCD 2021 Management Plan approval. The Hearing will be held via online teleconference, Dial-in: 1(866)899-4679, Access Code: 918-486-741. Hearing items are available for review on the District website, www.haysgroundwater.com, under Agendas, and at the District office. The District will accept written comments on the Hearing item until Wednesday, December 2 at 4pm via mail to PO Box 1648, Dripping Springs, TX 78620 or by email to staff3@haysgroundwater.com. Oral comments may also be presented at the Hearing. Members of the public may contact the office at (512) 858-9253 or the email above for a copy of the item or with any questions.

RFCSP 20-21-005 WSE Relocation and ES#5 – Network & Wireless

Dripping Springs ISD is requesting competitive sealed proposals for WSE Relocation and ES #5 Network & Wireless (RFCSP 20-21-005). Proposals shall be addressed to Michelle Lyons, Purchasing Coordinator CTSBO, Dripping Springs Independent School District, 510 W. Mercer Street, Dripping Springs, Texas 78620, and must be received by 2:00 P.M. (CST) on January 05, 2021.

The RFCSP package may be obtained at the District's website at www.dsisdtx.us

Dripping Springs Independent School District reserves the right to accept or reject any and all proposals, to waive any

Public Notice

Public Notice

NOTICE OF APPLICATION TO SUBDIVIDE

An Application has been filed with Hays County to Subdivide 65.17 Acres of Property in Caliterra Phase 4 Section 12 Preliminary Plan located at Premier Park Loop at Misty Meadow in Hays County, Tx into 42 - Single Family Lots, 3 Open Space Lots 2 Drainage easement lots.

Application Information may be obtained from: Hays County Development Services (512) 393-2150. Tracking # PLN 1573 NP

General Help Wanted

BACKHOE OPERATOR NEEDED

has own transportation, above average pay for above average people that are willing to work hard and make some money. Email: marisa@paulswoyerseptics.com. Needed Immediately!!!!"

General Help Wanted

CAREGIVER NEEDED

Independent-minded, disabled Henly person needs reliable, experienced part-time caregiver for personal care, exercise, light housework, errands. Applicants should live within 15 miles of Henly/Dripping Springs.
(512) 858-4769

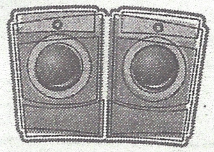
General Help Wanted

IMMEDIATE HIRE

For male and female caregivers in surrounding locations. Please contact hiring manager.
830.625.0444.

Misc. Merchandise

NICE WASHERS /dryers/stoves $250/up. Refrigerators $200/up. **Guaranteed Appliances, Sales / Service.** 512-392-0373.



Tools/ Machinery

FOR SALE
22cuft lawn sweeper and 270cc shredder
$300 cash
5128587410

Auctions

Auctions

Auctions

Auctions

REGULAR BOARD MEETING & PUBLIC HEARING
HAYS TRINITY GROUNDWATER CONSERVATION DISTRICT
BOARD OF DIRECTORS

December 3, 2020 6:00 PM
Via Teleconference

INSTRUCTIONS FOR PARTICIPATION:
Telephone Conference Opens at 5:45 p.m.

Registration for Public Comment requires submitting a Public Participation Form to staff3@haysgroundwater.com before the meeting begins. Properly registered speakers must limit Public Comments to 5 minutes for all topics. All Public Comments will be made during the Public Comments section of the meeting. Any person participating in the meeting must be recognized and identified by the Presiding Officer each time they speak. The District will accept written comments by 4pm the business day before the Board Meeting. Written comments may be submitted on any item by mail to PO Box 1648, Dripping Springs, TX 78620 or by email to staff3@haysgroundwater.com.

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AGENDA

Call to Order – 6pm.

Public Comments To address the Board of Directors, please complete and submit a Public Participation Form to District staff. Comments will be limited to this section of the agenda.

Announcements (no discussion or possible action)

General Manager's Report (topics intended for general administrative and operational information dissemination. The HTGCD Board will not take any action unless the topic is specifically stated elsewhere within the agenda.)

- Standing Topic Updates: New Registrations and Connections, Announcements, Investment Report, District Activities, and monthly Status of Drought Briefing .... **Charlie Flatten**

Science Update (topics intended for information dissemination. The HTGCD Board will not take any action unless the topic is specifically stated elsewhere within the agenda.)

- Review status of projects, water level update, TCEQ projects, and other science
- Informational updates .... **Philip Webster**
  - *Overview of current HTGCD Scientific Reports*

Election Update (topics intended for information dissemination. The HTGCD Board will not take any action unless the topic is specifically stated elsewhere within the agenda.)

- Review and update of Election information .... **Keaton Hoelscher**

Consent Items The following agenda items may be considered and approved as one motion. A Board member or a citizen may request any item be removed from the consent agenda for Discussion and Possible Action as a separate item.

1. Approval of October Bank Reconciliations & Monthly Invoices .... **John Worrall**
2. Approval of October Financial Reports, Balance Sheets, and Budget to Actual Report .... **John Worrall**
3. Approval of November 5, 2020 Board Meeting Minutes .... **John Worrall**

Public Hearing Items

4. *2021 Groundwater Management Plan* approval .... **Staff**

Discussion and Possible Action

5. Al Broun Certificate .... **Staff**
6. *2021 Groundwater Management Plan* approval .... **Staff**
7. Holiday Hours for District Office .... **Linda Kaye Rogers**
8. Election of new Board Officers .... **Linda Kaye Rogers**

Discussion Only

9. *Standstill Agreement* with DSWSC status report. .... **John Worrall**
10. *Strategic Water Vision 2021* status report .... **Holly Fults**
11. Alternative connection fee options .... **Staff**
12. NOAV penalty discussion .... **Holly Fults**

Future Agenda Items

1. Incentive Policy for Personnel .... **Linda Kaye Rogers**
2. Recycling Policy .... **Staff**

Adjournment

EXECUTIVE SESSION: The Board of Directors of the Hays Trinity Conservation District reserves the right to adjourn into Executive Session at any time during the course of this meeting to discuss any of the posted matters listed on this agenda, as authorized by the Texas Government Code Chapter 551 including Section 551.071 (Consultation with Attorney) and Section 551.074 (Personnel Matters). No final action or decision will be made in Executive Session.

CERTIFICATE OF POSTING: Texas Government Code, Open Meetings, Section 551.054 The above Notice of Board Hearing & Meeting was posted on November 12 and 30, 2020 on the HTGCD website and District Office. A copy of the notice can also be reviewed at the Hays County Clerk's Office.

Chapter 36 Texas Water Code: Groundwater Conservation Districts: The District shall provide notice to the county clerk concerning Rulemaking 36.101(d)(2), Joint Planning 36.108(e)(2), and application for a Permit or Permit Amendment 36.404(c)(2).

The Hays Trinity Groundwater Conservation District is committed to compliance with the Americans with Disabilities Act (ADA). Reasonable accommodations and equal opportunity for effective communications will be provided upon request. Please contact the District office at 512-858-9253 at least 24 hours in advance if accommodation is needed.

An urgent public necessity exists requiring the District to alter meeting procedures due to the COVID-19 pandemic. Notice is hereby given to all interested members of the public that the Board of Directors of the Hays Trinity Groundwater Conservation District will hold meetings via telephone conference call pursuant to Texas Government Code, Section 551.125, and as modified by the Governor of Texas who ordered suspension of various provisions of the Open Meetings Act, Chapter 551, Government Code, effective March 16, 2020, in accordance with the Texas Disaster Act of 1975 (see the Governor's proclamation on March 13, 2020, certifying that the COVID-19 pandemic poses an imminent threat of disaster and declaring a state of disaster for all counties in Texas).

RESOLUTION NO. 20201203
A RESOLUTION OF THE
HAYS TRINITY GROUNDWATER CONSERVATION DISTRICT
ADOPTING THE 2021 MANAGEMENT PLAN

Whereas, the Hays Trinity Groundwater Conservation District (District) is a political subdivision of the State of Texas, created in Chapter 1331, Acts of the 76th Legislature, Regular Session, 1999 (S.B. 1911) and in Act of May 27, 2001, 77th Legislature, Regular Session, Chapter 966, Part 3, 2001 Texas General Laws 1880 (S.B. 2); (collectively, enabling legislation),

Whereas, the District's enabling legislation requires the District to adopt a Management Plan pursuant to Section 36.1071-36.108 of the Texas Water Code,

Whereas, Section 36.1071 of the Texas Water Code requires the Management Plan address the following: providing the most efficient use of groundwater, controlling and preventing waste of groundwater, controlling and preventing subsidence, conjunctive surface water management issues, natural resource issues, drought conditions, and conservation,

Whereas, the District has collected and analyzed the best available scientific information to complete the Management Plan,

Whereas, the District has actively sought out public input to the Management Plan through a publicly noticed public hearing,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE HAYS TRINITY GROUNDWATER CONSERVATION DISTRICT THAT:

1) The Management Plan of the Hays Trinity Groundwater Conservation District is hereby adopted.
2) This Management Plan will take effect upon certification by the Texas Water Development Board. It will remain in effect until a revised Management Plan is certified, or five years, whichever is earlier.

PASSED, APPROVED AND ADOPTED December 3, 2020

Holly Fults

Holly Fults, Board President

Name, Board Secretary Treasurer

Gmail

Laura Thomas <staff3@haysgroundwater.com>

HTGCD 2021 Management Plan

1 message

Laura Thomas <staff3@haysgroundwater.com>
To: npence@gbra.org

Mon, Dec 21, 2020 at 4:30 PM

Dear Mr. Pence,

According to the TWDB, we are to send certain surface water entities a copy of our 2021 Management Plan, which was adopted on December 3, 2020 at an open hearing of the Hays Trinity Groundwater Conservation District Board of Directors. The Guadalupe Blanco River Authority is on our list. We understand that sending this notification and accompanying document will satisfy this requirement.

Please contact our office if you have any questions or concerns regarding our Management Plan.

Happy Holidays from all of us.
Kind regards,
Laura

Laura Thomas, Office Administrator
Hays Trinity Groundwater Conservation District
14101 Hwy 290 W, Bldg 100, Ste 212; Austin, TX 78737
Mail: P. O. Box 1648, Dripping Springs, TX 78620
Phone: 512-858-9253
www.haysgroundwater.com

HTGCD 2021 Management Plan TWDB.pdf
11530K

Gmail

Laura Thomas <staff3@haysgroundwater.com>

HTGCD 2021 Management Plan

1 message

Laura Thomas <staff3@haysgroundwater.com>
To: jriechers@wtcpua.org

Mon, Dec 21, 2020 at 4:37 PM

Dear Ms. Riechers,

According to the TWDB, we are to send certain surface water entities a copy of our 2021 Management Plan, which was adopted on December 3, 2020 at an open hearing of the Hays Trinity Groundwater Conservation District Board of Directors. The WTCPUA is on our list. We understand that sending this notification and accompanying document will satisfy this requirement.

Please contact our office if you have any questions or concerns regarding our Management Plan.

Happy Holidays from all of us.
Kind regards,
Laura

Laura Thomas, Office Administrator
Hays Trinity Groundwater Conservation District
14101 Hwy 290 W, Bldg 100, Ste 212; Austin, TX 78737
Mail: P. O. Box 1648, Dripping Springs, TX 78620
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HTGCD 2021 Management Plan TWDB.pdf
11530K

Gmail

Laura Thomas <staff3@haysgroundwater.com>

HTGCD 2021 Management Plan

1 message

Laura Thomas <staff3@haysgroundwater.com>
To: administrative@regionk.org

Mon, Dec 21, 2020 at 4:27 PM

Dear Ms. Pandey:

According to the TWDB, we are to send you a copy of our 2021 Management Plan, which was adopted on December 3, 2020 at an open hearing of the Hays Trinity Groundwater Conservation District Board of Directors.

We understand that sending this notification and accompanying document will satisfy requirements to contact surface water entities for the LCRA and for Region K.

Please contact our office if you have any questions or concerns regarding our Management Plan.

Happy Holidays from all of us.
Kind regards,
Laura

Laura Thomas, Office Administrator
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11530K

Gmail

Laura Thomas <staff3@haysgroundwater.com>

HTGCD 2021 Management Plan

1 message

Laura Thomas <staff3@haysgroundwater.com>
To: cheller@sara-tx.org

Mon, Dec 21, 2020 at 4:21 PM

Dear Caitlin,

Our General Manager, Charlie Flatten, shared with me your contact information.

According to the TWDB, we are to send certain surface water entities a copy of our 2021 Management Plan, which was approved on December 3, 2020 at an open hearing of the Hays Trinity Groundwater Conservation District Board of Directors. The San Antonio River Authority is on our list. We understand that sending this notification and accompanying document will satisfy this requirement.

Please contact our office if you have any questions or concerns regarding our Management Plan.

Happy Holidays from all of us.
Kind regards,
Laura

Hays Trinity Groundwater Conservation District

Laura Thomas, Office Administrator
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