Northern Trinity
Groundwater Conservation District

Groundwater Management Plan

Adopted on May 7, 2015
Texas Water Development Board approval on _____

May 15, 2015

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NORTHERN TRINITY GROUNDWATER CONSERVATION DISTRICT
GROUNDWATER MANAGEMENT PLAN

1. District's Mission

The mission of the Northern Trinity Groundwater Conservation District ("District") is to manage, preserve, and protect the groundwater resources of Tarrant County, Texas. The District will work to minimize the further drawdown of water levels, prevent the waste of groundwater, prevent interference between wells, protect the existing and historic use of groundwater, prevent the degradation of the quality of groundwater, use public education to promote water conservation, give consideration to the needs of municipal water utilities and the agricultural community, and carry out the powers and duties conferred under Chapter 36 of the Texas Water Code ("TWC"). Any action taken by the District shall only be after full consideration and respect has been afforded to the individual property rights of all citizens of the District.

II. Purpose of the Management Plan

The purpose of the management plan is to provide a planning tool for the District as it moves forward with its efforts to manage and conserve groundwater resources of Tarrant County. The Management Plan contains the hydrogeological and technical information provided by the Texas Water Development Board ("TWDB") regarding the groundwater resources of Tarrant County. As the District obtains more site-specific groundwater information, the District will update and amend the Management Plan.

The development of the Management Plan for the District will enable the District to comply with the requirements of state law. The Texas Legislature created a statewide water planning process with the passage of Senate Bill 1 ("SB 1") in 1997 and Senate Bill 2 ("SB 2") in 2001. The development of management plans by each groundwater conservation district ("GCD") in Texas is an integral part of the statewide planning process. The District's Management Plan satisfies all requirements established for GCDs by SB 1, SB 2, the statutory requirements Chapter 36 of the Texas Water Code, and the administrative requirements of the rules of the TWDB.

III. District Information

A. Creation

The District was created in 2007 by the 80th Texas Legislature with the enactment of House Bill 4028 (Appendix A). In its enabling legislation, the District was provided the powers and duties provided by the general law of the State of Texas, including Chapter 36 of the Texas Water Code, applicable to groundwater conservation districts created under Section 59, Article XVI, of the Texas Constitution. The District's Rules and Management Plan provide the means to conserve, preserve, protect, and prevent waste of the groundwater resources of Tarrant County, Texas, and to promote recharge of the aquifers within Tarrant County.

B. Directors

The District Board of Directors consists of five directors, each serving four year staggered terms. The Tarrant County Commissioners Court shall appoint one director from each of the four commissioner's precincts in the county to represent the precinct in which the director resides. The Tarrant County Judge shall appoint one director in the District to represent the District at large.

C. Authority

The District has the rights and responsibilities provided for in TWC Chapter 36 and 31 Texas Administrative Code (TAC) Chapter 356. The District is charged with conducting hydrogeological studies, adopting a management plan, providing for the permitting of certain water wells and implementing programs to achieve statutory mandates. The District has rule-making authority to implement the policies and procedures needed to manage the groundwater resources of Tarrant County

D. Location and Extent

The District's boundaries are coextensive with the boundaries of Tarrant County, and all lands and other property within these boundaries will benefit from the works and projects that will be accomplished by the District. The District covers an area of approximately 863.42 square miles. Figure 1 is a map of the District showing major roads, incorporated areas and major surface water bodies.

E. Groundwater Resources of Tarrant County

Groundwater resources in Tarrant County, which makes up the District, include the Cretaceous-age northern Trinity and Woodbine aquifers (Figure 2). Sediments in the Washita and Fredericksburg Groups and the Paleozoic-age sediments are general confining units but do produce water locally. A generalized stratigraphic section representative of the hydrogeology of the District is provided in Table 1. The northern Trinity and Woodbine aquifers are recognized by the TWDB as a major and minor aquifer in Texas, respectively. The TWDB defines a major aquifer as one that supplies large quantities of water over large areas of the state and a minor aquifer as one that supplies relatively small quantities of water over large areas of the state or supplies large quantities of water over small areas of the state (George and others, 2011).

Major Aquifer –Trinity Aquifer

The northern Trinity Aquifer is composed of several individual aquifers contained within the Trinity Group. In the District, the northern Trinity Aquifer consists of the aquifers of the Paluxy and Twin Mountains formations separated by the predominantly confining Glen Rose Formation (Figure 3). South of the District, the upper and lower sands of the Twin Mountains Formation are locally referred to as the Hensell and Hosston aquifers and the middle portion of the aquifer, which contains more shale relative to the upper and lower sands, is locally referred to as the Pearsall Formation (see Figure 3). The Fredericksburg and Washita groups are considered confining units, although they can be locally productive, and overlie the downdip portion of the northern Trinity Aquifer in the central portion of the District (see Figures 3 and 4). The northern Trinity Aquifer is underlain by Paleozoic-age sediments, which can be locally productive.

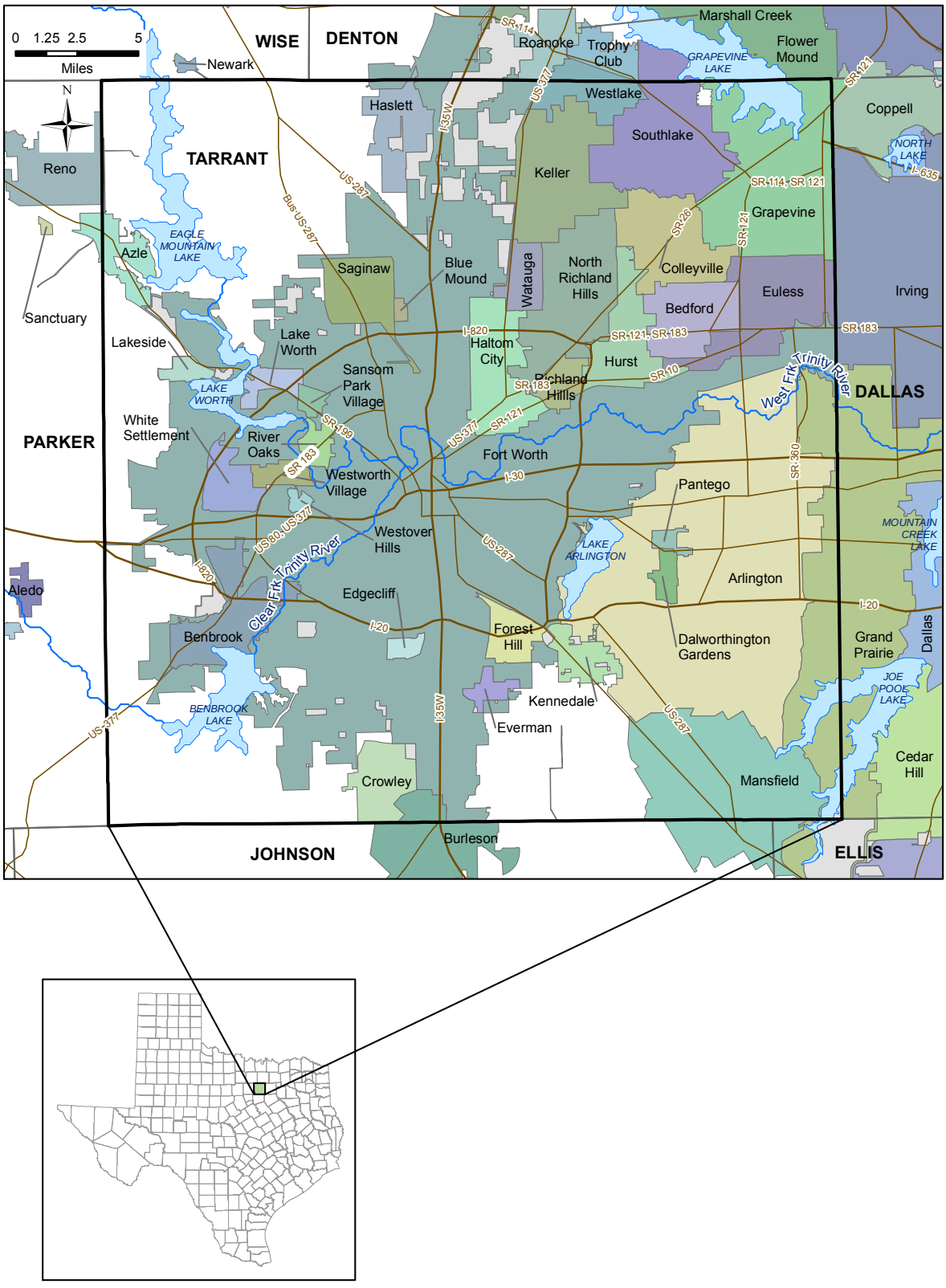


Figure 1 **Map showing the location and boundaries of the District along with cities, major roads, lakes, and major rivers in the District.**

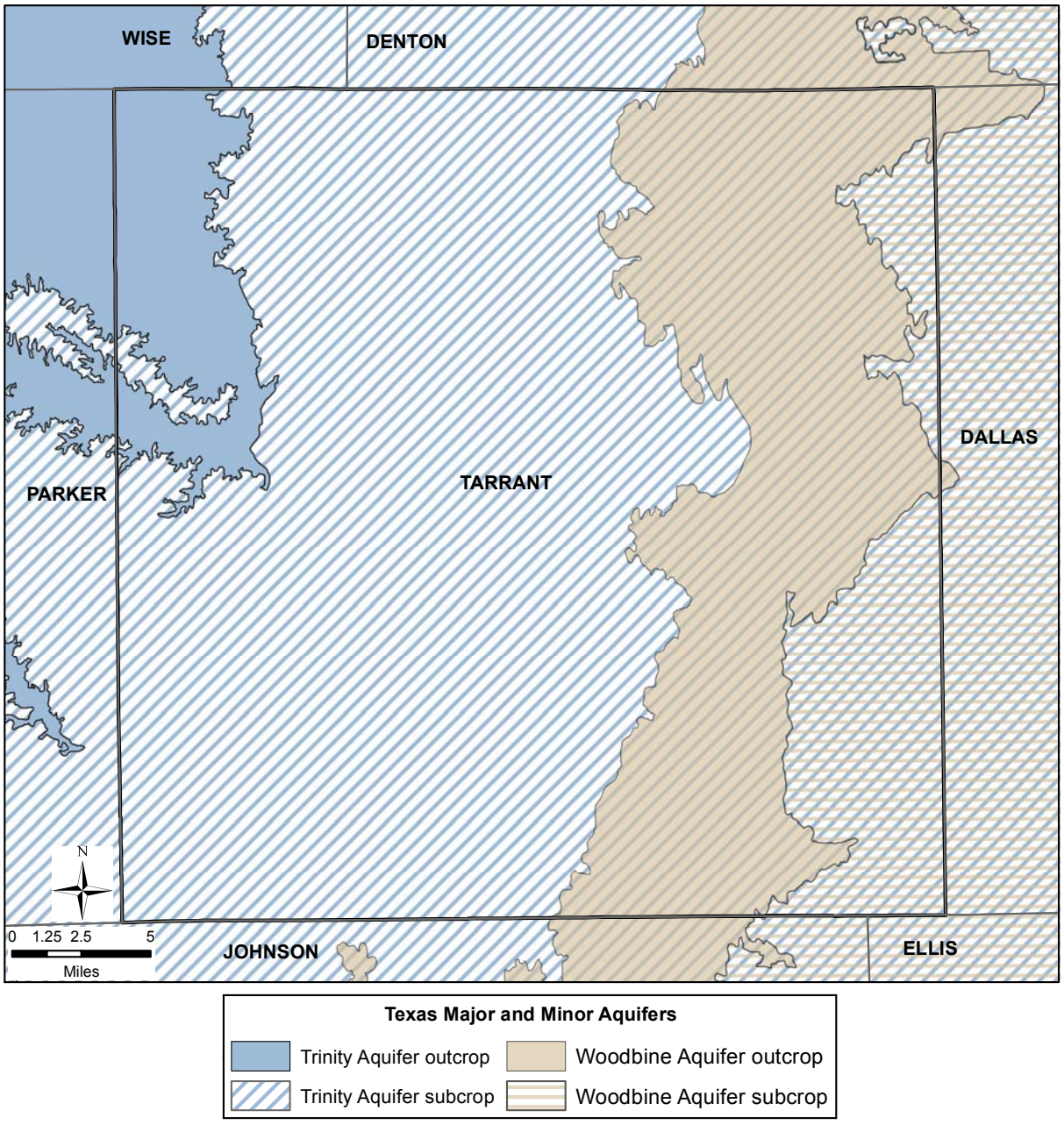
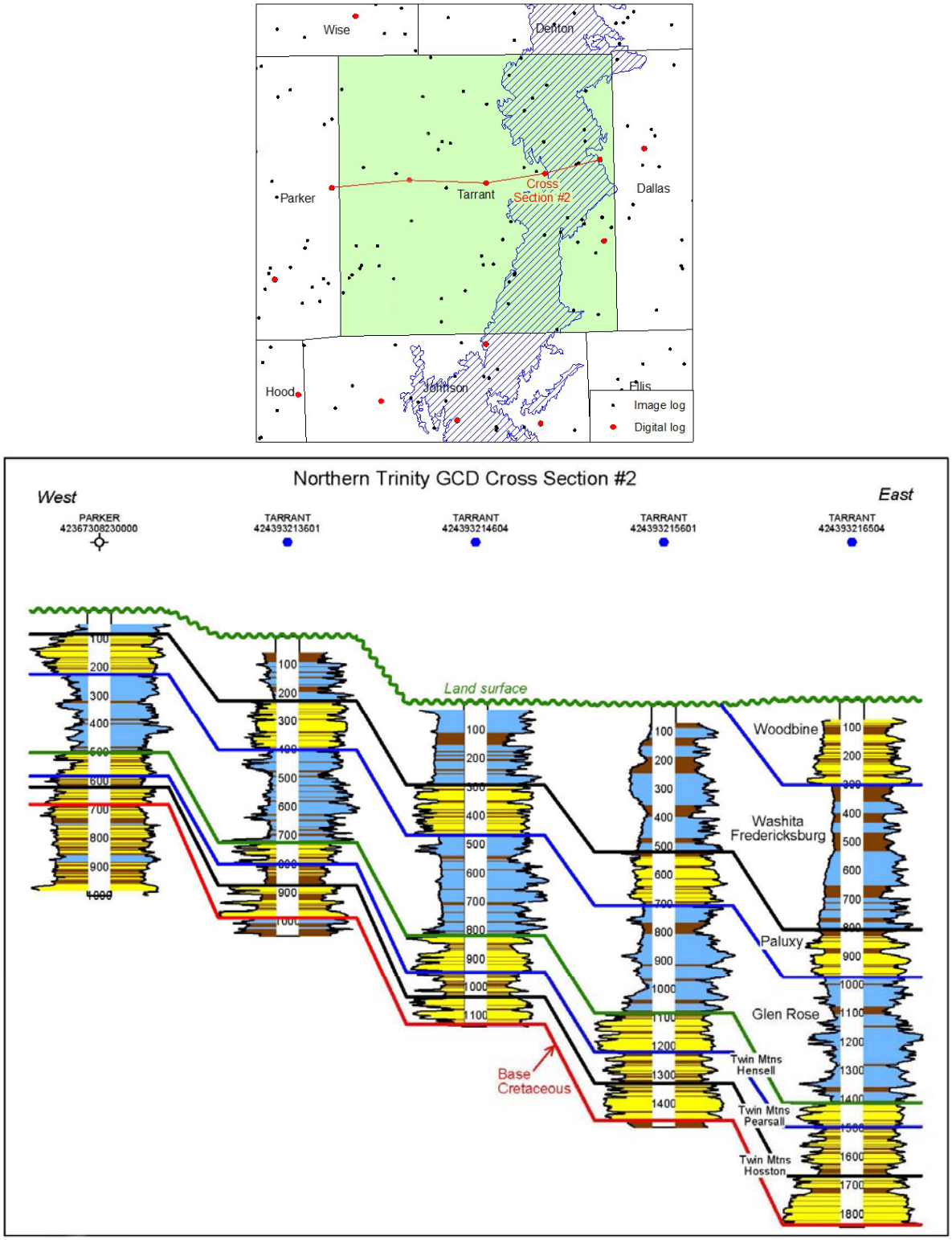


Figure 2 Outcrop and subcrop of the northern Trinity and Woodbine aquifers in the District.

Table 1 General stratigraphy and hydrogeology of the District (after Kelley and others, 2014).

System	Hydrogeologic Characteristic	Group	Formation	
Quaternary	Water-Bearing		alluvial deposits	
Cretaceous	Confining Unit	Eagle Ford	undifferentiated	
	Woodbine Aquifer	Woodbine	Lewisville	
			Dexter	
	Confining Unit (locally productive)	Washita	Grayson	
			Mainstreet	
			PawPaw	
			Weno	
			Denton	
			Fort Worth	
			Duck Creek	
	Confining Unit (locally productive)	Fredericksburg	Kiamichi	
			Edwards	
			Comanche Peak	
			Walnut	
	Trinity Aquifer	Trinity	Paluxy	
			Glen Rose	
			Twin Mountains	Hensell
				Pearsall
				Hosston
Paleozoic	Confining Unit (locally productive)	undifferentiated		

Blue highlight indicates aquifers.



yellow = greater than 50 percent sandstone, blue = greater than 50 percent limestone, brown = greater than 50 percent shale

Figure 3 Digital cross section showing the stratigraphy in the District from ground surface to the base of the northern Trinity Aquifer.

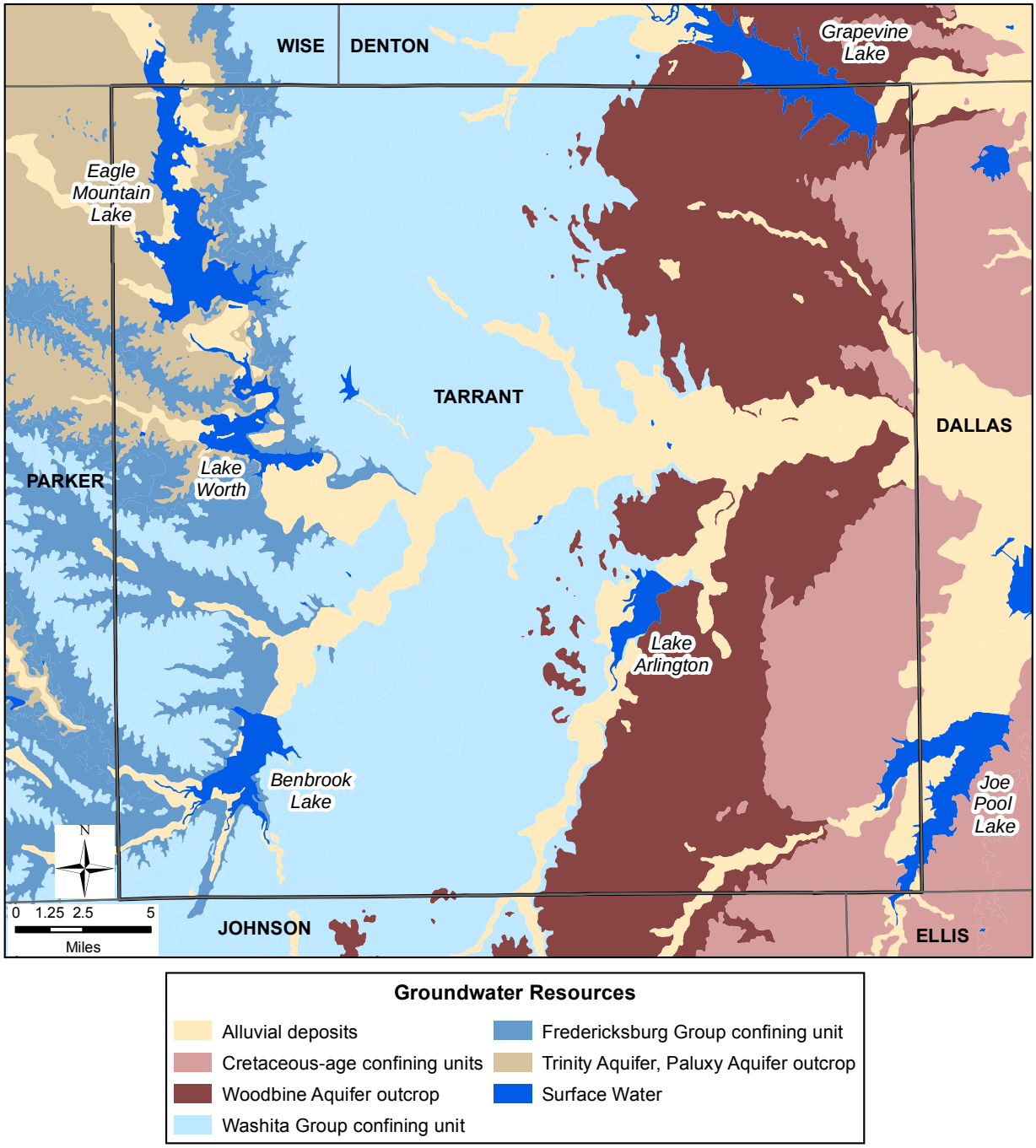


Figure 4 Surface expression of groundwater resources in the District.

The Paluxy Aquifer consists of sand, silt, and clay, with fine-grained sand dominating and the Twin Mountains Aquifer consists predominately of medium- to coarse-grained sand, silty clay, and conglomerates. The following description of the aquifers is taken from Kelley and others (2014). The sandstones in both aquifers are well developed in the District comprising greater than 60 percent of the aquifers everywhere except in the northwest corner of the District. Sandstones in the Paluxy Aquifer are located at surface to depths of 1,000 feet and in the Twin Mountains Aquifer at depths of 500 to 2,000 feet. The depth to sandstone increases from west to east across the District following the structure dip of the Trinity Group. Major, east-oriented, fluvial channel axes in the Paluxy and Twin Mountains aquifers are expressed as thick-bedded sandstones (see Figure 3). The sandstones of the Paluxy Aquifer and the lowermost sands of the Twin Mountains Formation (Hosston Aquifer equivalent) form the most hydraulically conductive and transmissive units in the District. The limestones of the Glen Rose Formation in the northern Trinity Aquifer are well developed confining layers throughout the District. However, the formation does yield small quantities of water in localized areas.

Groundwater samples from wells in the District indicate that the water quality in the northern Trinity Aquifer is fresh with total dissolved solids concentrations typically less than 1,000 milligrams per liter. The composition of the groundwater throughout the vertical extent of the aquifer is predominately sodium-bicarbonate in the District. Groundwater quality in the Woodbine in the District is highly variable with measured groundwater concentrations exceeding 1,500 milligrams per liter.

Groundwater use in the District is dominated by the Municipal Water User Group (WUG). According to the TWDB Water Use Survey Data, municipal groundwater use comprises approximately 87% of pumping on average from 2000 to 2012. Pumping for manufacturing purposes across that same time period made up about 5 percent of total pumping on average. During this same time period, rural and domestic pumping has been estimated to be about 1 to 2 percent of total groundwater use in the District (Kelley and others, 2014). Mining related pumping has increased significantly as a percent of total pumping because of oil and gas related activities. In 2000, there was zero reported mining groundwater use in Tarrant County, but that grew to approximately 14% of all groundwater use by 2011. It has since declined, making up 4% of pumping in 2012. Groundwater usage for irrigation was essentially zero for the period from 2000-2007, but has been steadily increasing since 2008, reaching approximately 12% of total groundwater use in the District in 2012.

IV Statement of Guiding Principles

The District recognizes that the groundwater resources of Tarrant County and the local region are of vital importance. The District will strive to manage and conserve this most valuable resource in a prudent and cost effective manner through education, cooperation, and development of a comprehensive understanding of the aquifers. The District's management plan is intended to serve as a tool to focus the objectives and of those given the responsibility for the execution of the District's activities.

V. Criteria for Plan Approval

A. Planning Horizon

The original management plan was approved by the TWDB on July 9th, 2010. The plan remains in effect for five (5) years after the date of approval or until a revised plan is readopted and reapproved. The original management plan and all subsequent plans shall be reviewed and updated and readopted in accordance with the requirements of the Texas Water Code as part of the five-year review and re-adoption process as required by TWC 36.1072(e). The effective time period for this plan is 5 years from the date of approval by the TWDB Executive Administrator or, if appealed, on approval by the TWDB. This management plan will become effective upon adoption by the Northern Trinity Groundwater Conservation District Board of Directors and approved as administratively complete by the TWDB.

B. Board Resolution

A certified copy of the District Board of Directors' resolution adopting the plan is located in Appendix B - District Resolution.

C. Plan Adoption

Public notice documenting that the plan was adopted following appropriate public meetings and hearings are located in Appendix C – Notice of Hearings and Meetings.

D. Coordination with Surface Water Management Entities

Letters transmitting copies of this plan to the Trinity River Authority, the North Texas Municipal Water District, the Tarrant Regional Water District as well as other Surface Water Management Entities are located in Appendix D – Correspondence to Surface Water Management Entities.

VI. Estimates of Technical Information as Required by TWC § 36.1071 and 31 TAC § 356.52

A. Modeled Available Groundwater in the district based on the Desired Future Condition established under 31 TAC §356.52(a)(5)(A) and TWC §36.1071(e)(3)(A).

Modeled available groundwater (MAG) is defined in Section 36.001 of the Texas Water Code as "the amount of water that the executive administrator [of TWDB] determines may be produced on an average annual basis to achieve a desired future condition established under Section 36.108." The desired future condition of the aquifer may only be determined through joint planning with other GCDs in the same groundwater management area (GMA) as required by the 79th Legislature with the enactment of HB 1763. The District is part of GMA 8. The GCDs of GMA 8 completed the first round of the joint planning process and adopted DFCs for the Woodbine Aquifer on December 17, 2007. GMA-8 adopted DFCs for the northern Trinity Aquifer on September 17, 2008. GMA-8 readopted DFCs for the Woodbine and northern Trinity aquifers on April 27, 2011. The submittal package for the DFCs can be found at the following URL:

http://www.twdb.texas.gov/groundwater/docs/DFC/GMA8_DFC_Adopted_2011-0427.pdf

The DFCs adopted by the District and GMA 8 represent the quantified, measurable conditions of the groundwater resources of the District in 50 years defined in terms of average water level decline (drawdown) from 2010 to 2050. The DFCs are summarized by aquifer in Table 2.

Table 2 Desired future conditions submitted to TWDB

Average Water Level Decrease in Tarrant County from 2010 to 2050 (feet)				
Paluxy	Glen Rose	Hensell	Hosston	Woodbine
33	75	160	173	2

With the DFCs defined by GMA-8, the TWDB used the state approved GAM to estimate the MAG. The MAGs are documented in TWDB GAM Runs GR10-063 MAG (Appendix F) for the northern Trinity Aquifer and GR 10-064 MAG (Appendix G) for the Woodbine Aquifer. These MAG runs can be found at the following links:

http://www.twdb.texas.gov/groundwater/docs/GAMruns/GR10-063_MAG.pdf

http://www.twdb.texas.gov/groundwater/docs/GAMruns/GR10-064_MAG.pdf

The MAGs for the northern Trinity and Woodbine aquifers in Tarrant County are summarized below in Table 3.

Table 3 Modeled available groundwater estimates from TWDB GAM Run 10-063 MAG and 10-064 MAG.

Aquifer	MAG [1] (acre-feet per year)	Source
Paluxy	10,544	GAM Run 10-063 MAG
Glen Rose	112	GAM Run 10-063 MAG
Hensell	2,535	GAM Run 10-063 MAG
Hosston	5,556	GAM Run 10-063 MAG
Woodbine	632	GAM Run 10-064 MAG

[1] for each decade from 2010 through 2060

B. Estimate of the Amount of Groundwater Being Used within the District on an Annual Basis—31 TAC §356.52(a)(5)(B) and TWC § 36.1071(e)(3)(B)

To estimate the annual amount of groundwater being used in the District, the District has used the TWDB Annual Water Use Survey Data provided by the TWDB and attached on Page 3 of Appendix E – Groundwater Management Plan Data. Appendix E summarizes groundwater and surface water use for years 2000 through 2012 by water user group. The only water user group not included in this survey is rural and domestic groundwater use which is a small percentage of groundwater use in Tarrant County.

The TWDB estimate of the amount of groundwater being used in the District on an annual basis is 21,219 acre-feet per year. The estimate is from the TWDB Annual Water Use Survey for the Year 2012 which is the most recent data provided. The average groundwater use from 2000

through 2012 is 16,794 acre-feet per year. For comparison, the average surface water use from 2000 through 2012 is 331,755 acre-feet per year.

C. Estimate of the Annual Amount of Recharge from Precipitation to the Groundwater Resources within the District—31 TAC § 356.52(a)(5)(C) and TWC 36.1071(e)(3)(C)

The estimated total amount of annual recharge from precipitation within the District is estimated by the TWDB to be 3,735 acre-feet per year for the Paluxy Formation within the Trinity Aquifer and 16,545 acre-feet per year for the Woodbine Aquifer. These estimates are from the updated northern Trinity and Woodbine aquifers GAM (Kelley and others, 2014) and can be found in Table 1 and 2 of GAM Run 14-001 attached as Appendix H. The recharge to the northern Trinity Aquifer (Paluxy Formation) is small relative to the Woodbine Aquifer because of the small area of outcrop of the northern Trinity Aquifer in Tarrant County (see Figure 2).

The Washita and Fredericksburg Groups lie between the top of the northern Trinity Aquifer and the Woodbine Aquifer and are generally considered confining units and are not recognized by the TWDB as either minor or major aquifers. However, most of the surface area in Tarrant County is the outcrop of the Washita and Fredericksburg Groups. These geologic units do receive recharge within the county and may act as a minor source of groundwater to wells within the District.

D. Estimate of the Annual Volume of Water that Discharges from the Aquifer to Springs and Surface Water Bodies—31 TAC § 356.52(a)(5)(D) and TWC § 36.1071(e)(3)(D)

The estimated total annual volume of groundwater that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers is 18,836 acre-feet per year. Approximately 4,560 acre-feet per year discharges from the northern Trinity Aquifer and approximately 14,276 acre-feet per year discharges from the Woodbine Aquifer in the District boundaries. These estimates are from the updated northern Trinity and Woodbine aquifers GAM (Kelley and others, 2014) and can be found in Table 1 and 2 of GAM Run 14-001 attached as Appendix H.

E. Estimate of the Annual Volume of Flow into the District, out of the District, and Between Aquifers in the District—31 TAC § 356.52(a)(5)(E) and TWC § 36.1071(e)(3)(E)

The estimates of annual volume of groundwater flow into the District, out of the District and between aquifers in the District are provided by the TWDB and documented in GAM Run GR 14-001 which is attached as Appendix H to the Management Plan. All volumes are reported as acre-feet per year rounded to the nearest acre foot. Table 4 summarizes the reported groundwater flows for the District.

Table 4 Annual volume of flow into the District, out of the District within each aquifer, and between each aquifer in the District.

Management Plan Requirement	Aquifer or confining unit	Acre-feet per year
Estimated annual volume of flow into the district within each aquifer in the district	Woodbine Aquifer	1,135
	Northern Trinity Aquifer	13,750
Estimated annual volume of flow out of the district within each aquifer in the district	Woodbine Aquifer	1,916
	Northern Trinity Aquifer	5,785
Estimated net annual volume of flow between each aquifer in the district	Flow from overlying Younger Confining Units to the Woodbine Aquifer	70
	Flow from Woodbine Aquifer to underlying Washita and Fredericksburg Confining Units	1,816
	Flow from overlying Washita and Fredericksburg Confining Units into the Trinity Aquifer	7,228
	Flow from Trinity Aquifer to underlying Older Units (Paleozoic Aquifers)	NA[(1)]

[(1)] The model assumes a no flow boundary condition at the bottom of the Trinity Aquifer

F. Projected Surface Water Supply within the District—31 TAC § 356.52(a)(5)(F) and TWC § 36.1071(e)(3)(F)

The Projected Surface Water Supply within the District was provided by the TWDB and is attached on Pages 4 through 7 of Appendix E – Groundwater Management Plan Data. The data is based upon the most current State Water Plan (SWP) data available as of April 16, 2015.

G. Projected Water Demand within the District—31 TAC § 356.52(a)(5)(G) and TWC`§ 36.1071(e)(3)(G)

The Projected Water Demand within the District was provided by the TWDB and is attached on Pages 8 and 9 of Appendix E – Groundwater Management Plan Data. The data is based upon the most current State Water Plan (SWP) data available as of April 16, 2015.

H. Water Supply Needs and Water Management Strategies Included in the Adopted State Water Plan—TWC § 36.1071(e)(4)

The Water Supply Needs within the District were provided by the TWDB and is attached on Pages 10 and 11 of Appendix E – Groundwater Management Plan Data. The data is based upon the most current State Water Plan (SWP) data available as of April 16, 2015. It is important to note that red numbers are negative needs representing a deficit in water based upon the balance between current supplies future demands. The deficits are projected to climb to 374,975 acre-feet per year by 2060.

The Water Management Strategies to meet the future demand including the projected supply deficits were provided by the TWDB and are attached on Pages 12 through 26 of Appendix E – Groundwater Management Plan Data. The data is based upon the most current State Water Plan (SWP) data available as of April 16, 2015. As can be seen in Appendix E, very little of the future water management strategies are dependent upon supplemental groundwater development through wells because of the limited long term availability of groundwater in Tarrant County as a result of extreme historical water level declines.

VII. Management of Groundwater Supplies—31 TAC § 356.52(a)(4) and TWC §36.1071(e)(4)

The Texas Legislature has established that GCDs are the state's preferred method of groundwater management. The Texas Legislature codified this policy decision in Section 36.0015 of the Texas Water Code, which establishes that districts will manage groundwater resources through rules developed and implemented in accordance with Chapter 36 of the Texas Water Code ("Chapter 36"). Chapter 36 gives districts the tools to protect and manage the groundwater resources within their boundaries. The District will use the regulatory tools provided by Chapter 36 and the Texas Legislature to manage the groundwater resources within its boundaries.

The District places a priority on prevention of the contamination of its groundwater resources through abandoned and deteriorated water wells. Wells that have been abandoned or not properly maintained provide direct conduits or pathways that allow contamination from the surface to quickly reach the groundwater resources of the District. To address the threats to the water quality of its groundwater resources, the District intends to develop rules which require the capping and plugging of wells that are abandoned or deteriorated. The District plans to require that all abandoned, deteriorated, or replaced wells be plugged in compliance with the Water Well Drillers and Pump Installers Rules of the Texas Department of Licensing and Regulation.

The District will manage the supply of groundwater within the District in order to conserve the groundwater resources while seeking to maintain the economic viability of all groundwater user groups. In consideration of the economic and cultural activities occurring within the District, the District will identify and engage in such activities and practices which, if implemented, would result in a reduction of groundwater use. The District will develop a monitoring network within the District to monitor groundwater conditions and to be used to evaluate compliance with DFCs to the degree possible.

The District also has the authority to use the regulatory tools granted to districts by Chapter 36 to protect the existing and historic users of groundwater in the District. The District specifically has the authority to protect existing users of groundwater, which are those individuals or entities currently invested in and using groundwater or the groundwater resources within the District for a beneficial purpose, and preserve historic use by historic users, which are those individuals or entities who used groundwater beneficially in the past. The District will strive to protect such use to the extent practicable under the goals and objectives of this Management Plan. One way the District can protect existing and historic use is to create a future permitting process for groundwater use that preserves and protects the existing and historic use of groundwater in the

District. Pursuant to legislative authority, including Section 36.113(e) of the Texas Water Code, the District can protect existing use by imposing different permit conditions on new permit applications. In protecting existing users, the District may establish limitations that apply to new permit applications relative to historic use permit holders.

In order to better manage groundwater resources within its boundaries, the District may establish management zones and adopt different rules for: (1) each aquifer, subdivision of an aquifer, or geologic strata located in whole or in part within the boundaries of the District; or (2) each geographic area overlying an aquifer or subdivision of an aquifer located in whole or in part within the boundaries of the district.

VIII. Methodology to Track District Progress in Achieving Management Goals—31 TAC § 356.52(a)(4)

The District's General Manager and staff will prepare an annual report ("Annual Report") and will submit the Annual Report to members of the Board of the District. The Annual Report covers the activities of the District including information on the District's performance in regards to achieving the District's management goals and objectives. The Annual Report will be delivered to the Board within 120 days following the completion of the District's fiscal year. A copy of the Annual Report will be kept on file and available for public inspection at the District's offices upon approval by the Board.

IX. Actions, Procedures, Performance, and Avoidance for District Implementation of Management Plan – 31 TAC § 356.52(a)(3); 31 TAC § 356.52 (a)(4) / 36.1071(e)(2)

The District will implement this plan and will use the provisions of this plan as a means to determine the direction or priority for all District activities. All operations of the District and any additional planning efforts in which the District may participate will be consistent with the provisions of this plan. Rules adopted by the District for the permitting of wells and the production of groundwater shall comply with Chapter 36, including §36.113, and the provisions of this plan. All rules developed by the District will be adhered to and enforced in accordance with Chapter 36. The promulgation and enforcement of the rules will be based on the best scientific evidence available to the District. A copy of the Temporary District Rules (amended December 8th, 2011) can be found in Appendix I and at the following link:

http://www.ntgcd.com/documents/NTGCDRulesAmended12082011.pdf

The District will work to encourage public cooperation and coordination in the implementation of this plan, as it is amended. All operations and activities of the District have been and will be performed in a manner that best encourages cooperation with the appropriate state, regional or local water entity. The meetings of the Board of the District are noticed and conducted at all times in accordance with the Texas Open Meetings Act. The District also makes available for

public inspection all official documents, reports, records and minutes of the District pursuant with the Texas Public Information Act and will continue to do so in the future.

X. Management Goals and Performance Standards

A. Providing the Most Efficient Use of Groundwater—31 TAC § 356.52(a)(1)(A) and TWC § 36.1071(a)(1)

1. Objective – The District will require all new water wells constructed within the District to be in accordance with the District Rules.

   Performance Standard – The number of water wells registered by the District for each year will be included in the Annual Report submitted to the Board of Directors of the District.

2. Objective – The District will regulate the production of groundwater by maintaining a database of groundwater usage for non-exempt wells through the collection of groundwater production reports each year pursuant to the District Rules.

   Performance Standard – The District will include a summary of the volume of water produced in the County from non-exempt wells annually that will be included in the Annual Report.

B. Controlling and Preventing Waste of Groundwater—31 TAC § 356.52(a)(1)(B) and TWC §36.1071(a)(2)

1. Objective – The District will annually provide information to the public on eliminating and reducing wasteful practices in the use of groundwater by one of the following methods:

   a. Provide newspaper articles for publication;
   b. Publish a newsletter;
   c. Conduct public presentations;
   d. Set up displays at public events;
   e. Distribute brochures/literature.

   Performance Standard – The District's Annual Report will include information about the method and type of information supplied to the public.

2. Objective – The District will submit at least one request annually to the Texas Railroad Commission asking for the location of existing salt water and/or waste disposal injection wells which have been permitted by the Texas Railroad Commission within the District within the most recent fiscal year.

   Performance Standard – A copy of each request letter that was submitted to the Texas Railroad Commission asking for the location of existing salt water or waste disposal wells permitted to operate within the District will be included in the Annual Report submitted to the Board of Directors of the District for each fiscal year and the Annual

Report will also include the information supplied by the Texas Railroad Commission, if any.

3. Objective – The District will encourage the elimination and reduction of groundwater waste through the collection of a water-use fee for non-exempt production wells within the District.

   Performance Standard – Annual reporting of the total fees paid and the total volume used by users of non-exempt wells will be included in the Annual Report provided to the Board.

C. Addressing Conjunctive Surface Water Management Issues—31 TAC § 356.52(a)(1)(D) and TWC § 36.1071(a)(4)

1. Objective – Each year, the District will participate in the regional planning process by attending at least one Region C Regional Water Planning Group meeting.

   Performance Standard – The attendance of a District representative at the Region C Regional Water Planning Group meeting(s) will be noted in the Annual Report presented to the Board and will provide the total number of meetings conducted by the Region C Regional Water Planning Group for that year.

D. Addressing Drought Conditions—31 TAC § 356.52(a)(1)(F) and TWC § 36.1071(a)(6)

1. Objective – Quarterly, the District will review drought conditions by going to TWDB Drought Page (http://www.waterdatafortexas.org/drought/) which compiles many sources of valuable information on drought conditions in Texas.

   Performance Standard – The District will make an assessment of the status of drought conditions in the District and will prepare a briefing to the Board of Directors at regular Board Meetings. Any information compiled and presented at Board Meetings will be in the District Annual Report.

E. Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, and Brush Control—31 TAC § 356.52(a)(1)(G) and TWC § 36.1071(a)(7)

1. Objective – The District will submit at least one article regarding water conservation for publication each year to at least one newspaper of general circulation in Tarrant County.

   Performance Standard – A copy of the article submitted by the District for publication to regarding water conservation will be included in the Annual Report submitted to the Board.

2. Objective – The District will provide information on the District website relating to recharge enhancement at least once each year.

   Performance Standard – The Annual Report will include a copy of the information provided by the District related to recharge enhancement.

3. Objective – The District will provide information on rainwater harvesting on the District website at least once a year.

   Performance Standard – The Annual Report will provide a copy of the information on rainwater harvesting that was posted by the District in the previous year.

4. Objective – The District will evaluate the State Brush Control Plan on an annual basis to determine the necessity of projects within the District and whether projects within the District would increase the groundwater resources of the District.

   Performance Standard –The Annual Report will include a copy of the most recent brush control information pertaining to the District and the District's conclusions regarding necessity of projects and whether certain projects would increase the District's groundwater resources.

F. Addressing the Desired Future Conditions—31 TAC § 356.52(a)(1)(H) and TWC § 36.1071(a)(8)

1. Objective – Within 3 years of the adoption of this plan the District will develop a Groundwater Monitoring Program within the District.

   Performance Standard – The District's Annual Report will include a discussion of the District's progress on developing and implementing a Groundwater Monitoring Program.

2. Objective – Once the Groundwater Monitoring Program is established, annually, the District will measure the water levels in at least five monitoring wells within the District. At least four of the monitoring wells will be located within the Trinity Aquifer and one will be monitoring the Woodbine Aquifer.

   Performance Standard – The District's Annual Report will include the water level measurement data from the monitoring wells and an assessment of water level trends and the adequacy of the monitoring network to monitor aquifer conditions within the District and comply with the aquifer Desired Future Conditions.

3. Objective – The District will estimate non-exempt pumping within the District for use in evaluating compliance with Desired Future Conditions.

   Performance Standard – The District's Annual Report will include an estimate of groundwater use in the District by non-exempt wells.

XI. Management Goals Determined not to be Applicable to the District

A. Controlling and Preventing Subsidence – 31 TAC § 356.52(a)(1)(C) / TWC § 36.1071(a)(3)

This category of management goal is not considered applicable to the District because the formations making up the aquifers of use are consolidated with little potential for subsidence within the District as a result of groundwater withdrawal. Mace and others (1994) studied the

potential for subsidence resulting from the significant historical water level declines observed in the Northern Trinity Aquifer in central Texas. They concluded that even in the confined portions of the aquifer, where the largest declines have occurred, the subsidence expected would be only a small amount and would take a very long time to manifest itself.

B. Addressing Natural Resource Issues – 31 TAC § 356.52(a)(1)(E) and TWC § 36.1071(a)(5)

This management goal is not applicable to the District because we have not been advised as to any threatened or endangered species that exist within the boundaries of the District and are significantly impacted by groundwater usage.

C. Addressing Precipitation Enhancement—31 TAC § 356.52(a)(1)(G) and TWC § 36.1071(a)(7)

This management goal is not applicable to the District. Precipitation enhancement is not a cost effective or appropriate program for the District at this time since there are not precipitation enhancement programs in nearby counties or groundwater conservation districts that the District could participate with and allocate expenses for precipitation enhancement projects.

XII. References

George, P.G, Mace, R.E., and Petrossian, R., 2011, Aquifers of Texas: TWDB, Report 380.

Kelley, V.A., Ewing, J., Jones, T.L., Young, S.C., Deeds, N. and Hamlin, S., 2014, Updated groundwater availability model of the northern Trinity and Woodbine aquifers, Final Report: prepared for the TWDB by INTERA, Inc, the University of Texas Bureau of Economic Geology, and LBG-Guyton Associates.

Leggat, E.R., 1957, Geology and ground-water resources of Tarrant County, Texas: TWDB, Bulletin 5709.

Mace, R.E., Dutton, A.R., and Nance, H.S., 1994, Water-Level Declines in the Woodbine, Paluxy, and Trinity Aquifers of North-Central Texas: Transactions of the Gulf Coast Association of Geological Societies, Vol. XLIV, pages 412-402.

APPENDIX A

House Bill 4028

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Chapter 1126

H.B. No. 4028

AN ACT

relating to the creation of the Northern Trinity Groundwater Conservation District.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Subtitle H, Title 6, Special District Local Laws Code, is amended by adding Chapter 8820 to read as follows:

CHAPTER 8820. NORTHERN TRINITY GROUNDWATER CONSERVATION DISTRICT

SUBCHAPTER A. GENERAL PROVISIONS

Sec. 8820.001. DEFINITIONS. In this chapter:

(1) "Board" means the district's board of directors.

(2) "Director" means a board member.

(3) "District" means the Northern Trinity Groundwater Conservation District.

Sec. 8820.002. NATURE OF DISTRICT. The district is a groundwater conservation district in Tarrant County created under Section 59, Article XVI, Texas Constitution.

Sec. 8820.003. DISTRICT TERRITORY. The boundaries of the district are coextensive with the boundaries of Tarrant County.

Sec. 8820.004. CONFIRMATION ELECTION NOT REQUIRED. The board is not required to hold an election to confirm the district's creation.

[Sections 8820.005-8820.050 reserved for expansion]

SUBCHAPTER B. BOARD OF DIRECTORS

Sec. 8820.051. GOVERNING BODY; TERMS. (a) The district is

governed by a board of five directors.

(b) Directors serve staggered four-year terms.

Sec. 8820.052. APPOINTMENT OF DIRECTORS. (a) The Tarrant County Commissioners Court shall appoint one director from each of the four commissioners precincts in the county to represent the precinct in which the director resides.

(b) The county judge of Tarrant County shall appoint one director who resides in the district to represent the district at large.

Sec. 8820.053. INITIAL DIRECTORS. (a) Not later than the 45th day after the effective date of this chapter:

(1) the Tarrant County Commissioners Court shall appoint one director from each of the four commissioners precincts in the county to represent the precinct in which the director resides; and

(2) the county judge of Tarrant County shall appoint one director who resides in the district to represent the district at large.

(b) The initial board may agree on which three directors serve four-year terms that expire at the end of the calendar year following the fourth anniversary of the effective date of this chapter, and which two directors serve two-year terms that expire at the end of the calendar year following the second anniversary of the effective date of this chapter. If the initial board cannot agree, the directors shall draw lots to determine which three directors serve the four-year terms and which two directors serve the two-year terms.

(c) This section expires September 1, 2014.

[Sections 8820.054-8820.100 reserved for expansion]

SUBCHAPTER C. POWERS AND DUTIES

Sec. 8820.101. GROUNDWATER CONSERVATION DISTRICT POWERS AND DUTIES. The district has the powers and duties provided by the general law of this state, including Chapter 36, Water Code, applicable to groundwater conservation districts created under Section 59, Article XVI, Texas Constitution.

Sec. 8820.102. NO EMINENT DOMAIN POWER. The district may not exercise the power of eminent domain.

[Sections 8820.103-8820.150 reserved for expansion]

SUBCHAPTER D. REGULATION OF OTHER DISTRICTS

Sec. 8820.151. REGULATION OF WELLS IN ANOTHER DISTRICT. Except as provided by this subchapter, the district may not regulate the drilling or equipping of, or the completion, operation, or production of, a well located in the district and in another conservation and reclamation district created under Section 59, Article XVI, Texas Constitution, and that on January 1, 2007:

(1) had statutory authority to require a person to obtain a permit before drilling, equipping, completing, altering, or operating a well in its boundaries; and

(2) had adopted rules to implement that statutory authority.

Sec. 8820.152. FEES ON WELLS IN ANOTHER DISTRICT. The district may assess to the owner or operator of a well located in a conservation and reclamation district described by Section

8820.151 a fee based on the amount of groundwater produced from the well in the same manner and at the same rate as other wells in the district.

Sec. 8820.153. COORDINATION WITH OTHER DISTRICTS. (a) The district and any conservation and reclamation district described by Section 8820.151 shall meet to:

(1) coordinate the adoption of rules by each district to promote consistent planning and regulation; and

(2) develop procedures to ensure the expedited exchange of technical and regulatory information between the districts.

(b) The district and a conservation and reclamation district described by Section 8820.151 may enter into one or more agreements to implement this section, including an interlocal contract under Chapter 791, Government Code.

[Sections 8820.154-8820.200 reserved for expansion]

SUBCHAPTER E. GENERAL FINANCIAL PROVISIONS

Sec. 8820.201. TAXES AND BONDS PROHIBITED. The district may not impose a tax or issue bonds.

SECTION 2. (a) The legal notice of the intention to introduce this Act, setting forth the general substance of this Act, has been published as provided by law, and the notice and a copy of this Act have been furnished to all persons, agencies, officials, or entities to which they are required to be furnished under Section 59, Article XVI, Texas Constitution, and Chapter 313, Government Code.

(b) The governor has submitted the notice and Act to the

Texas Commission on Environmental Quality.

(c) The Texas Commission on Environmental Quality has filed its recommendations relating to this Act with the governor, the lieutenant governor, and the speaker of the house of representatives within the required time.

(d) All requirements of the constitution and laws of this state and the rules and procedures of the legislature with respect to the notice, introduction, and passage of this Act are fulfilled and accomplished.

SECTION 3. This Act takes effect immediately if it receives a vote of two-thirds of all the members elected to each house, as provided by Section 39, Article III, Texas Constitution. If this Act does not receive the vote necessary for immediate effect, this Act takes effect September 1, 2007.

David Dewhurst
President of the Senate

Tom Craddick
Speaker of the House

I certify that H.B. No. 4028 was passed by the House on May 11, 2007, by the following vote: Yeas 144, Nays 0, 2 present, not voting; and that the House concurred in Senate amendments to H.B. No. 4028 on May 25, 2007, by the following vote: Yeas 140, Nays 0, 2 present, not voting.

Robert Haney
Chief Clerk of the House

I certify that H.B. No. 4028 was passed by the Senate, with amendments, on May 23, 2007, by the following vote: Yeas 31, Nays 0.

Patsy Spaw
Secretary of the Senate

APPROVED: 15 JUN 07
Date

Rick Perry
Governor

FILED IN THE OFFICE OF THE
SECRETARY OF STATE
7 PM O'CLOCK
JUN 15 2007
Roger Williams
Secretary of State

APPENDIX B

District Resolution Adopting Plan

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RESOLUTION OF THE BOARD OF DIRECTORS OF THE NORTHERN TRINITY GROUNDWATER CONSERVATION DISTRICT ADOPTING DISTRICT GROUNDWATER MANAGEMENT PLAN

THE STATE OF TEXAS §
§
NORTHERN TRINITY GROUNDWATER CONSERVATION DISTRICT §

WHEREAS, the Northern Trinity Groundwater Conservation District ("District") was created by the Texas Legislature, pursuant to the authority of Article XVI, § 59 of the Texas Constitution, through Act of May 28, 2007, 80th Leg., R.S., ch. 1126, 2007 Tex. Gen. Laws 3794, as a groundwater conservation district operating under Chapter 36, Texas Water Code, Section 59, Article XVI of the Texas Constitution, and the Act;

WHEREAS, the Board of Directors of the District ("Board") is required to adopt a Management Plan in accordance with Sections 36.1071 and 36.1072 of the Texas Water Code and 31 Texas Administrative Code Chapter 356, and must thereafter submit the plan for TWDB approval pursuant to 31 Texas Administrative Code Sections 356.5 and 356.6;

WHEREAS, as part of the process of adopting its Management Plan, the District requested and received the assistance of the TWDB and worked with the TWDB staff to obtain the staff's recommendations and comments on the revisions to its Management Plan;

WHEREAS, the Board and the consultants of the District reviewed and analyzed the District's best available data, groundwater availability modeling, desired future conditions, and managed available groundwater information, and other information and data required by the TWDB;

WHEREAS, the District issued notice in the manner required by state law and held at least one public hearing to receive public and written comments on the Management Plan;

WHEREAS, the District will coordinate with the appropriate surface water management entities after the public healing and adoption of its Management Plan to afford surface water management entities within the boundaries of the District the opportunity to review and provide comments to the District on its Management Plan;

WHEREAS, the Board finds that the Management Plan meets all of the requirements of Chapter 36, Texas Water Code, and 31 Texas Administrative Code Chapter 356; and the Board of Directors met in a public meeting on May 7th, 2015, properly noticed in accordance with appropriate law, after holding a public hearing on the attached revised Management Plan, considered the adoption of the Management Plan, and considered approval of this resolution.

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

1. The above recitals are true and correct.

2. The Board of Directors hereby adopts the attached Management Plan as the Management Plan of the District;

3. The Board of Directors, the District's Board President and Secretary, and the District's consultants are further authorized to take all steps necessary to implement this resolution and submit the revised Management Plan to the TWDB for its approval; and

4. The Board of Directors, the District's Board President and Secretary, and the District's consultants are further authorized to take any and all action necessary to coordinate with the TWDB as may be required in furtherance of TWDB's approval pursuant to the provisions of Section 36.1072 of the Texas Water Code.

AND IT IS SO ORDERED.

PASSED AND ADOPTED on this 7TH day of MAY, 2015

NORTHERN TRINITY GROUNDWATER CONSERVATION DISTRICT

By: _____
Board President

ATTEST:

Robert Patterson
Board Secretary

APPENDIX C

Notice of Hearings and Meetings

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NOTICE AND AGENDA

MEETING of the BOARD OF DIRECTORS

NORTHERN TRINITY GROUNDWATER CONSERVATION DISTRICT

1100 Circle Drive, Suite 300
Fort Worth, Texas 76119

Thursday, May 7, 2015
2:30 P.M.

Public Hearing

The Public Hearing to commence at 2:30 p.m.

The Board of Directors of the Northern Trinity Groundwater Conservation District will hold a public hearing, accept public comment, and may discuss, consider, and take all necessary action to adopt the 2015 Management Plan approved by TWDB.

1. Call Public Hearing to order; declare meeting open to the public; and establish a quorum.
2. Presentation of Management Plan – Intera Corporation.
3. Public Comment (verbal comments limited to 3 minutes each; written comments may also be submitted for the Board's consideration).
4. Adjourn Public Hearing.

The Regular Board Meeting will begin upon adjournment of the above noticed Public Hearing.

Regular Board Meeting

The board may consider, discuss and take action, including expending funds, on any of the following agenda items:

1. Call to order; declare meeting open to the public; and establish a quorum.

2. Welcome and introductions.

3. Public Comment.

4. Consent Agenda: Each of these items is recommended by the Staff and approval thereof will be strictly on the basis of the Staff recommendations. Approval for the Consent Agenda authorizes the General Manager or his designee to implement each item in accordance with the Staff recommendations. The Consent Agenda will be approved as a block. Any Board member that has questions regarding any item on the Consent Agenda may have the item pulled and considered as a regular item on the agenda. Any items so pulled for separate discussion will be considered as the first items following approval of the Consent Agenda.

   A. Approval of minutes from Board meeting on April 8, 2015.
   B. Approval of Budget Performance report.
   C. Payment of bills/invoices received.

D. Reimburse General Manager and/or Administrative Assistant for invoices/bills paid on behalf of the District.

5. Any items from Consent Agenda that were pulled for further discussion.

6. Discussion and possible action on the additional Predictive Simulation runs for the NTWGAM.

7. Appointment of GMA 8 alternate according to GMA Administrative Policy.

8. General Manager's Report:
   A. Legislative update
   B. Contacts with Aging Accounts Receivable
   C. Update on Annual Report
   D. Update on Audit
   E. Update on Region C
   F. Update on new wells drilled

9. Other Business / Setting of next meeting

10. Adjourn

FILED
TARRANT COUNTY CLERK
2015 MAY -1 PM 2:02
MARY LOUISE GARCIA
COUNTY CLERK
BY

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time.

The Northern Trinity Groundwater Conservation District is committed to public access. To request an accommodation for a person with a disability who wishes to attend the meeting, contact Laura Schumacher at 817.249.2062 at least one business day prior to the posted meeting.

At any time during the meeting and in compliance with the Texas Open Meetings Act, Chapter 551, Government Code, Vernon's Texas Codes, Annotated, the Northern Trinity Groundwater Conservation District Board may meet in executive session on any of the above agenda items or other lawful items for consultation concerning attorney-client matters (§551.071); deliberation regarding real property (§551.072); deliberation regarding prospective gifts (§551.073); personnel matters (§551.074); and deliberation regarding security devices (§551.076). Any subject discussed in executive session may be subject to action during an open meeting.

Certificate:

This is to certify that I, Robert Patterson, posted the above agenda giving notice of meeting on the bulletin board at the Office of Northern Trinity GCD, 1100 Circle Drive, Suite 300, Fort Worth, TX 76119 and also provided this agenda to the County Clerk in Tarrant County, Texas with a request that it be posted on or before 2:30 p.m. May 1, 2015.

Robert Patterson

Robert Patterson, General Manager

Sworn and subscribed to before me on this 1st day of May, 2015

Laura Schumacher

Laura Schumacher, Notary

LAURA P. SCHUMACHER
NOTARY PUBLIC STATE OF TEXAS
COMMISSION EXPIRES:
03-23-2016

SEAL

APPENDIX D

Correspondence to Surface Water Management Entities

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Northern Trinity
Groundwater Conservation District
Tarrant County
www.ntgcd.com

1100 Circle Drive, Suite 300 Fort Worth, TX 76119
817.249.2062 Voice Fax 817.249.2918

May 7, 2015

Jim Oliver
General Manager
Tarrant Regional Water District (TRWD)
800 East Northside Drive
Fort Worth, Texas 76102

Subject: **Adopted Northern Trinity Groundwater Conservation District Groundwater Management Plan**

Dear Mr. Oliver:

Enclosed you will find a CD with an electronic copy of the Northern Trinity Groundwater Conservation District ("District") Groundwater Management Plan in compliance with Chapter 36 of the Texas Water Code. The District provided notice and conducted a public hearing on the Management Plan on May 7th, 2015. On that same date the District adopted the Groundwater Management Plan in a Northern Trinity Groundwater Conservation District Board Meeting.

The District submits the enclosed plan pursuant to Section 36.1071(a) of the Texas Water Code and the Texas Water Development Board's rules, codified in Title 31 Texas Administrative Code, Section 356.6(a), to coordinate in establishing its comprehensive management goals.

Please feel free to contact me if you have any questions or comments regarding the enclosed.

Sincerely,

Bob Patterson

Bob Patterson
General Manager
Enclosure: CD with the Adopted Groundwater Management Plan

Northern Trinity
Groundwater Conservation District
Tarrant County
www.ntgcd.com

1100 Circle Drive, Suite 300 Fort Worth, TX 76119
817.249.2062 Voice Fax 817.249.2918

May 7, 2015

Kevin Ward
General Manager
Trinity River Authority (TRA)
General Office
5300 S. Collins,
Arlington, Texas 76018

Subject: **Adopted Northern Trinity Groundwater Conservation District Groundwater Management Plan**

Dear Mr. Ward:

Enclosed you will find a CD with an electronic copy of the Northern Trinity Groundwater Conservation District ("District") Groundwater Management Plan in compliance with Chapter 36 of the Texas Water Code. The District provided notice and conducted a public hearing on the Management Plan on May 7th, 2015. On that same date the District adopted the Groundwater Management Plan in a Northern Trinity Groundwater Conservation District Board Meeting.

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Please feel free to contact me if you have any questions or comments regarding the enclosed.

Sincerely,

Bob Patterson

Bob Patterson
General Manager
Enclosure: CD with the Adopted Groundwater Management Plan

Northern Trinity
Groundwater Conservation District
Tarrant County
www.ntgcd.com

1100 Circle Drive, Suite 300 Fort Worth, TX 76119
817.249.2062 Voice Fax 817.249.2918

May 7, 2015

John R. Carman
Water Director
City of Fort Worth Water Department
P.O. Box 870
Fort Worth, TX 76101

Subject: **Adopted Northern Trinity Groundwater Conservation District Groundwater Management Plan**

Dear Mr. Carman:

Enclosed you will find a CD with an electronic copy of the Northern Trinity Groundwater Conservation District ("District") Groundwater Management Plan in compliance with Chapter 36 of the Texas Water Code. The District provided notice and conducted a public hearing on the Management Plan on May 7th, 2015. On that same date the District adopted the Groundwater Management Plan in a Northern Trinity Groundwater Conservation District Board Meeting.

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Please feel free to contact me if you have any questions or comments regarding the enclosed.

Sincerely,

Bob Patterson

Bob Patterson
General Manager
Enclosure: CD with the Adopted Groundwater Management Plan

Northern Trinity
Groundwater Conservation District
Tarrant County
www.ntgcd.com

1100 Circle Drive, Suite 300 Fort Worth, TX 76119
817.249.2062 Voice Fax 817.249.2918

May 7, 2015

Walter Pishkur
Director of Water Utilities
City of Arlington Water Utilities
1100 SW Green Oaks Blvd
Arlington, TX 76017

Subject: **Adopted Northern Trinity Groundwater Conservation District Groundwater Management Plan**

Dear Mr. Pishkur:

Enclosed you will find a CD with an electronic copy of the Northern Trinity Groundwater Conservation District ("District") Groundwater Management Plan in compliance with Chapter 36 of the Texas Water Code. The District provided notice and conducted a public hearing on the Management Plan on May 7th, 2015. On that same date the District adopted the Groundwater Management Plan in a Northern Trinity Groundwater Conservation District Board Meeting.

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Please feel free to contact me if you have any questions or comments regarding the enclosed.

Sincerely,

Bob Patterson

Bob Patterson
General Manager
Enclosure: CD with the Adopted Groundwater Management Plan

Northern Trinity
Groundwater Conservation District
Tarrant County
www.ntgcd.com

1100 Circle Drive, Suite 300 Fort Worth, TX 76119
817.249.2062 Voice Fax 817.249.2918

May 7, 2015

Jody Puckett, P.E.
Department Director
City of Dallas Water Utilities
1500 Marilla Street
Room 4A North
Dallas, TX 75201

Subject: **Adopted Northern Trinity Groundwater Conservation District Groundwater Management Plan**

Dear Ms. Puckett

Enclosed you will find a CD with an electronic copy of the Northern Trinity Groundwater Conservation District ("District") Groundwater Management Plan in compliance with Chapter 36 of the Texas Water Code. The District provided notice and conducted a public hearing on the Management Plan on May 7th, 2015. On that same date the District adopted the Groundwater Management Plan in a Northern Trinity Groundwater Conservation District Board Meeting.

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Please feel free to contact me if you have any questions or comments regarding the enclosed.

Sincerely,

Bob Patterson

Bob Patterson
General Manager
Enclosure: CD with the Adopted Groundwater Management Plan

Northern Trinity
Groundwater Conservation District
Tarrant County
www.ntgcd.com

1100 Circle Drive, Suite 300 Fort Worth, TX 76119
817.249.2062 Voice Fax 817.249.2918

May 7, 2015

Joe Smolinski
Director of Water Utilities
City of Mansfield Water Utilities Division
1200 E. Broad St.
Mansfield, TX 76063

Subject: **Adopted Northern Trinity Groundwater Conservation District Groundwater Management Plan**

Dear Mr. Smolinski:

Enclosed you will find a CD with an electronic copy of the Northern Trinity Groundwater Conservation District ("District") Groundwater Management Plan in compliance with Chapter 36 of the Texas Water Code. The District provided notice and conducted a public hearing on the Management Plan on May 7th, 2015. On that same date the District adopted the Groundwater Management Plan in a Northern Trinity Groundwater Conservation District Board Meeting.

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Please feel free to contact me if you have any questions or comments regarding the enclosed.

Sincerely,

Bob Patterson

Bob Patterson
General Manager
Enclosure: CD with the Adopted Groundwater Management Plan

Northern Trinity
Groundwater Conservation District
Tarrant County
www.ntgcd.com

1100 Circle Drive, Suite 300 Fort Worth, TX 76119
817.249.2062 Voice Fax 817.249.2918

May 7, 2015

Jody Puckett, P.E.
Chair
Region C Water Planning Group
5525 N. MacArthur Blvd.
Suite 530
Irving, TX 75038

Subject: **Adopted Northern Trinity Groundwater Conservation District Groundwater Management Plan**

Dear Ms. Puckett:

Enclosed you will find a CD with an electronic copy of the Northern Trinity Groundwater Conservation District ("District") Groundwater Management Plan in compliance with Chapter 36 of the Texas Water Code. The District provided notice and conducted a public hearing on the Management Plan on May 7th, 2015. On that same date the District adopted the Groundwater Management Plan in a Northern Trinity Groundwater Conservation District Board Meeting.

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Please feel free to contact me if you have any questions or comments regarding the enclosed.

Sincerely,

Bob Patterson

Bob Patterson
General Manager
Enclosure: CD with the Adopted Groundwater Management Plan

Northern Trinity
Groundwater Conservation District
Tarrant County
www.ntgcd.com

1100 Circle Drive, Suite 300 Fort Worth, TX 76119
817.249.2062 Voice Fax 817.249.2918

May 7, 2015

David L. Wasson
General Manager
Benbrook Water Authority
1121 Mercedes Street
Benbrook, TX 76126

Subject: **Adopted Northern Trinity Groundwater Conservation District Groundwater Management Plan**

Dear Mr. Wasson:

Enclosed you will find a CD with an electronic copy of the Northern Trinity Groundwater Conservation District ("District") Groundwater Management Plan in compliance with Chapter 36 of the Texas Water Code. The District provided notice and conducted a public hearing on the Management Plan on May 7th, 2015. On that same date the District adopted the Groundwater Management Plan in a Northern Trinity Groundwater Conservation District Board Meeting.

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Please feel free to contact me if you have any questions or comments regarding the enclosed.

Sincerely,

Bob Patterson

Bob Patterson
General Manager
Enclosure: CD with the Adopted Groundwater Management Plan

Northern Trinity
Groundwater Conservation District
Tarrant County
www.ntgcd.com

1100 Circle Drive, Suite 300 Fort Worth, TX 76119
817.249.2062 Voice Fax 817.249.2918

May 7, 2015

Ron Burton
Water Plant Superintendent
City of Azle
1500 Lakeview Drive
Azle, TX 76020

Subject: **Adopted Northern Trinity Groundwater Conservation District Groundwater Management Plan**

Dear Mr. Burton:

Enclosed you will find a CD with an electronic copy of the Northern Trinity Groundwater Conservation District ("District") Groundwater Management Plan in compliance with Chapter 36 of the Texas Water Code. The District provided notice and conducted a public hearing on the Management Plan on May 7th, 2015. On that same date the District adopted the Groundwater Management Plan in a Northern Trinity Groundwater Conservation District Board Meeting.

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Please feel free to contact me if you have any questions or comments regarding the enclosed.

Sincerely,

Bob Patterson

Bob Patterson
General Manager
Enclosure: CD with the Adopted Groundwater Management Plan

Northern Trinity
Groundwater Conservation District
Tarrant County
www.ntgcd.com

1100 Circle Drive, Suite 300 Fort Worth, TX 76119
817.249.2062 Voice Fax 817.249.2918

May 7, 2015

Thomas W. Kula
Executive Director
North Texas Municipal Water District (NTMWD)
Administration Building
505 East Brown St.
P.O. Box 2408
Wylie, Texas 75098

Subject: **Adopted Northern Trinity Groundwater Conservation District Groundwater Management Plan**

Dear Mr. Kula:

Enclosed you will find a CD with an electronic copy of the Northern Trinity Groundwater Conservation District ("District") Groundwater Management Plan in compliance with Chapter 36 of the Texas Water Code. The District provided notice and conducted a public hearing on the Management Plan on May 7th, 2015. On that same date the District adopted the Groundwater Management Plan in a Northern Trinity Groundwater Conservation District Board Meeting.

The District submits the enclosed plan pursuant to Section 36.1071(a) of the Texas Water Code and the Texas Water Development Board's rules, codified in Title 31 Texas Administrative Code, Section 356.6(a), to coordinate in establishing its comprehensive management goals.

Please feel free to contact me if you have any questions or comments regarding the enclosed.

Sincerely,

Bob Patterson

Bob Patterson
General Manager
Enclosure: CD with the Adopted Groundwater Management Plan

APPENDIX E

Groundwater Management Plan Data from TWDB

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Estimated Historical Water Use And 2012 State Water Plan Datasets:

Northern Trinity Groundwater Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Resources Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
April 16, 2015

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 part 1 are:

1. Estimated Historical Water Use (checklist Item 2)

   from the TWDB Historical Water Use Survey (WUS)

2. Projected Surface Water Supplies (checklist Item 6)
3. Projected Water Demands (checklist Item 7)
4. Projected Water Supply Needs (checklist Item 8)
5. Projected Water Management Strategies (checklist Item 9)

   reports 2-5 are from the 2012 Texas State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report. 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 2012 SWP data available as of 4/16/2015. Although it does not happen frequently, neither of these datasets are static so they are subject to change pending the availability of more accurate WUS data or an amendment to the 2012 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 2012 SWP dataset can be verified by contacting Sabrina Anderson (sabrina.anderson@twdb.texas.gov or 512-936-0886).

For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512-463-7317) or Rima Petrossian (rima.petrossian@twdb.texas.gov or 512-936-2420).

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

Groundwater and surface water historical use estimates are currently unavailable for calendar year 2013. TWDB staff anticipates the calculation and posting of these estimates at a later date.

TARRANT COUNTY

All values are in acre-fee/year

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2012	GW	17,829	78	770	0	2,456	86	21,219
	SW	321,264	10,238	3,807	4,584	2,538	485	342,916
2011	GW	23,772	54	4,110	0	1,755	110	29,801
	SW	341,594	11,520	9,867	1,911	4,500	626	370,018
2010	GW	9,584	726	1,933	0	591	108	12,942
	SW	305,697	11,870	5,219	1,154	3,900	612	328,452
2009	GW	15,297	723	2,317	0	842	97	19,276
	SW	292,807	9,968	3,556	764	2,758	551	310,404
2008	GW	15,517	1,015	2,701	0	90	111	19,434
	SW	324,835	11,531	4,327	1,333	4,285	568	346,879
2007	GW	11,410	746	1	0	0	136	12,293
	SW	294,340	12,350	558	2,160	1,865	711	311,984
2006	GW	14,116	790	1	0	0	136	15,043
	SW	335,324	13,954	1,274	3,054	6,359	617	360,582
2005	GW	12,865	822	0	0	0	256	13,943
	SW	319,523	12,260	1	3,311	6,129	704	341,928
2004	GW	11,906	854	1	0	7	234	13,002
	SW	275,384	13,500	0	3,756	3,856	248	296,744
2003	GW	13,989	820	1	0	0	254	15,064
	SW	303,371	14,225	0	1,102	4,392	243	323,333
2002	GW	13,987	880	1	0	0	345	15,213
	SW	273,035	11,889	0	1,589	10,910	333	297,756
2001	GW	13,904	813	0	1	0	437	15,155
	SW	333,980	11,949	0	5,164	10,910	423	362,426
2000	GW	14,674	858	0	1	0	409	15,942
	SW	294,145	11,757	0	4,652	8,417	425	319,396

Projected Surface Water Supplies
TWDB 2012 State Water Plan Data

TARRANT COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
C	ARLINGTON	TRINITY	ARLINGTON LAKE/RESERVOIR	9,850	9,700	9,550	9,400	9,250	9,100
C	ARLINGTON	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	65,417	68,766	61,668	55,702	48,548	42,409
C	AZLE	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	1,505	1,532	1,565	1,596	1,615	1,619
C	BEDFORD	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	8,755	8,567	7,450	6,543	5,853	5,222
C	BENBROOK	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	4,176	5,055	5,055	5,055	5,055	5,055
C	BETHESDA WSC	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	1,112	1,112	1,112	1,112	1,112	1,112
C	BLUE MOUND	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	0	0	0	0	0	0
C	BURLESON	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	786	907	928	942	976	1,013
C	COLLEYVILLE	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	7,104	7,702	6,495	5,600	4,884	4,259
C	COMMUNITY WSC	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	419	386	325	274	243	216
C	COUNTY-OTHER	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	1,832	1,657	1,366	1,128	971	847
C	CROWLEY	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	1,218	1,420	1,597	1,944	2,095	2,005
C	DALWORTHINGTON GARDENS	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	500	505	453	402	359	318
C	EDGECLIFF	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	456	414	346	293	253	221
C	EULESS	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	8,050	8,607	7,623	6,698	5,905	5,186
C	EVERMAN	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	230	244	190	150	127	111

Projected Surface Water Supplies
TWDB 2012 State Water Plan Data

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
C	FOREST HILL	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	1,478	1,454	1,303	1,199	1,130	1,035
C	FORT WORTH	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	154,890	162,375	161,688	172,222	184,716	199,693
C	GRAND PRAIRIE	TRINITY	RAY HUBBARD LAKE/RESERVOIR	701	118	149	155	146	114
C	GRAND PRAIRIE	TRINITY	RAY ROBERTS-LEWISVILLE-GRAPEVINE LAKE/RESERVOIR SYSTEM	1,115	325	382	380	342	232
C	GRAND PRAIRIE	TRINITY	TAWAKONI LAKE/RESERVOIR	1,586	541	704	747	715	565
C	GRAND PRAIRIE	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	1,065	1,029	874	757	662	578
C	GRAPEVINE	TRINITY	GRAPEVINE LAKE/RESERVOIR NON-SYSTEM PORTION	2,017	1,983	1,950	1,917	1,883	1,850
C	GRAPEVINE	TRINITY	RAY ROBERTS-LEWISVILLE-GRAPEVINE LAKE/RESERVOIR SYSTEM	3,553	2,677	2,532	2,123	1,794	1,473
C	GRAPEVINE	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	9,551	9,838	9,490	8,331	7,388	6,526
C	HALTOM CITY	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	6,465	7,192	6,350	5,555	4,888	4,289
C	HASLET	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	657	1,316	2,009	1,733	1,513	1,320
C	HURST	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	6,652	6,417	5,346	4,533	3,941	3,437
C	IRRIGATION	TRINITY	TRINITY RIVER COMBINED RUN-OF-RIVER IRRIGATION	549	549	549	549	549	549
C	IRRIGATION	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	5,518	3,863	3,282	2,840	2,487	2,168
C	JOHNSON COUNTY SUD	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	1,633	3,037	5,192	4,481	3,913	3,403
C	KELLER	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	8,856	9,301	8,965	7,680	6,725	5,864

Projected Surface Water Supplies
TWDB 2012 State Water Plan Data

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
C	KENNEDALE	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	48	390	458	471	454	424
C	LAKE WORTH	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	555	610	590	570	558	515
C	LIVESTOCK	TRINITY	LIVESTOCK LOCAL SUPPLY	442	442	442	442	442	442
C	MANSFIELD	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	12,721	7,114	5,857	7,082	8,018	8,915
C	MANUFACTURING	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	17,258	18,766	18,430	18,171	17,680	16,724
C	MINING	TRINITY	OTHER LOCAL SUPPLY	342	342	342	342	342	342
C	MINING	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	536	415	366	329	298	267
C	NORTH RICHLAND HILLS	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	12,160	12,483	11,325	10,169	9,136	8,135
C	RICHLAND HILLS	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	854	844	764	708	648	576
C	RIVER OAKS	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	1,000	905	744	628	545	476
C	SAGINAW	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	3,126	3,447	3,257	3,030	2,780	2,517
C	SANSOM PARK VILLAGE	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	45	52	44	36	33	32
C	SOUTHLAKE	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	8,813	8,606	7,347	6,539	5,935	5,436
C	STEAM ELECTRIC POWER	TRINITY	TRINITY RIVER COMBINED RUN-OF-RIVER INDUSTRIAL	235	187	219	257	304	362
C	STEAM ELECTRIC POWER	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	2,640	2,247	2,059	1,782	1,560	1,360
C	WATAUGA	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	3,401	3,242	2,730	2,305	2,002	1,746
C	WESTOVER HILLS	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	274	252	212	182	158	138

Projected Surface Water Supplies
TWDB 2012 State Water Plan Data

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
C	WESTWORTH VILLAGE	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	344	378	332	298	278	267
C	WHITE SETTLEMENT	TRINITY	TRWD LAKE/RESERVOIR SYSTEM	1,173	1,505	1,353	1,231	1,196	1,157
	Sum of Projected Surface Water Supplies (acre-feet/year)			**383,663**	**390,816**	**373,359**	**366,613**	**362,405**	**361,620**

Projected Water Demands
TWDB 2012 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.

TARRANT COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
C	WESTWORTH VILLAGE	TRINITY	350	412	426	442	470	519
C	WHITE SETTLEMENT	TRINITY	2,531	2,647	2,742	2,831	3,031	3,253
C	RICHLAND HILLS	TRINITY	1,327	1,381	1,441	1,511	1,558	1,580
C	RIVER OAKS	TRINITY	1,010	986	954	931	923	923
C	SANSOM PARK VILLAGE	TRINITY	603	609	609	605	608	615
C	KELLER	TRINITY	9,124	10,138	11,495	11,380	11,380	11,380
C	KENNEDALE	TRINITY	1,255	1,594	1,756	1,867	1,937	1,992
C	PANTEGO	TRINITY	701	693	685	685	672	672
C	HASLET	TRINITY	784	1,555	2,697	2,689	2,682	2,682
C	GRAND PRAIRIE	TRINITY	6,068	7,048	7,769	7,969	7,969	7,969
C	GRAPEVINE	TRINITY	17,256	18,298	19,827	19,692	19,625	19,625
C	EULESS	TRINITY	9,698	10,760	11,158	11,308	11,377	11,448
C	EDGECLIFF	TRINITY	460	451	443	434	428	428
C	EVERMAN	TRINITY	771	798	776	754	747	747
C	FOREST HILL	TRINITY	1,492	1,584	1,671	1,776	1,912	2,008
C	FORT WORTH	TRINITY	170,244	194,624	231,781	281,251	340,384	417,660
C	ARLINGTON	TRINITY	77,597	85,215	89,219	92,537	92,008	92,008
C	BEDFORD	TRINITY	10,138	10,447	10,665	10,808	11,017	11,246
C	BLUE MOUND	TRINITY	297	300	294	286	283	283
C	COLLEYVILLE	TRINITY	8,123	9,190	9,127	9,096	9,064	9,064
C	AZLE	TRINITY	1,600	2,195	3,069	4,083	5,141	6,049
C	COMMUNITY WSC	TRINITY	426	421	416	406	410	419
C	JOHNSON COUNTY SUD	TRINITY	419	532	656	799	976	1,154
C	WESTOVER HILLS	TRINITY	276	274	272	270	268	268
C	BETHESDA WSC	TRINITY	1,530	1,850	2,182	2,542	2,970	3,501
C	LIVESTOCK	TRINITY	803	803	803	803	803	803
C	IRRIGATION	TRINITY	8,417	8,417	8,417	8,417	8,417	8,417
C	MANUFACTURING	TRINITY	17,258	20,444	23,630	26,924	29,919	32,457
C	COUNTY-OTHER	TRINITY	3,482	3,402	3,348	3,268	3,241	3,241
C	STEAM ELECTRIC POWER	TRINITY	2,640	2,448	4,168	5,000	5,000	5,000
C	MINING	TRINITY	1,073	904	939	974	1,009	1,036
C	BENBROOK	TRINITY	5,592	6,140	6,721	7,984	9,489	11,254

Projected Water Demands
TWDB 2012 State Water Plan Data

Please note that the demand numbers presented here include the plumbing code savings found in the Regional and State Water Plans.

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
C	SOUTHLAKE	TRINITY	9,059	9,375	9,420	9,689	10,044	10,549
C	WATAUGA	TRINITY	3,437	3,532	3,500	3,416	3,388	3,388
C	HURST	TRINITY	7,524	7,807	7,670	7,532	7,486	7,486
C	NORTH RICHLAND HILLS	TRINITY	12,496	13,832	14,753	15,300	15,693	16,022
C	BURLESON	TRINITY	799	989	1,190	1,397	1,653	1,967
C	DALWORTHINGTON GARDENS	TRINITY	771	816	847	862	874	884
C	CROWLEY	TRINITY	1,667	1,977	2,478	3,310	3,976	4,322
C	HALTOM CITY	TRINITY	6,521	7,835	8,142	8,231	8,272	8,324
C	PELICAN BAY	TRINITY	166	214	268	290	320	359
C	LAKE WORTH	TRINITY	930	1,010	1,102	1,190	1,290	1,344
C	MANSFIELD	TRINITY	13,230	18,373	23,359	27,550	30,493	33,673
C	LAKESIDE	TRINITY	447	512	580	652	740	846
C	SAGINAW	TRINITY	3,161	3,755	4,176	4,489	4,705	4,885
	Sum of Projected Water Demands (acre-feet/year)		**423,553**	**476,587**	**537,641**	**604,230**	**674,652**	**763,750**

Projected Water Supply Needs
TWDB 2012 State Water Plan Data

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

TARRANT COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
C	ARLINGTON	TRINITY	-2,330	-6,749	-18,001	-27,435	-34,210	-40,499
C	AZLE	TRINITY	-95	-663	-1,504	-2,487	-3,526	-4,430
C	BEDFORD	TRINITY	-274	-771	-2,106	-3,156	-4,055	-4,915
C	BENBROOK	TRINITY	-233	98	-483	-1,746	-3,251	-5,016
C	BETHESDA WSC	TRINITY	-13	-333	-665	-1,025	-1,453	-1,984
C	BLUE MOUND	TRINITY	30	27	33	41	44	44
C	BURLESON	TRINITY	-13	-82	-262	-455	-677	-954
C	COLLEYVILLE	TRINITY	-220	-689	-1,833	-2,697	-3,381	-4,006
C	COMMUNITY WSC	TRINITY	-7	-35	-91	-132	-167	-203
C	COUNTY-OTHER	TRINITY	-53	-148	-385	-543	-673	-797
C	CROWLEY	TRINITY	-20	-128	-452	-937	-1,452	-1,888
C	DALWORTHINGTON GARDENS	TRINITY	-5	-45	-128	-194	-249	-300
C	EDGECLIFF	TRINITY	-4	-37	-97	-141	-175	-207
C	EULESS	TRINITY	-632	-1,137	-2,519	-3,594	-4,456	-5,246
C	EVERMAN	TRINITY	-9	-22	-54	-72	-88	-104
C	FOREST HILL	TRINITY	-14	-130	-368	-577	-782	-973
C	FORT WORTH	TRINITY	-5,655	-23,418	-61,551	-100,526	-147,183	-209,427
C	GRAND PRAIRIE	TRINITY	-389	-4,096	-4,656	-4,891	-5,044	-5,442
C	GRAPEVINE	TRINITY	61	-1,226	-3,014	-4,303	-5,409	-6,516
C	HALTOM CITY	TRINITY	-56	-643	-1,792	-2,676	-3,384	-4,035
C	HASLET	TRINITY	-6	-118	-567	-835	-1,048	-1,241
C	HURST	TRINITY	-56	-574	-1,508	-2,183	-2,729	-3,233
C	IRRIGATION	TRINITY	-17	-1,672	-2,253	-2,695	-3,048	-3,367
C	JOHNSON COUNTY SUD	TRINITY	1,214	2,505	4,536	3,682	2,937	2,249
C	KELLER	TRINITY	-258	-827	-2,520	-3,690	-4,645	-5,506
C	KENNEDALE	TRINITY	-254	-251	-345	-443	-530	-615
C	LAKE WORTH	TRINITY	-135	-160	-272	-380	-492	-589
C	LAKESIDE	TRINITY	135	70	2	-70	-158	-264
C	LIVESTOCK	TRINITY	0	0	0	0	0	0
C	MANSFIELD	TRINITY	-509	-11,259	-17,502	-20,468	-22,475	-24,758
C	MANUFACTURING	TRINITY	0	-1,678	-5,200	-8,753	-12,239	-15,733
C	MINING	TRINITY	878	926	842	770	704	646

Projected Water Supply Needs
TWDB 2012 State Water Plan Data

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

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
C	NORTH RICHLAND HILLS	TRINITY	-103	-1,116	-3,195	-4,898	-6,324	-7,654
C	PANTEGO	TRINITY	70	78	86	86	99	99
C	PELICAN BAY	TRINITY	12	-36	-90	-112	-142	-181
C	RICHLAND HILLS	TRINITY	-11	-75	-215	-341	-448	-542
C	RIVER OAKS	TRINITY	-10	-81	-210	-303	-378	-447
C	SAGINAW	TRINITY	-35	-308	-919	-1,459	-1,925	-2,368
C	SANSOM PARK VILLAGE	TRINITY	-6	-5	-13	-17	-23	-31
C	SOUTHLAKE	TRINITY	-246	-769	-2,073	-3,150	-4,109	-5,113
C	STEAM ELECTRIC POWER	TRINITY	235	-14	-1,890	-2,961	-3,136	-3,278
C	WATAUGA	TRINITY	-36	-290	-770	-1,111	-1,386	-1,642
C	WESTOVER HILLS	TRINITY	-2	-22	-60	-88	-110	-130
C	WESTWORTH VILLAGE	TRINITY	-6	-34	-94	-144	-192	-252
C	WHITE SETTLEMENT	TRINITY	-351	-135	-382	-593	-828	-1,089
	Sum of Projected Water Supply Needs (acre-feet/year)		**-12,063**	**-59,776**	**-140,039**	**-212,281**	**-285,980**	**-374,975**

Projected Water Management Strategies
TWDB 2012 State Water Plan Data

TARRANT COUNTY

WUG, Basin (RWPG)

All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
ARLINGTON, TRINITY (C)							
DIRECT REUSE	DIRECT REUSE [TARRANT]	207	602	602	602	602	602
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	2,123	3,969	5,273	6,290	7,032	7,798
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	267	516	619	627	628
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	12,627	15,314
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	1,911	11,610	19,925	13,322	16,157
WATER TREATMENT PLANT-EXPANSION- REUSE SOURCES	INDIRECT REUSE [NAVARRO]	0	0	0	0	0	0
AZLE, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	81	69	124	182	245	310
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	14	19	25	33	41	49
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	91
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	527	1,095	1,817	2,387
WATER TREATMENT PLANT - EXPANSION	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	484	828	1,158	1,424	1,497
WATER TREATMENT PLANT - NEW	INDIRECT REUSE [NAVARRO]	0	93	0	19	0	96
BEDFORD, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	274	486	631	736	843	954
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	48	72	73	74	75
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	185
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	237	0	45	0	195
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	1,403	2,302	3,138	3,506

Projected Water Management Strategies
TWDB 2012 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
BENBROOK, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	172	328	445	602	800	1,046
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	61	95	103	123	146	172
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	156
PURCHASE FROM WATER PROVIDER (1)	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	581	187	333	552	744
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	82	0	32	0	165
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	931	1,839	2,937	3,916
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
WATER TREATMENT PLANT - EXPANSION	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	0	0	0	0	0
BETHESDA WSC, TRINITY (C)							
CONVEYANCE PROJECT (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	533	770
CONVEYANCE PROJECT (2)	INDIRECT REUSE [NAVARRO]	0	272	403	720	562	813
CONVEYANCE PROJECT (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	332	321	658	530
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	30	95	120	150	186	231
OKLAHOMA WATER TO NTMWD, TRWD, UTRWD	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	649
PURCHASE FROM WATER PROVIDER (1)	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	1,410	535	824	711	603
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
BLUE MOUND, TRINITY (C)							
MARVIN NICHOLS RESERVOIR	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	0
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	4	12	16	17	18	19

Projected Water Management Strategies
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WUG, Basin (RWPG) All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	19	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	0
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
BURLESON, TRINITY (C)							
CONVEYANCE PROJECT (2)	INDIRECT REUSE [NAVARRO]	0	48	0	0	0	0
CONVEYANCE PROJECT (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	212	391	595	718
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	13	34	50	64	82	106
OKLAHOMA WATER TO NTMWD, TRWD, UTRWD	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	130
COLLEYVILLE, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	220	477	649	725	799	874
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	2	2	2	2	2
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	111
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	210	0	35	0	117
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	1,183	1,935	2,581	2,903
COMMUNITY WSC, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	7	24	25	28	29	32
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	11	0	0	0	0
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	66	104	138	172

Projected Water Management Strategies
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WUG, Basin (RWPG) All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
COUNTY-OTHER, TRINITY (C)							
MARVIN NICHOLS RESERVOIR	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	202	349	469	453
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	55	173	183	194	204	215
OKLAHOMA WATER TO NTMWD, TRWD, UTRWD	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	129
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	405	386
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	1,007	960	843	754	728
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	202	349	469	453
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
TRWD THIRD PIPELINE AND REUSE	INDIRECT REUSE [HENDERSON]	0	1,007	960	843	754	728
TRWD THIRD PIPELINE AND REUSE	INDIRECT REUSE [NAVARRO]	0	1,007	960	843	754	728
CROWLEY, TRINITY (C)							
CONVEYANCE PROJECT (2)	INDIRECT REUSE [NAVARRO]	0	60	0	0	0	0
CONVEYANCE PROJECT (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	342	777	1,244	1,284
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	20	68	110	160	208	240
OKLAHOMA WATER TO NTMWD, TRWD, UTRWD	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	364
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
DALWORTHINGTON GARDENS, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	5	33	44	54	61	69
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	4	5	5	5	5

Projected Water Management Strategies
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WUG, Basin (RWPG) All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
OKLAHOMA WATER TO NTMWD, TRWD, UTRWD	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	50
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	9	0	0	0	0
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	79	135	183	176
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
EDGECLIFF, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	4	22	29	32	36	39
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	2	3	3	3	3
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	54	51
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	76	134	127	112	100	96
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	66	106	137	129
EULESS, TRINITY (C)							
DIRECT REUSE	DIRECT REUSE [TARRANT]	368	368	368	368	368	368
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	264	597	865	977	1,080	1,182
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	43	78	86	87	87
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	128
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	129	0	36	0	135
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	1,208	2,127	2,921	3,346
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
EVERMAN, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	9	30	40	42	45	47

Projected Water Management Strategies
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WUG, Basin (RWPG) All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	74	72
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	66	132	142	138	138	136
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	14	31	43	45
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
FOREST HILL, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	14	56	81	94	109	121
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	286	286
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	294	561	573	547	532	539
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	287	483	673	664
FORT WORTH, TRINITY (C)							
DIRECT REUSE	DIRECT REUSE [TARRANT]	929	2,509	8,359	12,815	12,782	12,874
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	4,726	9,009	13,425	18,742	25,551	34,832
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	488	1,100	1,598	1,938	2,357
PURCHASE FROM WATER PROVIDER (1)	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	35,022
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (1)	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	11,412	5,414	2,352	897	897
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	33,253	65,019	106,015	123,445
WATER TREATMENT PLANT - EXPANSION	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	0	0	0	0	0
WATER TREATMENT PLANT - NEW	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	0	0	0	0	0

Projected Water Management Strategies
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WUG, Basin (RWPG) All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
GRAND PRAIRIE, TRINITY (C)							
CONVEYANCE PROJECT (1)	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	0	0	0	0	0
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	252	611	784	876	944	1,011
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	6	31	37	38	38	39
PURCHASE FROM WATER PROVIDER (1)	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (1)	RAY HUBBARD LAKE/RESERVOIR [RESERVOIR]	65	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (1)	RAY ROBERTS-LEWISVILLE-GRAPEVINE LAKE/RESERVOIR SYSTEM [RESERVOIR]	66	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	3,454	3,835	3,977	4,062	4,392
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	0
TRA TARRANT COUNTY PROJECT	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	0	0	0	0	0
GRAPEVINE, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	453	939	1,437	1,597	1,756	1,919
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	180	254	316	334	333	333
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	217
PURCHASE FROM WATER PROVIDER (1)	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (1)	WRIGHT PATMAN LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	33	0	68	0	229
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	1,261	2,304	3,320	3,818

Projected Water Management Strategies
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WUG, Basin (RWPG) All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
HALTOM CITY, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	56	221	303	340	371	401
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	1,035	991
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	1,175	2,320	2,335	2,122	1,925	1,872
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	1,489	2,336	3,013	2,831
HASLET, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	6	60	131	154	176	198
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	156	149
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	43	194	361	323	291	281
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	436	680	872	813
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
HURST, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	56	393	546	605	665	727
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	34	57	65	64	64
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	885	853
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	1,061	2,004	1,988	1,802	1,647	1,611
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	905	1,513	2,000	1,902
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
IRRIGATION, TRINITY (C)							
GOLF COURSE CONSERVATION	CONSERVATION [TARRANT]	17	274	527	660	785	910
PURCHASE FROM WATER PROVIDER (1)	DIRECT REUSE [TARRANT]	0	1,327	1,327	1,327	1,327	1,327

Projected Water Management Strategies
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Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	72
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	345	0	23	0	76
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	926	1,345	1,721	1,891
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
JOHNSON COUNTY SUD, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	7	23	30	39	50	62
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	191	267
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	40	141	255	201	282
KELLER, TRINITY (C)							
CONVEYANCE PROJECT (2)	INDIRECT REUSE [NAVARRO]	0	197	0	0	0	0
CONVEYANCE PROJECT (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	1,460	2,533	3,393	3,240
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	268	592	1,009	1,101	1,196	1,290
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	42	61	66	66	66
PURCHASE FROM WATER PROVIDER (1)	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	919
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
KENNEDALE, TRINITY (C)							
MARVIN NICHOLS RESERVOIR	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	0	69	132	153
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	37	89	122	147	169	190
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	1	6	8	11	13	13
NEW WELLS - TRINITY AQUIFER	TRINITY AQUIFER [TARRANT]	216	216	216	216	216	216

Projected Water Management Strategies
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Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
OKLAHOMA WATER TO NTMWD, TRWD, UTRWD	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	43
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	0	69	132	153
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
LAKE WORTH, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	29	62	84	102	121	138
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	1	3	5	6	7	7
NEW WELLS - TRINITY AQUIFER	TRINITY AQUIFER [TARRANT]	105	105	105	105	105	105
PURCHASE FROM WATER PROVIDER (1)	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	75
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	78	167	259	264
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
LAKESIDE, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	3	9	14	50	96	117
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	5	6	6	10	11	13
NEW WELLS - TRINITY AQUIFER	TRINITY AQUIFER [TARRANT]	0	0	264	264	264	264
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
LIVESTOCK, TRINITY (C)							
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
MANSFIELD, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	493	1,189	1,785	2,341	2,846	3,424
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	16	87	135	181	206	231
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	4,585	6,164

Projected Water Management Strategies
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Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
PURCHASE FROM WATER PROVIDER (1)	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	9,752	12,362	11,512	10,001	8,436
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	231	3,220	6,434	4,837	6,503
WATER TREATMENT PLANT - EXPANSION	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	0	0	0	0	0
WATER TREATMENT PLANT - NEW	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	0	0	0	0	0
MANUFACTURING, TRINITY (C)							
MANUFACTURING CONSERVATION	CONSERVATION [TARRANT]	0	35	413	630	711	784
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	2,807	2,900
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	2,104	4,480	4,960	5,085	5,011	5,254
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	5,200	8,606	12,239	14,588
MINING, TRINITY (C)							
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
NORTH RICHLAND HILLS, TRINITY (C)							
CONVEYANCE PROJECT (1)	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	0	0	0	0	0
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	103	744	1,131	1,315	1,485	1,652
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	71	101	106	109	111
PURCHASE FROM WATER PROVIDER (1)	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	379
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	148
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	301	0	42	0	156
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	1,963	3,436	4,730	5,209
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0

Projected Water Management Strategies
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Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
PANTEGO, TRINITY (C)							
CONVEYANCE PROJECT (2)	INDIRECT REUSE [NAVARRO]	0	0	0	0	0	0
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	4	13	18	21	23	25
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	7	7	6	6	6	6
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	19	38	53	65
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
PELICAN BAY, TRINITY (C)							
CONVEYANCE PROJECT (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	6	19	38	64
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	3	10	14	17	20	24
PURCHASE FROM WATER PROVIDER (1)	TRWD LAKE/RESERVOIR SYSTEM [RESERVOIR]	0	33	70	76	84	93
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
RICHLAND HILLS, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	11	39	56	65	73	79
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	176	170
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	193	363	369	350	327	321
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	159	276	375	361
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
RIVER OAKS, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	10	34	45	50	52	55
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	0
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	47	0	0	0	0

Projected Water Management Strategies
TWDB 2012 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	165	253	326	393
SAGINAW, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	35	191	271	331	388	443
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	14	21	23	25	25
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	556	550
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	475	1,048	1,131	1,093	1,035	1,038
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	627	1,105	1,513	1,479
SANSOM PARK VILLAGE, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	6	22	30	33	35	38
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	23	23
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	30	55	54	47	43	43
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	42	36	65	64
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
SOUTHLAKE, TRINITY (C)							
CONVEYANCE PROJECT (2)	INDIRECT REUSE [NAVARRO]	0	354	0	0	0	0
CONVEYANCE PROJECT (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	1,545	2,522	3,374	3,315
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	246	414	527	626	733	857
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	0	2	2	2	2	2
PURCHASE FROM WATER PROVIDER (1)	OKLAHOMA LAKE/RESERVOIR [RESERVOIR - OKLAHOMA]	0	0	0	0	0	940

Projected Water Management Strategies
TWDB 2012 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
STEAM ELECTRIC POWER, TRINITY (C)							
DIRECT REUSE	DIRECT REUSE [TARRANT]	0	0	1,528	2,360	2,360	2,360
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	54
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	0	202	0	26	0	57
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	582	833	1,080	1,169
WATAUGA, TRINITY (C)							
CONVEYANCE PROJECT (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	458	443
CONVEYANCE PROJECT (2)	INDIRECT REUSE [NAVARRO]	0	1,046	1,028	929	851	837
CONVEYANCE PROJECT (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	605	933	1,197	1,124
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	36	122	165	178	189	200
WESTOVER HILLS, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	2	12	17	19	21	24
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	34	32
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	46	81	78	70	62	60
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	43	69	89	83
WESTWORTH VILLAGE, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	6	17	23	27	30	35
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	41	43
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	40	85	85	79	77	82
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	71	117	162	169

Projected Water Management Strategies
TWDB 2012 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
WHITE SETTLEMENT, TRINITY (C)							
MUNICIPAL CONSERVATION-BASIC	CONSERVATION [TARRANT]	349	70	99	115	134	154
MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION [TARRANT]	2	1	0	0	0	0
PURCHASE FROM WATER PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	275	289
PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE [NAVARRO]	280	538	570	516	512	545
PURCHASE FROM WATER PROVIDER (3)	MARVIN NICHOLS LAKE/RESERVOIR [RESERVOIR]	0	0	283	478	694	728
SUPPLEMENTAL WELLS	TRINITY AQUIFER [TARRANT]	0	0	0	0	0	0
Sum of Projected Water Management Strategies (acre-feet/year)		**18,660**	**76,320**	**160,577**	**232,709**	**313,686**	**399,436**

APPENDIX F

GAM Run 10-063 MAG

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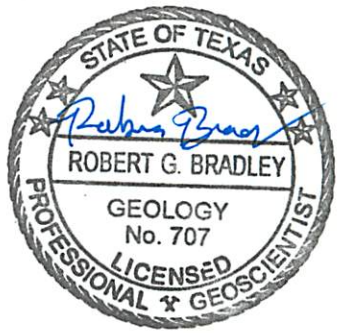
GAM Run 10-063 MAG

by Mr. Wade Oliver and Mr. Robert G. Bradley, P.G.

Texas Water Development Board
Groundwater Availability Modeling Section
(512) 463-3132
December 14, 2011



Cynthia K. Ridgeway, the Manager of the Groundwater Availability Modeling Section and Interim Director of the Groundwater Resources Division, is responsible for oversight of work performed by employees under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G. 471 on December 14, 2011.

Robert G. Bradley, P.G. is responsible for the water budget approach for Comanche and Erath counties within Middle Trinity Groundwater Conservation District. The seal appearing on this document was authorized by Robert G. Bradley, P.G. 707 on December 14, 2011.

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EXECUTIVE SUMMARY:

In response to receiving the adopted desired future conditions for the Trinity Aquifer in Groundwater Management Area 8, the Texas Water Development Board completed Groundwater Availability Model (GAM) Run 08-84mag, which reported the "managed available groundwater" that achieves the adopted desired future conditions. Subsequent to the release of GAM Run 08-84mag, the Middle Trinity Groundwater Conservation District requested that the Texas Water Development Board reevaluate the "managed available groundwater" for Comanche and Erath counties. This resulted in the completion of Aquifer Assessment 09-07, which addressed these counties. In April 2011, the groundwater conservation districts in Groundwater Management Area 8 readopted the desired future conditions for the Trinity Aquifer previously adopted in September 2008.

This report, an update to GAM Run 08-84mag and Aquifer Assessment 09-07, incorporates the changes above and addresses the readopted desired future conditions. In addition, the pumping estimates previously reported as "managed available groundwater" in the above reports are reported here as "modeled available groundwater" to reflect changes in statute effective September 1, 2011. The modeled available groundwater for the Trinity Aquifer as a result of the desired future conditions adopted by the members of Groundwater Management Area 8 is approximately 261,000 acre-feet per year.

REQUESTOR:

Mr. Eddy Daniel of North Texas Groundwater Conservation District on behalf of Groundwater Management Area 8

DESCRIPTION OF REQUEST:

In a letter dated August 31, 2011, Mr. Eddy Daniel provided the Texas Water Development Board (TWDB) with the desired future conditions of the Trinity Aquifer adopted in a resolution, dated April 27, 2011, by the members of Groundwater Management Area 8. This resolution referenced the desired future conditions previously adopted for the aquifer on September 17, 2008 by the groundwater conservation districts within Groundwater Management Area 8. These are summarized in Table 1.

In response to receiving the initially adopted desired future conditions from September 2008, the Texas Water Development Board completed Groundwater Availability Model (GAM) Run 08-84mag, which reported the "managed available groundwater" that achieves the above desired future conditions (Wade, 2009). On June 12, 2009, the general manager and consultants for the Middle Trinity Groundwater Conservation District met with Texas Water Development Board staff to discuss issues they had concerning GAM Run 08-84mag. After discussion, staff reevaluated pumping estimates using a water-budget approach based on the desired future conditions for Comanche and Erath counties and released this analysis as Aquifer Assessment 09-07 on November 22, 2010 (Bradley, 2010). This report, an update to GAM Run 08-84mag and Aquifer Assessment 09-07, incorporates the two changes above. In addition, the pumping estimates previously reported as "managed available groundwater" in the above reports are

reported here as "modeled available groundwater" to reflect changes in statute effective September 1, 2011.

METHODS:

Groundwater Management Area 8 contains the Trinity Aquifer, a major aquifer in Texas as defined in the 2007 State Water Plan (TWDB, 2007). The location of Groundwater Management Area 8, the Trinity Aquifer, and the groundwater availability model cells that represent the aquifer are shown in Figure 1.

Modeled Available Groundwater and Permitting

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. This is distinct from "managed available groundwater," shown in the draft version of this report dated December 20, 2010, which was a permitting value and accounted for the estimated use of the aquifer exempt from permitting. This change was made to reflect changes in statute by the 82nd Texas Legislature, effective September 1, 2011.

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 estimated amount of pumping exempt from permitting, which the Texas Water Development Board is now required to develop after soliciting input from applicable groundwater conservation districts, will be provided in a separate report.

PARAMETERS AND ASSUMPTIONS:

The groundwater availability model for the northern portion of the Trinity Aquifer was used for the results presented in this report outside of Comanche and Erath counties. In those counties, a water budget approach was used. The parameters and assumptions for developing the modeled available groundwater are described below:

Groundwater Availability Model for the Northern Portion of the Trinity Aquifer

- The results for modeled available groundwater presented here are based on the results reported as "managed available groundwater" in GAM Run 08-84mag (Wade, 2009) for all areas except Comanche and Erath counties. See GAM Run 08-84mag for a full description of the methods and assumptions associated with the model simulation. Because GAM Run 08-84mag presented constant pumping from 2000 to 2050, it was assumed for the purposes of this analysis that pumping from 2051 to 2060 was also constant at the same level. As summarized in Table 1, desired future conditions were defined by the groundwater conservation districts in Groundwater Management Area 8 for 2050. It is expected that pumping from 2051 to 2060 would cause additional

drawdown, but this analysis does not estimate drawdown in 2060. Pumping estimates for 2060 were important to include for purposes of regional water planning.

- Version 1.01 of the groundwater availability model for the northern portion of the Trinity Aquifer was used for this analysis. See Bené and others (2004) for assumptions and limitations of the model.

- The model includes seven layers which generally correspond to the Woodbine Aquifer (Layer 1), the Washita and Fredericksburg Groups (Layer 2), the Paluxy Formation (Layer 3), the Glen Rose Formation (Layer 4), the Hensell Formation (Layer 5), the Pearsall/Cow Creek/Hammett/Sligo Members (Layer 6), and the Hosston Formation (Layer 7).

- The mean absolute error (a measure of the difference between simulated and measured water levels during model calibration) for the four main aquifers in the model (Woodbine, Paluxy, Hensell, and Hosston) for the calibration and verification time periods (1980 to 2000) ranged from approximately 38 to 75 feet. The root mean squared error was less than ten percent of the maximum change in water levels across the model (Bené and others, 2004).

- Average annual recharge conditions based on climate data from 1980 to 1999 were assumed for the first 47 years of the simulation. The last three years of the simulation drought-of-record recharge conditions were assumed, which were defined as the years 1954 to 1956.

- Groundwater conservation district boundaries were updated since the release of GAM Run 08-84mag. The results presented here correspond to the official district boundaries as of the date of this report.

Water Budget Approach for Comanche and Erath Counties

- The modeled available groundwater presented for Comanche and Erath counties is based on Aquifer Assessment 09-07 (Bradley, 2010). See Aquifer Assessment 09-07 for a full description of the methods and assumptions associated with the water budget calculations.

- The Hensell and Hosston members were grouped as the Twin Mountains Formation in Aquifer Assessment 09-07. To be consistent with the desired future conditions, however, it was necessary to split the pumping in Aquifer Assessment 09-07 into the Hensell and Hosston members. In Comanche County, 10 percent of the pumping in the Twin Mountains Formation was assigned to the Hensell member while 90 percent was assigned to the Hosston. In Erath County, 35 percent of the pumping in Aquifer Assessment 09-07 was assigned to the Hensell with the remaining 65 percent assigned to the Hosston. These percentages were developed after a preliminary review of available pumping information and discussion with Joe Cooper of Middle Trinity Groundwater Conservation District.

RESULTS:

The modeled available groundwater for the Trinity Aquifer in Groundwater Management Area 8 as a result of the desired future conditions is approximately 261,000 acre-feet per year between 2010 and 2060. This pumping has been divided by county, regional water planning area, and river basin for each decade between 2010 and 2060 for use in the regional water planning process (Table 2). These areas are shown in Figure 2.

Since the desired future conditions are specified for individual units of the Trinity Aquifer (Paluxy, Glen Rose, Hensell, and Hosston) based on the layering used in the model, the modeled available groundwater is shown for each unit in the subsequent tables. Tables 3, 4, 5, and 6 show the modeled available groundwater summarized by county in the Paluxy, Glen Rose, Hensell, and Hosston units of the Trinity Aquifer, respectively. Tables 7, 8, 9, and 10 show the modeled available groundwater summarized by regional water planning area for the same units, respectively. Tables 11, 12, 13, and 14 show the modeled available groundwater summarized by river basin for each of the above units, respectively. The modeled available groundwater summarized by groundwater conservation district is shown for the Paluxy, Glen Rose, Hensell, and Hosston units in tables 15, 16, 17, and 18, respectively. Notice that the pumping is totaled both excluding and including areas outside of a groundwater conservation district.

LIMITATIONS:

The groundwater model used in developing estimates of modeled available groundwater is the best available scientific tool that can be used to estimate the pumping that will achieve the desired future conditions. Although the groundwater model used in this analysis is the best available scientific tool for this purpose, it, like all models, has limitations. 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 develop estimates of modeled available groundwater is the need to make assumptions about the location in the aquifer where future pumping will occur. As actual pumping changes in the future, it will be necessary to evaluate the amount of that pumping as well as its location in the context of the assumptions associated with this analysis. Evaluating the amount and location of future pumping is as important as evaluating the changes in groundwater levels, spring flows, and other metrics that describe the condition of the groundwater resources in the area that relate to the adopted desired future condition(s).

Given these limitations, users of this information are cautioned that the modeled available groundwater numbers should not be considered a definitive, permanent description of the amount

of groundwater that can be pumped to meet the adopted desired future condition. 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 future groundwater pumping as well as whether or not they are achieving their desired future conditions. Because of the limitations of the model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine the modeled available groundwater numbers given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future.

REFERENCES:

Bené, J., Harden, B., O'Rourke, D., Donnelly, A., and Yelderman, J., 2004, Northern Trinity/Woodbine Groundwater Availability Model: contract report to the Texas Water Development Board by R.W. Harden and Associates, 391 p.

Bradley, R.G., 2010, GTA Aquifer Assessment 09-07: Texas Water Development Board, GTA Aquifer Assessment 09-07 Report, 19 p.

National Research Council, 2007, Models in Environmental Regulatory Decision Making. Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p.

Texas Water Development Board, 2007, Water for Texas – 2007—Volumes I-III; Texas Water Development Board Document No. GP-8-1, 392 p.

Wade, S., 2009, GAM Run 08-84mag, Texas Water Development Board GAM Run 08-84mag Report, 37 p.

Table 1. Desired future conditions (in feet of drawdown) for each unit of the Trinity Aquifer adopted by members of Groundwater Management Area 8.

County	Average water level decrease (feet)			
	Paluxy	Glen Rose	Hensell	Hosston
Bell	134	155	286	319
Bosque	26	33	201	220
Brown	0	0	1	1
Burnet	1	1	11	29
Callahan	n/a	n/a	0	2
Collin	298	247	224	236
Comanche	0	0	2	11
Cooke	26	42	60	78
Coryell	15	15	156	179
Dallas	240	224	263	290
Delta	175	162	162	159
Denton	98	134	180	214
Eastland	0	0	0	0
Ellis	265	283	336	362
Erath	1	1	11	27
Falls	279	354	459	480
Fannin	212	196	182	181
Grayson	175	161	160	165
Hamilton	0	2	39	51
Hill	209	253	381	406
Hood	1	2	16	56
Hunt	286	245	215	223
Johnson	37	83	208	234
Kaufman	303	286	295	312
Lamar	132	130	136	134
Lampasas	0	1	12	23
Limestone	328	392	475	492
McLennan	251	291	489	527
Milam	252	294	337	344
Mills	0	0	3	12
Montague	0	1	3	12
Navarro	344	353	399	413
Parker	5	6	16	40
Red River	82	77	78	78
Rockwall	346	272	248	265
Somervell	1	4	53	113
Tarrant	33	75	160	173
Taylor	n/a	n/a	n/a	3
Travis	124	61	98	116
Williamson	108	88	142	166
Wise	4	14	23	53

Table 2. Modeled available groundwater in acre-feet for the Trinity Aquifer in Groundwater Management Area 8 by county, regional water planning area, and river basin.

County	Regional Water Planning Area	Basin	Year					
			2010	2020	2030	2040	2050	2060
Bell	G	Brazos	7,068	7,068	7,068	7,068	7,068	7,068
Bosque	G	Brazos	5,849	5,849	5,849	5,849	5,849	5,849
Brown	F	Brazos	28	28	28	28	28	28
		Colorado	2,017	2,017	2,017	2,017	2,017	2,017
Burnet	K	Brazos	2,723	2,723	2,723	2,723	2,723	2,723
		Colorado	823	823	823	823	823	823
Callahan	G	Brazos	1,792	1,792	1,792	1,792	1,792	1,792
		Colorado	1,985	1,985	1,985	1,985	1,985	1,985
Collin	C	Sabine	0	0	0	0	0	0
		Trinity	2,104	2,104	2,104	2,104	2,104	2,104
Comanche	G	Brazos	32,115	32,115	32,115	32,115	32,115	32,115
		Colorado	120	120	120	120	120	120
Cooke	C	Red	1,284	1,284	1,284	1,284	1,284	1,284
		Trinity	5,566	5,566	5,566	5,566	5,566	5,566
Coryell	G	Brazos	3,716	3,716	3,716	3,716	3,716	3,716
Dallas	C	Trinity	5,458	5,458	5,458	5,458	5,458	5,458
Delta	D	Sulphur	362	362	362	362	362	362
Denton	C	Trinity	19,333	19,333	19,333	19,333	19,333	19,333
Eastland	G	Brazos	4,489	4,489	4,489	4,489	4,489	4,489
		Colorado	231	231	231	231	231	231
Ellis	C	Trinity	3,959	3,959	3,959	3,959	3,959	3,959
Erath	G	Brazos	32,926	32,926	32,926	32,926	32,926	32,926
Falls	G	Brazos	169	169	169	169	169	169
Fannin	C	Red	617	617	617	617	617	617
		Sulphur	0	0	0	0	0	0
		Trinity	83	83	83	83	83	83
Franklin	D	Sulphur	0	0	0	0	0	0
Grayson	C	Red	7,722	7,722	7,722	7,722	7,722	7,722
		Trinity	1,678	1,678	1,678	1,678	1,678	1,678
Hamilton	G	Brazos	2,144	2,144	2,144	2,144	2,144	2,144
Hill	G	Brazos	3,086	3,086	3,086	3,086	3,086	3,086
		Trinity	61	61	61	61	61	61
Hood	G	Brazos	11,081	11,081	11,081	11,081	11,081	11,081
		Trinity	64	64	64	64	64	64
Hunt	D	Sabine	0	0	0	0	0	0
		Sulphur	0	0	0	0	0	0
		Trinity	551	551	551	551	551	551
Johnson	G	Brazos	4,940	4,940	4,940	4,940	4,940	4,940
		Trinity	7,931	7,931	7,931	7,931	7,931	7,931
Kaufman	C	Sabine	45	45	45	45	45	45
		Trinity	1,136	1,136	1,136	1,136	1,136	1,136

Table 2. Continued.

County	Regional Water Planning Area	Basin	Year					
			2010	2020	2030	2040	2050	2060
Lamar	D	Red	1,320	1,320	1,320	1,320	1,320	1,320
		Sulphur	2	2	2	2	2	2
Lampasas	G	Brazos	2,925	2,925	2,925	2,925	2,925	2,925
		Colorado	192	192	192	192	192	192
Limestone	G	Brazos	69	69	69	69	69	69
		Trinity	0	0	0	0	0	0
McLennan	G	Brazos	20,690	20,690	20,690	20,690	20,690	20,690
Milam	G	Brazos	288	288	288	288	288	288
Mills	K	Brazos	1,273	1,273	1,273	1,273	1,273	1,273
		Colorado	1,128	1,128	1,128	1,128	1,128	1,128
Montague	B	Brazos	0	0	0	0	0	0
		Red	129	129	129	129	129	129
		Trinity	2,545	2,545	2,545	2,545	2,545	2,545
Navarro	C	Trinity	1,873	1,873	1,873	1,873	1,873	1,873
Parker	C	Brazos	2,799	2,799	2,799	2,799	2,799	2,799
		Trinity	12,449	12,449	12,449	12,449	12,449	12,449
Red River	D	Red	263	263	263	263	263	263
		Sulphur	267	267	267	267	267	267
Rockwall	C	Sabine	0	0	0	0	0	0
		Trinity	958	958	958	958	958	958
Somervell	G	Brazos	2,485	2,485	2,485	2,485	2,485	2,485
Tarrant	C	Trinity	18,747	18,747	18,747	18,747	18,747	18,747
Taylor	G	Brazos	153	153	153	153	153	153
		Colorado	278	278	278	278	278	278
Travis	K	Brazos	8	8	8	8	8	8
		Colorado	3,882	3,882	3,882	3,882	3,882	3,882
Williamson	G	Brazos	1,514	1,514	1,514	1,514	1,514	1,514
		Colorado	68	68	68	68	68	68
	K	Brazos	157	157	157	157	157	157
		Colorado	61	61	61	61	61	61
Wise	C	Trinity	9,282	9,282	9,282	9,282	9,282	9,282
Total			**261,061**	**261,061**	**261,061**	**261,061**	**261,061**	**261,061**

Table 3. Modeled available groundwater for the Paluxy unit of the Trinity Aquifer summarized by county in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Bell	96	96	96	96	96	96
Bosque	1,013	1,013	1,013	1,013	1,013	1,013
Brown	18	18	18	18	18	18
Burnet	182	182	182	182	182	182
Collin	1,762	1,762	1,762	1,762	1,762	1,762
Comanche	2,292	2,292	2,292	2,292	2,292	2,292
Cooke	3,528	3,528	3,528	3,528	3,528	3,528
Coryell	254	254	254	254	254	254
Dallas	433	433	433	433	433	433
Delta	0	0	0	0	0	0
Denton	9,822	9,822	9,822	9,822	9,822	9,822
Eastland	4	4	4	4	4	4
Ellis	400	400	400	400	400	400
Erath	13,614	13,614	13,614	13,614	13,614	13,614
Falls	0	0	0	0	0	0
Fannin	288	288	288	288	288	288
Grayson	4,708	4,708	4,708	4,708	4,708	4,708
Hamilton	291	291	291	291	291	291
Hill	1,254	1,254	1,254	1,254	1,254	1,254
Hood	942	942	942	942	942	942
Hunt	551	551	551	551	551	551
Johnson	9,493	9,493	9,493	9,493	9,493	9,493
Kaufman	102	102	102	102	102	102
Lamar	0	0	0	0	0	0
Lampasas	13	13	13	13	13	13
Limestone	0	0	0	0	0	0
McLennan	231	231	231	231	231	231
Milam	0	0	0	0	0	0
Mills	5	5	5	5	5	5
Montague	505	505	505	505	505	505
Navarro	413	413	413	413	413	413
Parker	9,800	9,800	9,800	9,800	9,800	9,800
Red River	473	473	473	473	473	473
Rockwall	958	958	958	958	958	958
Somervell	120	120	120	120	120	120
Tarrant	10,544	10,544	10,544	10,544	10,544	10,544
Travis	3	3	3	3	3	3
Williamson	11	11	11	11	11	11
Wise	2,559	2,559	2,559	2,559	2,559	2,559
Total	**76,682**	**76,682**	**76,682**	**76,682**	**76,682**	**76,682**

Table 4. Modeled available groundwater for the Glen Rose unit of the Trinity Aquifer summarized by county in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Bell	880	880	880	880	880	880
Bosque	258	258	258	258	258	258
Brown	0	0	0	0	0	0
Burnet	205	205	205	205	205	205
Collin	0	0	0	0	0	0
Comanche	0	0	0	0	0	0
Cooke	0	0	0	0	0	0
Coryell	784	784	784	784	784	784
Dallas	0	0	0	0	0	0
Delta	0	0	0	0	0	0
Denton	0	0	0	0	0	0
Eastland	0	0	0	0	0	0
Ellis	0	0	0	0	0	0
Erath	41	41	41	41	41	41
Falls	2	2	2	2	2	2
Fannin	0	0	0	0	0	0
Franklin	0	0	0	0	0	0
Grayson	0	0	0	0	0	0
Hamilton	46	46	46	46	46	46
Hill	10	10	10	10	10	10
Hood	4	4	4	4	4	4
Hunt	0	0	0	0	0	0
Johnson	24	24	24	24	24	24
Kaufman	0	0	0	0	0	0
Lamar	0	0	0	0	0	0
Lampasas	773	773	773	773	773	773
Limestone	4	4	4	4	4	4
McLennan	265	265	265	265	265	265
Milam	149	149	149	149	149	149
Mills	66	66	66	66	66	66
Montague	0	0	0	0	0	0
Navarro	0	0	0	0	0	0
Parker	192	192	192	192	192	192
Red River	0	0	0	0	0	0
Rockwall	0	0	0	0	0	0
Somervell	134	134	134	134	134	134
Tarrant	112	112	112	112	112	112
Travis	2,612	2,612	2,612	2,612	2,612	2,612
Williamson	760	760	760	760	760	760
Wise	5	5	5	5	5	5
Total	**7,326**	**7,326**	**7,326**	**7,326**	**7,326**	**7,326**

Table 5. Modeled available groundwater for the Hensell unit of the Trinity Aquifer summarized by county in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Bell	1,099	1,099	1,099	1,099	1,099	1,099
Bosque	1,749	1,749	1,749	1,749	1,749	1,749
Brown	79	79	79	79	79	79
Burnet	690	690	690	690	690	690
Callahan	123	123	123	123	123	123
Collin	103	103	103	103	103	103
Comanche	2,995	2,995	2,995	2,995	2,995	2,995
Cooke	1,611	1,611	1,611	1,611	1,611	1,611
Coryell	1,765	1,765	1,765	1,765	1,765	1,765
Dallas	1,121	1,121	1,121	1,121	1,121	1,121
Delta	181	181	181	181	181	181
Denton	3,112	3,112	3,112	3,112	3,112	3,112
Eastland	79	79	79	79	79	79
Ellis	1,142	1,142	1,142	1,142	1,142	1,142
Erath	6,745	6,745	6,745	6,745	6,745	6,745
Falls	22	22	22	22	22	22
Fannin	203	203	203	203	203	203
Grayson	2,345	2,345	2,345	2,345	2,345	2,345
Hamilton	1,109	1,109	1,109	1,109	1,109	1,109
Hill	933	933	933	933	933	933
Hood	3,595	3,595	3,595	3,595	3,595	3,595
Hunt	0	0	0	0	0	0
Johnson	1,065	1,065	1,065	1,065	1,065	1,065
Kaufman	240	240	240	240	240	240
Lamar	661	661	661	661	661	661
Lampasas	885	885	885	885	885	885
Limestone	15	15	15	15	15	15
McLennan	4,190	4,190	4,190	4,190	4,190	4,190
Milam	36	36	36	36	36	36
Mills	946	946	946	946	946	946
Montague	362	362	362	362	362	362
Navarro	256	256	256	256	256	256
Parker	1,441	1,441	1,441	1,441	1,441	1,441
Red River	19	19	19	19	19	19
Rockwall	0	0	0	0	0	0
Somervell	741	741	741	741	741	741
Tarrant	2,535	2,535	2,535	2,535	2,535	2,535
Travis	156	156	156	156	156	156
Williamson	415	415	415	415	415	415
Wise	1,480	1,480	1,480	1,480	1,480	1,480
Total	**46,244**	**46,244**	**46,244**	**46,244**	**46,244**	**46,244**

Table 6. Modeled available groundwater for the Hosston unit of the Trinity Aquifer summarized by county in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Bell	4,993	4,993	4,993	4,993	4,993	4,993
Bosque	2,829	2,829	2,829	2,829	2,829	2,829
Brown	1,948	1,948	1,948	1,948	1,948	1,948
Burnet	2,469	2,469	2,469	2,469	2,469	2,469
Callahan	3,654	3,654	3,654	3,654	3,654	3,654
Collin	239	239	239	239	239	239
Comanche	26,948	26,948	26,948	26,948	26,948	26,948
Cooke	1,711	1,711	1,711	1,711	1,711	1,711
Coryell	913	913	913	913	913	913
Dallas	3,904	3,904	3,904	3,904	3,904	3,904
Delta	181	181	181	181	181	181
Denton	6,399	6,399	6,399	6,399	6,399	6,399
Eastland	4,637	4,637	4,637	4,637	4,637	4,637
Ellis	2,417	2,417	2,417	2,417	2,417	2,417
Erath	12,526	12,526	12,526	12,526	12,526	12,526
Falls	145	145	145	145	145	145
Fannin	209	209	209	209	209	209
Franklin	0	0	0	0	0	0
Grayson	2,347	2,347	2,347	2,347	2,347	2,347
Hamilton	698	698	698	698	698	698
Hill	950	950	950	950	950	950
Hood	6,604	6,604	6,604	6,604	6,604	6,604
Hunt	0	0	0	0	0	0
Johnson	2,289	2,289	2,289	2,289	2,289	2,289
Kaufman	839	839	839	839	839	839
Lamar	661	661	661	661	661	661
Lampasas	1,446	1,446	1,446	1,446	1,446	1,446
Limestone	50	50	50	50	50	50
McLennan	16,004	16,004	16,004	16,004	16,004	16,004
Milam	103	103	103	103	103	103
Mills	1,384	1,384	1,384	1,384	1,384	1,384
Montague	1,807	1,807	1,807	1,807	1,807	1,807
Navarro	1,204	1,204	1,204	1,204	1,204	1,204
Parker	3,815	3,815	3,815	3,815	3,815	3,815
Red River	38	38	38	38	38	38
Rockwall	0	0	0	0	0	0
Somervell	1,490	1,490	1,490	1,490	1,490	1,490
Tarrant	5,556	5,556	5,556	5,556	5,556	5,556
Taylor	431	431	431	431	431	431
Travis	1,119	1,119	1,119	1,119	1,119	1,119
Williamson	614	614	614	614	614	614
Wise	5,238	5,238	5,238	5,238	5,238	5,238
Total	**130,809**	**130,809**	**130,809**	**130,809**	**130,809**	**130,809**

Table 7. Modeled available groundwater for the Paluxy unit of the Trinity Aquifer summarized by regional water planning area in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
B	505	505	505	505	505	505
C	45,317	45,317	45,317	45,317	45,317	45,317
D	1,024	1,024	1,024	1,024	1,024	1,024
F	18	18	18	18	18	18
G	29,628	29,628	29,628	29,628	29,628	29,628
K	190	190	190	190	190	190
Total	**76,682**	**76,682**	**76,682**	**76,682**	**76,682**	**76,682**

Table 8. Modeled available groundwater for the Glen Rose unit of the Trinity Aquifer summarized by regional water planning area in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
B	0	0	0	0	0	0
C	309	309	309	309	309	309
D	0	0	0	0	0	0
F	0	0	0	0	0	0
G	4,016	4,016	4,016	4,016	4,016	4,016
K	3,001	3,001	3,001	3,001	3,001	3,001
Total	**7,326**	**7,326**	**7,326**	**7,326**	**7,326**	**7,326**

Table 9. Modeled available groundwater for the Hensell unit of the Trinity Aquifer summarized by regional water planning area in Groundwater Management Area 12 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
B	362	362	362	362	362	362
C	15,589	15,589	15,589	15,589	15,589	15,589
D	861	861	861	861	861	861
F	79	79	79	79	79	79
G	27,514	27,514	27,514	27,514	27,514	27,514
K	1,839	1,839	1,839	1,839	1,839	1,839
Total	**46,244**	**46,244**	**46,244**	**46,244**	**46,244**	**46,244**

Table 10. Modeled available groundwater for the Hosston unit of the Trinity Aquifer summarized by regional water planning area in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
B	1,807	1,807	1,807	1,807	1,807	1,807
C	33,878	33,878	33,878	33,878	33,878	33,878
D	880	880	880	880	880	880
F	1,948	1,948	1,948	1,948	1,948	1,948
G	87,271	87,271	87,271	87,271	87,271	87,271
K	5,025	5,025	5,025	5,025	5,025	5,025
Total	**130,809**	**130,809**	**130,809**	**130,809**	**130,809**	**130,809**

Table 11. Modeled available groundwater for the Paluxy unit of the Trinity Aquifer summarized by river basin in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	2020	2030	2040	2050	2060
Brazos	23,223	23,223	23,223	23,223	23,223	23,223
Colorado	193	193	193	193	193	193
Red	4,943	4,943	4,943	4,943	4,943	4,943
Sabine	4	4	4	4	4	4
Sulphur	267	267	267	267	267	267
Trinity	48,052	48,052	48,052	48,052	48,052	48,052
Total	**76,682**	**76,682**	**76,682**	**76,682**	**76,682**	**76,682**

Table 12. Modeled available groundwater for the Glen Rose unit of the Trinity Aquifer summarized by river basin in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	2020	2030	2040	2050	2060
Brazos	4,263	4,263	4,263	4,263	4,263	4,263
Colorado	2,753	2,753	2,753	2,753	2,753	2,753
Red	0	0	0	0	0	0
Sabine	0	0	0	0	0	0
Sulphur	0	0	0	0	0	0
Trinity	310	310	310	310	310	310
Total	**7,326**	**7,326**	**7,326**	**7,326**	**7,326**	**7,326**

Table 13. Modeled available groundwater for the Hensell unit of the Trinity Aquifer summarized by river basin in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	2020	2030	2040	2050	2060
Brazos	29,030	29,030	29,030	29,030	29,030	29,030
Colorado	585	585	585	585	585	585
Red	3,129	3,129	3,129	3,129	3,129	3,129
Sabine	9	9	9	9	9	9
Sulphur	182	182	182	182	182	182
Trinity	13,309	13,309	13,309	13,309	13,309	13,309
Total	**46,244**	**46,244**	**46,244**	**46,244**	**46,244**	**46,244**

Table 14. Modeled available groundwater for the Hosston unit of the Trinity Aquifer summarized by river basin in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	2020	2030	2040	2050	2060
Brazos	87,971	87,971	87,971	87,971	87,971	87,971
Colorado	7,254	7,254	7,254	7,254	7,254	7,254
Red	3,263	3,263	3,263	3,263	3,263	3,263
Sabine	32	32	32	32	32	32
Sulphur	182	182	182	182	182	182
Trinity	32,107	32,107	32,107	32,107	32,107	32,107
Total	**130,809**	**130,809**	**130,809**	**130,809**	**130,809**	**130,809**

Table 15. Modeled available groundwater for the Paluxy unit of the Trinity Aquifer summarized by groundwater conservation district (GCD) in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year. UWCD refers to Underground Water Conservation District. WD refers to Water District.

Groundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
Central Texas GCD	182	182	182	182	182	182
Clearwater UWCD	96	96	96	96	96	96
Fox Crossing WD	5	5	5	5	5	5
Middle Trinity GCD	17,173	17,173	17,173	17,173	17,173	17,173
North Texas GCD	15,112	15,112	15,112	15,112	15,112	15,112
Northern Trinity GCD	10,544	10,544	10,544	10,544	10,544	10,544
Post Oak Savannah GCD	0	0	0	0	0	0
Prairielands GCD	11,267	11,267	11,267	11,267	11,267	11,267
Red River GCD	4,996	4,996	4,996	4,996	4,996	4,996
Saratoga UWCD	13	13	13	13	13	13
Southern Trinity GCD	231	231	231	231	231	231
Upper Trinity GCD	13,806	13,806	13,806	13,806	13,806	13,806
Total (excluding non-district areas)	**73,425**	**73,425**	**73,425**	**73,425**	**73,425**	**73,425**
No District	3,257	3,257	3,257	3,257	3,257	3,257
Total (including non-district areas)	**76,682**	**76,682**	**76,682**	**76,682**	**76,682**	**76,682**

Table 16. Modeled available groundwater for the Glen Rose unit of the Trinity Aquifer summarized by groundwater conservation district (GCD) in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year. UWCD refers to Underground Water Conservation District. WD refers to Water District.

Groundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
Central Texas GCD	205	205	205	205	205	205
Clearwater UWCD	880	880	880	880	880	880
Fox Crossing WD	66	66	66	66	66	66
Middle Trinity GCD	1,083	1,083	1,083	1,083	1,083	1,083
North Texas GCD	0	0	0	0	0	0
Northern Trinity GCD	112	112	112	112	112	112
Post Oak Savannah GCD	149	149	149	149	149	149
Prairielands GCD	168	168	168	168	168	168
Red River GCD	0	0	0	0	0	0
Saratoga UWCD	773	773	773	773	773	773
Southern Trinity GCD	265	265	265	265	265	265
Upper Trinity GCD	201	201	201	201	201	201
Total (excluding non-district areas)	**3,902**	**3,902**	**3,902**	**3,902**	**3,902**	**3,902**
No District	3,424	3,424	3,424	3,424	3,424	3,424
Total (including non-district areas)	**7,326**	**7,326**	**7,326**	**7,326**	**7,326**	**7,326**

Table 17. Modeled available groundwater for the Hensell unit of the Trinity Aquifer summarized by groundwater conservation district (GCD) in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year. UWCD refers to Underground Water Conservation District. WD refers to Water District.

Groundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
Central Texas GCD	690	690	690	690	690	690
Clearwater UWCD	1,099	1,099	1,099	1,099	1,099	1,099
Fox Crossing WD	946	946	946	946	946	946
Middle Trinity GCD	13,254	13,254	13,254	13,254	13,254	13,254
North Texas GCD	4,826	4,826	4,826	4,826	4,826	4,826
Northern Trinity GCD	2,535	2,535	2,535	2,535	2,535	2,535
Post Oak Savannah GCD	36	36	36	36	36	36
Prairielands GCD	3,881	3,881	3,881	3,881	3,881	3,881
Red River GCD	2,548	2,548	2,548	2,548	2,548	2,548
Saratoga UWCD	885	885	885	885	885	885
Southern Trinity GCD	4,190	4,190	4,190	4,190	4,190	4,190
Upper Trinity GCD	6,878	6,878	6,878	6,878	6,878	6,878
Total (excluding non-district areas)	**41,768**	**41,768**	**41,768**	**41,768**	**41,768**	**41,768**
No District	4,476	4,476	4,476	4,476	4,476	4,476
Total (including non-district areas)	**46,244**	**46,244**	**46,244**	**46,244**	**46,244**	**46,244**

Table 18. Modeled available groundwater for the Hosston unit of the Trinity Aquifer summarized by groundwater conservation district (GCD) in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year. UWCD refers to Underground Water Conservation District. WD refers to Water District.

Groundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
Central Texas GCD	2,469	2,469	2,469	2,469	2,469	2,469
Clearwater UWCD	4,993	4,993	4,993	4,993	4,993	4,993
Fox Crossing WD	1,384	1,384	1,384	1,384	1,384	1,384
Middle Trinity GCD	43,216	43,216	43,216	43,216	43,216	43,216
North Texas GCD	8,349	8,349	8,349	8,349	8,349	8,349
Northern Trinity GCD	5,556	5,556	5,556	5,556	5,556	5,556
Post Oak Savannah GCD	103	103	103	103	103	103
Prairielands GCD	7,146	7,146	7,146	7,146	7,146	7,146
Red River GCD	2,556	2,556	2,556	2,556	2,556	2,556
Saratoga UWCD	1,446	1,446	1,446	1,446	1,446	1,446
Southern Trinity GCD	16,004	16,004	16,004	16,004	16,004	16,004
Upper Trinity GCD	17,464	17,464	17,464	17,464	17,464	17,464
Total (excluding non-district areas)	**110,686**	**110,686**	**110,686**	**110,686**	**110,686**	**110,686**
No District	20,123	20,123	20,123	20,123	20,123	20,123
Total (including non-district areas)	**130,809**	**130,809**	**130,809**	**130,809**	**130,809**	**130,809**

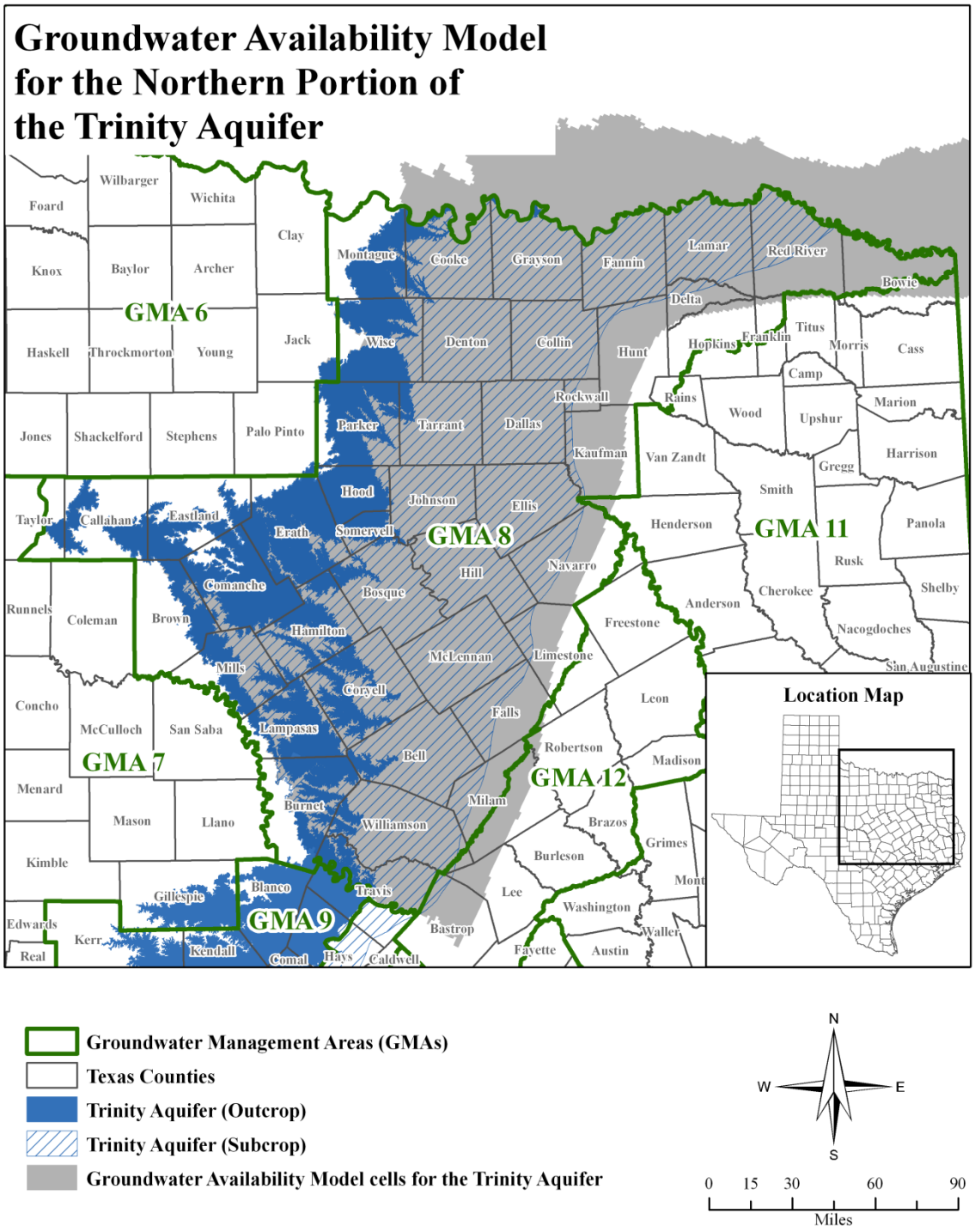

Figure 1. Map showing the areas of the groundwater availability model representing the northern portion of the Trinity Aquifer and the boundary of Groundwater Management Area 8.

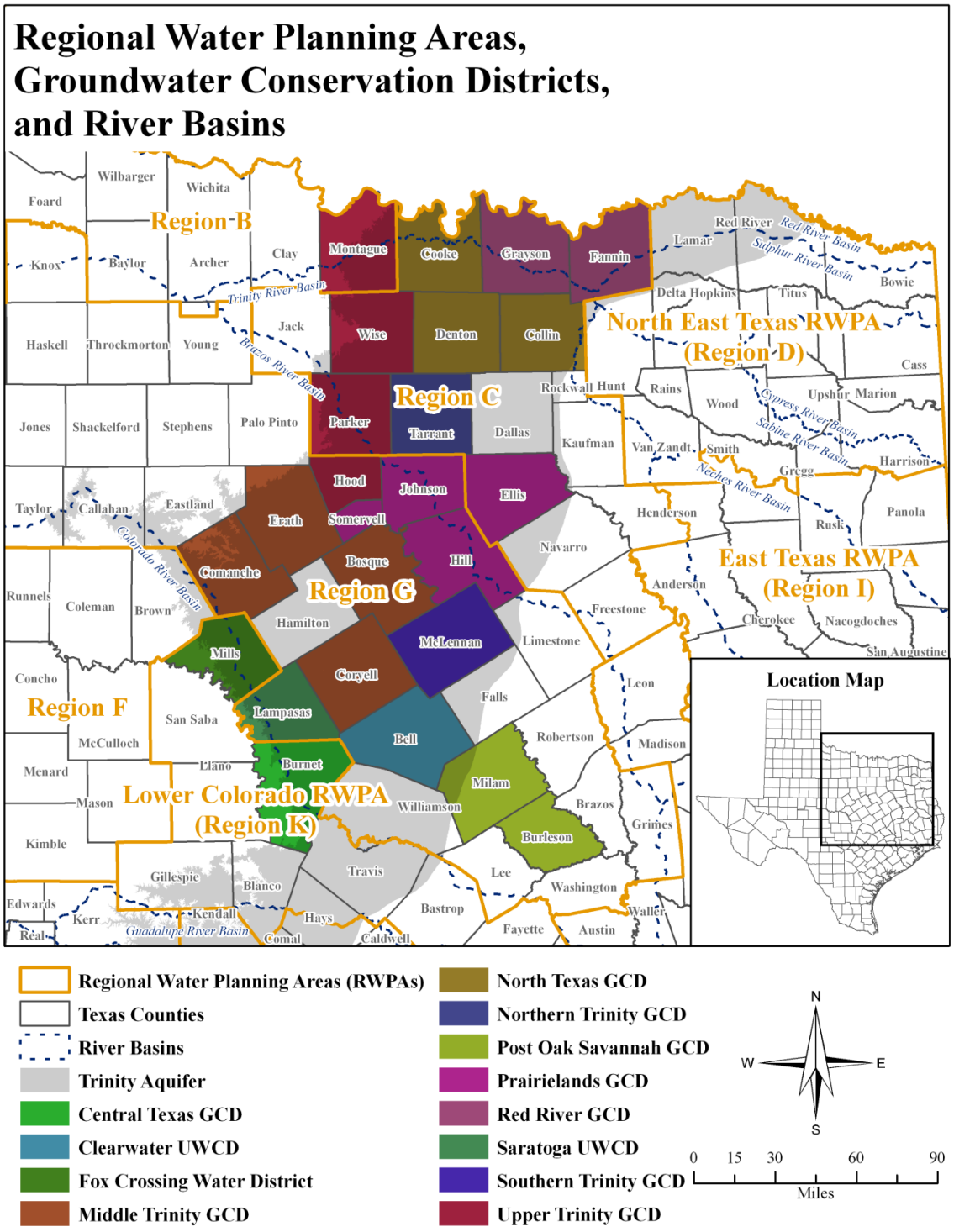

Figure 2. Map showing regional water planning areas (RWPAs), groundwater conservation districts (GCDs), counties, and river basins in and neighboring Groundwater Management Area 8.

APPENDIX G

GAM Run 10-064 MAG

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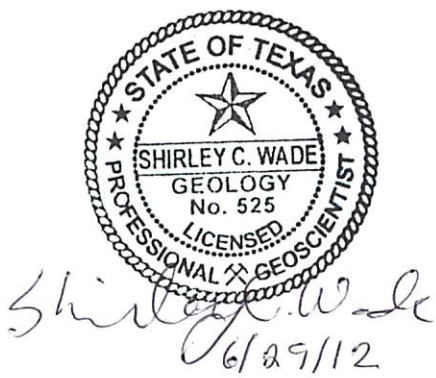
GAM Run 10-064 MAG

by Wade Oliver and Shirley Wade

Texas Water Development Board
Groundwater Availability Modeling Section
(512) 936-0883
June 29, 2012



The seal appearing on this document was authorized by Shirley C. Wade, P.G. 525 on June 29, 2012.

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EXECUTIVE SUMMARY:

The modeled available groundwater for the Woodbine Aquifer as a result of the desired future conditions adopted by the districts of Groundwater Management Area 8 is approximately 44,900 acre-feet per year. This is shown divided by county, regional water planning area, and river basin in Table 1 for use in the regional water planning process. Modeled available groundwater is summarized by county, regional water planning area, river basin, and groundwater conservation district in tables 2 through 5. The estimates were extracted from Groundwater Availability Model Run 07-30 (Wade, 2007) which simulates the desired future conditions adopted by the districts of Groundwater Management Area 8. The modeled available groundwater estimates presented in this report are intended to replace the estimates previously reported in GAM Run 08-14mag which included estimates for non-relevant areas.

REQUESTOR:

Mr. Eddy Daniel of North Texas Groundwater Conservation District on behalf of Groundwater Management Area 8

DESCRIPTION OF REQUEST:

In a letter dated August 31, 2011, Mr. Eddy Daniel provided the Texas Water Development Board (TWDB) with a resolution dated June 23, 2011 to retain the previously adopted desired future conditions of the Woodbine Aquifer adopted by the districts of Groundwater Management Area 8 [on December 17, 2007], except for the Southern Trinity Groundwater Conservation District, which adopted a resolution dated June 23, 2011 to declare the Woodbine Aquifer non-relevant for joint planning purposes [within their district]. Therefore, the relevant desired future conditions, adopted December 27, 2007 and re-adopted June 23, 2011, are shown below:

- From estimated year 2000 conditions, the average drawdown should not exceed approximately 154 feet after 50 years in Collin County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 0 feet after 50 years in Cooke County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 112 feet after 50 years in Dallas County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 16 feet after 50 years in Denton County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 102 feet after 50 years in Ellis County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 186 feet after 50 years in Fannin County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 28 feet after 50 years in Grayson County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 87 feet after 50 years in Hill County.

- From estimated year 2000 conditions, the average drawdown should not exceed approximately 353 feet after 50 years in Hunt County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 4 feet after 50 years in Johnson County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 211 feet after 50 years in Kaufman County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 297 feet after 50 years in Lamar County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 177 feet after 50 years in Navarro County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 202 feet after 50 years in Red River County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 241 feet after 50 years in Rockwall County.
- From estimated year 2000 conditions, the average drawdown should not exceed approximately 2 feet after 50 years in Tarrant County.

In response to receiving the adopted desired future conditions, the TWDB completed Groundwater Availability Model (GAM) Run 08-14mag in May 2008, which reported the "managed available groundwater" that achieves the above desired future conditions (Wade, 2008). However, GAM Run 08-14mag also included estimates for Delta, Limestone, and McLennan counties. We excluded those estimates from this report since Delta and Limestone counties were never issued a desired future condition for the Woodbine Aquifer and the Woodbine Aquifer was declared non-relevant in McLennan County.

METHODS:

The location of Groundwater Management Area 8, the Woodbine Aquifer, and the groundwater availability model cells that represent the aquifer are shown in Figure 1.

Modeled Available Groundwater and Permitting

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. This is distinct from "managed available groundwater," shown in the draft version of this report dated December 20, 2010, which was a permitting value and accounted for the estimated use of the aquifer exempt from permitting. This change was made to reflect changes in statute by the 82nd Texas Legislature, effective September 1, 2011.

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 estimated amount of pumping exempt from permitting, which the TWDB is now required to develop after soliciting input from applicable groundwater

conservation districts, will be provided in a separate report. It should be noted that groundwater conservation district boundaries have also been updated since GAM Run 08-14mag. The results presented here correspond to the official district boundaries as of the date of this report.

PARAMETERS AND ASSUMPTIONS:

The groundwater availability model for the northern portion of the Trinity Aquifer and the Woodbine Aquifer was used for the results presented in this report. The parameters and assumptions for this model are described below:

- The results for total pumping presented here are based on the results reported as "managed available groundwater" in GAM Run 08-14mag (Wade, 2008). See GAM Run 08-14mag for a full description of the methods and assumptions associated with the model simulation. Because GAM Run 08-14mag presented constant pumping from 2000 to 2050, it was assumed for the purposes of this analysis that pumping from 2051 to 2060 was also constant at this same level. As described above, desired future conditions were defined by the groundwater conservation districts in Groundwater Management Area 8 for 2050. It is expected that pumping from 2051 to 2060 would cause additional drawdown, but this analysis does not estimate drawdown in 2060. Pumping estimates were extended to 2060 for the purposes of regional water planning.

- Version 1.01 of the groundwater availability model for the northern portion of the Trinity Aquifer and the Woodbine Aquifer was used for this analysis. See Bené and others (2004) for assumptions and limitations of the model.

- The model includes seven layers which generally correspond to the Woodbine Aquifer (Layer 1), the Washita and Fredericksburg Groups (Layer 2), the Paluxy Formation (Layer 3), the Glen Rose Formation (Layer 4), the Hensell Formation (Layer 5), the Pearsall/Cow Creek/Hammett/Sligo Members (Layer 6), and the Hosston Formation (Layer 7).

- The mean absolute error (a measure of the difference between simulated and measured water levels during model calibration) for the four main aquifers in the model (Woodbine, Paluxy, Hensell, and Hosston) for the calibration and verification time periods (1980 to 2000) ranged from approximately 38 to 75 feet. The root mean squared error was less than ten percent of the maximum change in water levels across the model (Bené and others, 2004).

RESULTS:

The estimated total pumping from the Woodbine Aquifer in Groundwater Management Area 8 that achieves the above desired future conditions is approximately 44,900 acre-feet per year between 2010 and 2060. This pumping has been divided by county, regional water planning area, and river basin for each decade between 2010 and 2060 for use in the regional water planning process (Table 1). These areas are shown in Figure 2.

Tables 2, 3, 4, and 5 show the total pumping summarized by county, regional water planning area, river basin, and groundwater conservation district, respectively. Notice in Table 5 that the pumping is totaled both excluding and including areas outside of a groundwater conservation district.

LIMITATIONS:

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objective(s). 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 the impacts of future pumping is the need to make assumptions about the location in the aquifer where future pumping will occur. As actual pumping changes in the future, it will be necessary to evaluate the amount of that pumping as well as its location in the context of the assumptions associated with this analysis. Evaluating the amount and location of future pumping is as important as evaluating the changes in groundwater levels, spring flows, and other metrics that describe the impacts of that pumping. This analysis does not assess the possible impacts of pumping such as reduced water quality or land surface subsidence.

In addition, certain assumptions have been made regarding future precipitation, recharge, and streamflow in evaluating the impacts of future pumping. Those assumptions also need to be considered and compared to actual future data.

Given these limitations, users of this information are cautioned that the results should not be considered a definitive, permanent prediction of the changes in groundwater storage, streamflow, and spring flow. Because the application of the groundwater availability 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 future groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater availability 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.

REFERENCES:

Bené, J., Harden, B., O'Rourke, D., Donnelly, A., and Yelderman, J., 2004, Northern Trinity/Woodbine Groundwater Availability Model: contract report to the Texas Water Development Board by R.W. Harden and Associates, 391 p.

National Research Council, 2007, Models in Environmental Regulatory Decision Making. Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p.

Texas Water Development Board, 2007, Water for Texas – 2007—Volumes I-III; Texas Water Development Board Document No. GP-8-1, 392 p.

Wade, S.C., 2007, GAM07-30 Final Report, Texas Water Development Board GAM Run Report, October 26, 2007, 25 p.

Wade, S., 2008, GAM Run 08-14mag, Texas Water Development Board GAM Run 08-14mag Report, 7 p.

Table 1. Modeled available groundwater in acre-feet per year for the Woodbine Aquifer in Groundwater Management Area 8 by county, regional water planning area, and river basin.

County	Regional Water Planning Area	River Basin	Year					
			2010	2020	2030	2040	2050	2060
Collin	C	Sabine	40	40	40	40	40	40
		Trinity	2,469	2,469	2,469	2,469	2,469	2,469
Cooke	C	Red	18	18	18	18	18	18
		Trinity	136	136	136	136	136	136
Dallas	C	Trinity	2,313	2,313	2,313	2,313	2,313	2,313
Denton	C	Trinity	4,126	4,126	4,126	4,126	4,126	4,126
Ellis	C	Trinity	5,441	5,441	5,441	5,441	5,441	5,441
Fannin	C	Red	2,676	2,676	2,676	2,676	2,676	2,676
		Sulphur	21	21	21	21	21	21
		Trinity	600	600	600	600	600	600
Grayson	C	Red	6,590	6,590	6,590	6,590	6,590	6,590
		Trinity	5,497	5,497	5,497	5,497	5,497	5,497
Hill	G	Brazos	1,249	1,249	1,249	1,249	1,249	1,249
		Trinity	1,012	1,012	1,012	1,012	1,012	1,012
Hunt	D	Sabine	1,867	1,867	1,867	1,867	1,867	1,867
		Sulphur	849	849	849	849	849	849
		Trinity	124	124	124	124	124	124
Johnson	G	Brazos	141	141	141	141	141	141
		Trinity	4,591	4,591	4,591	4,591	4,591	4,591
Kaufman	C	Sabine	0	0	0	0	0	0
		Trinity	200	200	200	200	200	200
Lamar	D	Red	1,910	1,910	1,910	1,910	1,910	1,910
		Sulphur	1,734	1,734	1,734	1,734	1,734	1,734
Navarro	C	Trinity	300	300	300	300	300	300
Red River	D	Red	162	162	162	162	162	162
		Sulphur	4	4	4	4	4	4
Rockwall	C	Sabine	0	0	0	0	0	0
		Trinity	144	144	144	144	144	144
Tarrant	C	Trinity	632	632	632	632	632	632
Total			**44,846**	**44,846**	**44,846**	**44,846**	**44,846**	**44,846**

Table 2. Modeled available groundwater for the Woodbine Aquifer summarized by county in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Collin	2,509	2,509	2,509	2,509	2,509	2,509
Cooke	154	154	154	154	154	154
Dallas	2,313	2,313	2,313	2,313	2,313	2,313
Denton	4,126	4,126	4,126	4,126	4,126	4,126
Ellis	5,441	5,441	5,441	5,441	5,441	5,441
Fannin	3,297	3,297	3,297	3,297	3,297	3,297
Grayson	12,087	12,087	12,087	12,087	12,087	12,087
Hill	2,261	2,261	2,261	2,261	2,261	2,261
Hunt	2,840	2,840	2,840	2,840	2,840	2,840
Johnson	4,732	4,732	4,732	4,732	4,732	4,732
Kaufman	200	200	200	200	200	200
Lamar	3,644	3,644	3,644	3,644	3,644	3,644
Navarro	300	300	300	300	300	300
Red River	166	166	166	166	166	166
Rockwall	144	144	144	144	144	144
Tarrant	632	632	632	632	632	632
Total	**44,846**	**44,846**	**44,846**	**44,846**	**44,846**	**44,846**

Table 3. Modeled available groundwater for the Woodbine Aquifer summarized by regional water planning area in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
C	31,203	31,203	31,203	31,203	31,203	31,203
D	6,650	6,650	6,650	6,650	6,650	6,650
G	6,993	6,993	6,993	6,993	6,993	6,993
Total	**44,846**	**44,846**	**44,846**	**44,846**	**44,846**	**44,846**

Table 4. Modeled available groundwater for the Woodbine Aquifer summarized by river basin in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	2020	2030	2040	2050	2060
Brazos	1,390	1,390	1,390	1,390	1,390	1,390
Red	11,356	11,356	11,356	11,356	11,356	11,356
Sabine	1,907	1,907	1,907	1,907	1,907	1,907
Sulphur	2,608	2,608	2,608	2,608	2,608	2,608
Trinity	27,585	27,585	27,585	27,585	27,585	27,585
Total	**44,846**	**44,846**	**44,846**	**44,846**	**44,846**	**44,846**

Table 5. Modeled available groundwater for the Woodbine Aquifer summarized by groundwater conservation district (GCD) in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
North Texas GCD	6,789	6,789	6,789	6,789	6,789	6,789
Northern Trinity GCD	632	632	632	632	632	632
Prairielands GCD	12,434	12,434	12,434	12,434	12,434	12,434
Red River GCD	15,384	15,384	15,384	15,384	15,384	15,384
Total (excluding non-district areas)	**35,239**	**35,239**	**35,239**	**35,239**	**35,239**	**35,239**
No District	9,607	9,607	9,607	9,607	9,607	9,607
Total (including non-district areas)	**44,846**	**44,846**	**44,846**	**44,846**	**44,846**	**44,846**

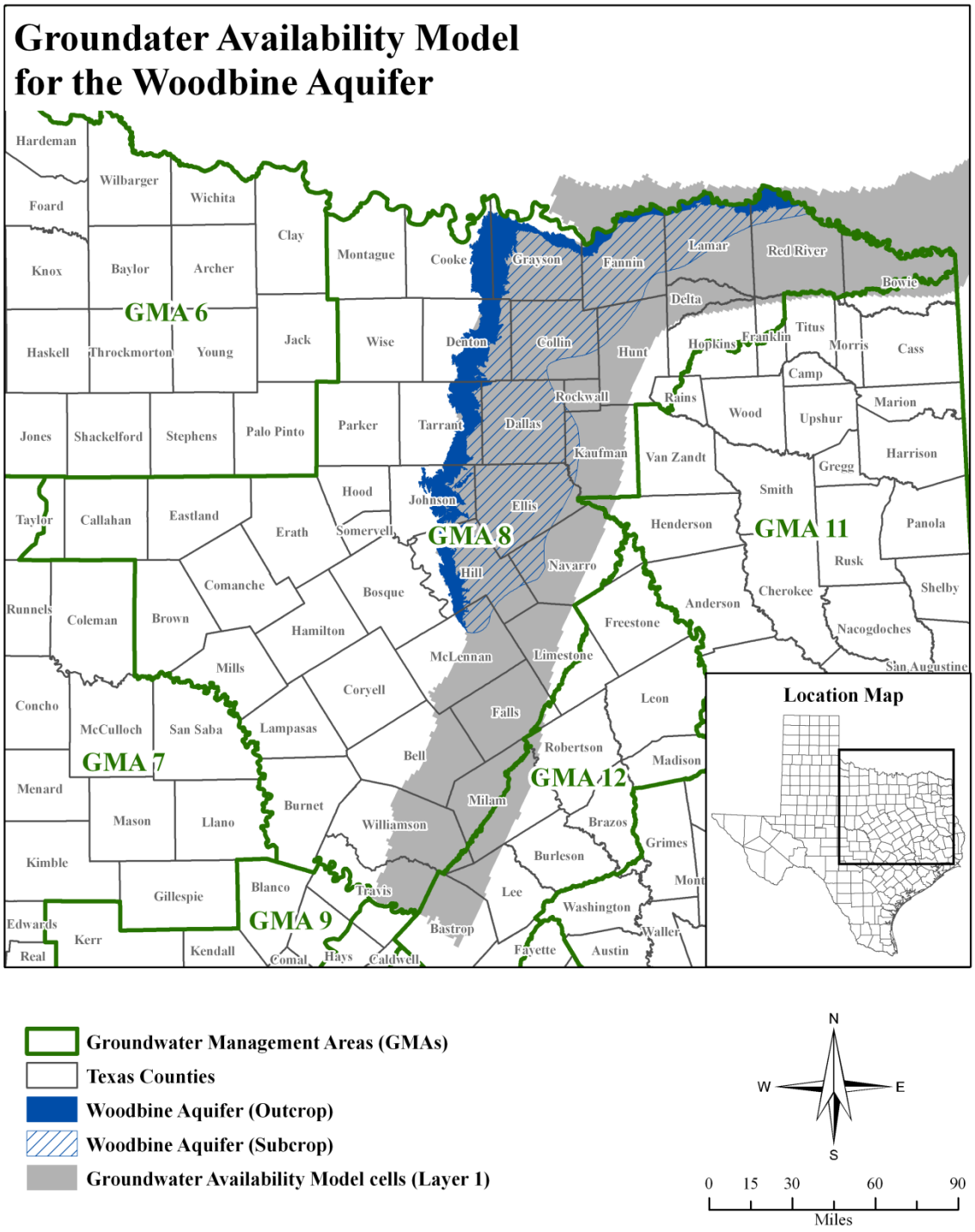

Figure 1. Map showing the areas of the groundwater availability model representing the Woodbine Aquifer and the boundary of Groundwater Management Area 8.

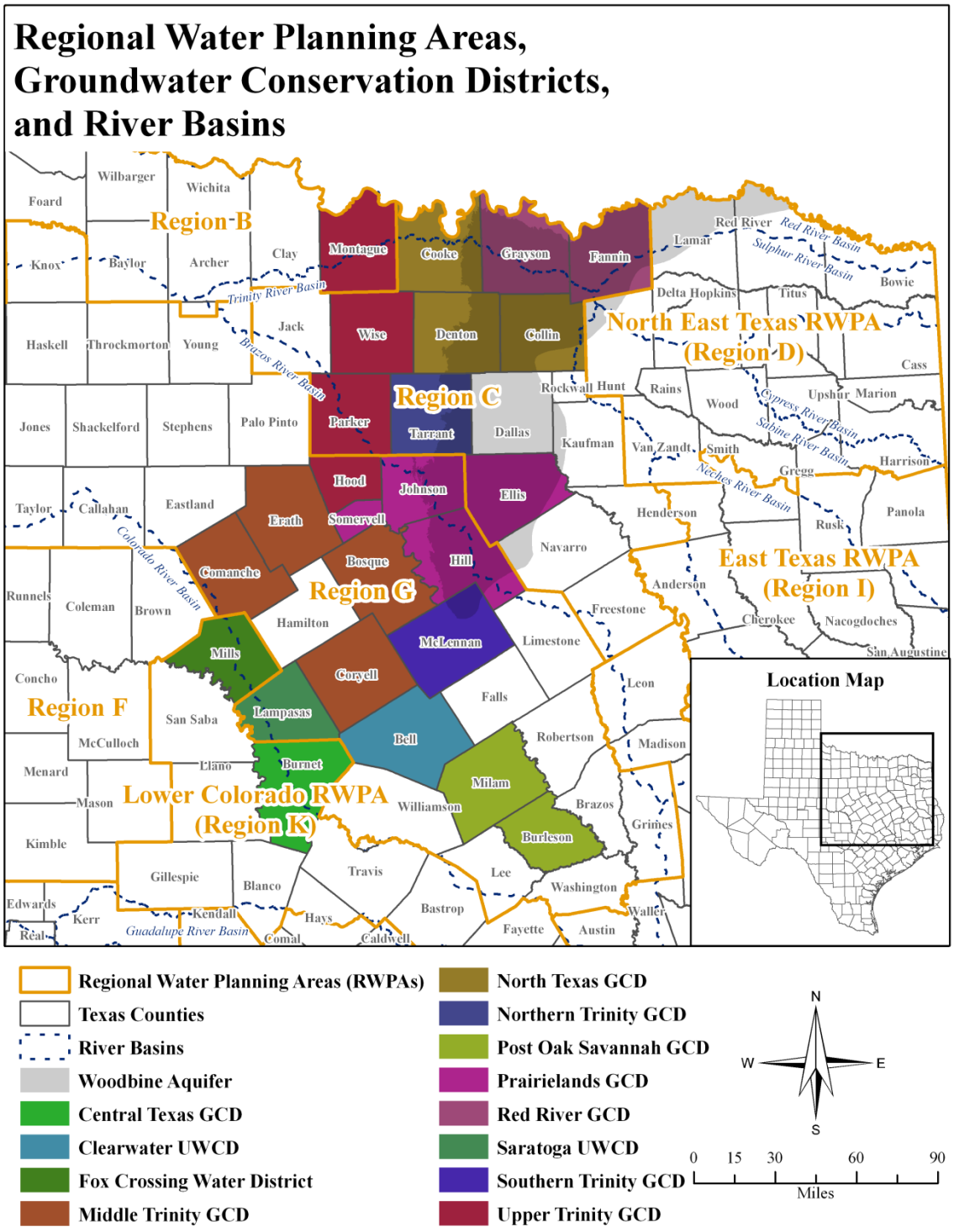

Figure 2. Map showing regional water planning areas (RWPAs), groundwater conservation districts (GCDs), counties, and river basins in and neighboring Groundwater Management Area 8.

APPENDIX H

GAM Run GR 14-001

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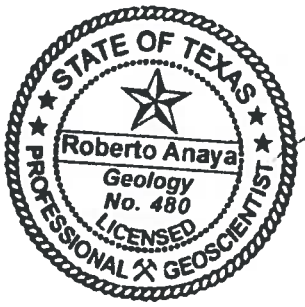
GAM Run 14-001: Northern Trinity Groundwater Conservation District Management Plan

by Roberto Anaya, P.G. and Shirley C. Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-6115
March 31, 2015



Roberto Anaya
3/31/2015

Shirley C. Wade
3/31/2015

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GAM RUN 14-001: NORTHERN TRINITY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Roberto Anaya, P.G. and Shirley C. Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-6115
March 31, 2015

EXECUTIVE 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 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. Information derived from groundwater availability models that shall be included in the groundwater management plan includes:

- the annual amount of recharge from precipitation to the groundwater resources within the district, if any;
- 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
- the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

This report (Part 2 of a two-part package of information from the TWDB to Northern Trinity Groundwater Conservation District) fulfills the requirements noted above. Part 1 of the two-part package is the Estimated Historical Water Use/State Water Plan data report. The district will receive, or received, this data report from the TWDB Groundwater Technical Assistance Section. Questions about the data report can be directed to Mr. Stephen Allen, Stephen.Allen@twdb.texas.gov, (512) 463-7317.

The groundwater management plan for the Northern Trinity Groundwater Conservation District should be adopted by the district on or before April 10, 2015 and submitted to the executive administrator of the TWDB on or before May 10, 2015. The current management plan for the Northern Trinity Groundwater Conservation District expires on July 9, 2015.

This report discusses the methods, assumptions, and results from a model run using the recently adopted groundwater availability model (approved by the TWDB executive administrator on November 21, 2014) for the Trinity (northern portion) and Woodbine aquifers, version 2.01 (Kelley and others, 2014). This model run replaces the results of GAM Run 08-65 (Oliver, 2008) that used version 1.01 of the groundwater availability model for the Trinity (northern portion) and Woodbine aquifers (Bené and others, 2004). Tables 1 and 2 summarize the groundwater availability model data required by statute to be included in the district's groundwater conservation management plan, and Figures 1 and 2 show the areas of the model from which the values in the table were extracted. If after review of the figures, Northern Trinity Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the updated groundwater availability model for the northern portion of the Trinity Aquifer and Woodbine Aquifer (Kelley and others, 2014) was used for this analysis. Water budgets for the Northern Trinity Groundwater Conservation District were extracted for the historical model periods (1980-2012) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). The average annual water budget values for recharge, surface water outflow, inflow to the district, outflow from the district, net inter-aquifer flow (upper), and net inter-aquifer flow (lower) for the portion of the aquifers located within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Northern portion of the Trinity Aquifer and Woodbine Aquifer

- We used the updated groundwater availability model for the northern portion of the Trinity Aquifer and Woodbine Aquifer. See Kelley and others (2014) for assumptions and limitations of the updated groundwater availability model.

- The groundwater availability model includes eight layers, that generally correspond to:
    - the surficial outcrop area of the units in layers 2 through 8 and the younger formations overlying the downdip portions of the Woodbine Aquifer and Washita and Fredericksburg groups (Layer 1),
    - the Woodbine Aquifer (Layer 2),
    - the Washita and Fredericksburg groups (Layer 3),
    - the Paluxy Aquifer (Layer 4),
    - the Glen Rose Formation (Layer 5),
    - the Hensell Sand (Layer 6),
    - the Pearsall Formation (Layer 7), and
    - The Hosston Formation (Layer 8).
- The Trinity Aquifer is the major source of groundwater in the Northern Trinity Groundwater Conservation District. Most of the Trinity Aquifer occurs as subcrop within the district boundaries. A small amount of the aquifer outcrops in the northwest portion of the district. All of the eight numerical layers in the model are designated as active in the Northern Trinity Groundwater Conservation District. The Trinity Aquifer is represented by Model Layers 1 through 8 in the outcrop area and by Model Layers 4 through 8 in the subcrop area. These layers were combined to calculate water budget values for the Trinity Aquifer in the district.
- Groundwater in the Trinity Aquifer within Northern Trinity Groundwater Conservation District is primarily fresh water, with total dissolved solids concentrations less than 1,000 milligrams per liter (see Figures 4.4.11 through 4.4.15 in Kelley and others (2014)).
- The Woodbine Aquifer is considered a minor source of groundwater in the Northern Trinity Groundwater Conservation District. Most of the Woodbine Aquifer outcrops in a north-south trend through the eastern portion of the district. A lesser amount of the aquifer is present as subcrop along the eastern district boundary. The Woodbine Aquifer is represented by Model Layers 1 and 2 in the outcrop area and by Model Layer 2 in the subcrop

area. These layers were combined to calculate water budget values for the Woodbine Aquifer in the district.

- Groundwater in the Woodbine Aquifer within Northern Trinity Groundwater Conservation District is generally fresh water, with total dissolved solids concentrations less than 1,000 milligrams per liter (see Figures 4.4.11 through 4.4.15 in Kelley and others (2014)).

- The model was run with MODFLOW-NWT (Niswonger and others, 2011).

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the model results for the Trinity and Woodbine aquifers located within the district and averaged over the duration of the calibration and verification portion of the model run, as shown in Tables 1 and 2.

- Precipitation recharge—the areally-distributed recharge sourced from precipitation falling on the outcrop areas of the Trinity Aquifer or Woodbine Aquifer (where the aquifers are exposed at land surface) within the district.

- Surface water outflow—the total volume of water discharging from the aquifer (outflow) to surface water features such as streams, reservoirs, and drains (springs).

- Flow into and out of district—the lateral flow within the aquifers between the district and adjacent counties.

- Flow between aquifers—the net vertical flow between aquifers or confining units. This flow is controlled by the relative water levels in each aquifer or confining unit and hydraulic properties of each aquifer or confining unit. In the Northern Trinity Groundwater Conservation District, this net vertical flow represents the net groundwater flow between the Trinity Aquifer and the immediate geologic unit overlying the aquifer in the subcrop area or the net groundwater flow between the Woodbine Aquifer and the immediate geologic units overlying and underlying the aquifer in the subcrop area.

The information needed for the Northern Trinity Groundwater Conservation District's management plan is summarized in Tables 1 and 2. It is important to note that sub-regional water budgets are approximate. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary,

is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located (Figures 1 and 2). Please note that the results of this model run are different from the results of the model run 08-65 that were obtained from the older groundwater availability model. The changes can be attributed to several characteristics of the new model, such as differences in model layering, geologic boundaries, hydraulic properties distribution, and the use of different MODFLOW modeling packages.

TABLE 1: SUMMARIZED INFORMATION FOR THE TRINITY AQUIFER THAT IS NEEDED FOR THE NORTHERN 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	3,735
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Trinity Aquifer	4,560
Estimated annual volume of flow into the district within each aquifer in the district	Trinity Aquifer	13,750
Estimated annual volume of flow out of the district within each aquifer in the district	Trinity Aquifer	5,785
Estimated net annual volume of flow between each aquifer in the district	From overlying Washita and Fredericksburg Confining Units into the Trinity Aquifer	7,228
	From Trinity Aquifer into underlying Older Units	n/a*

***** n/a: Not Applicable. The model assumes a no flow condition at the base of the Trinity Aquifer.

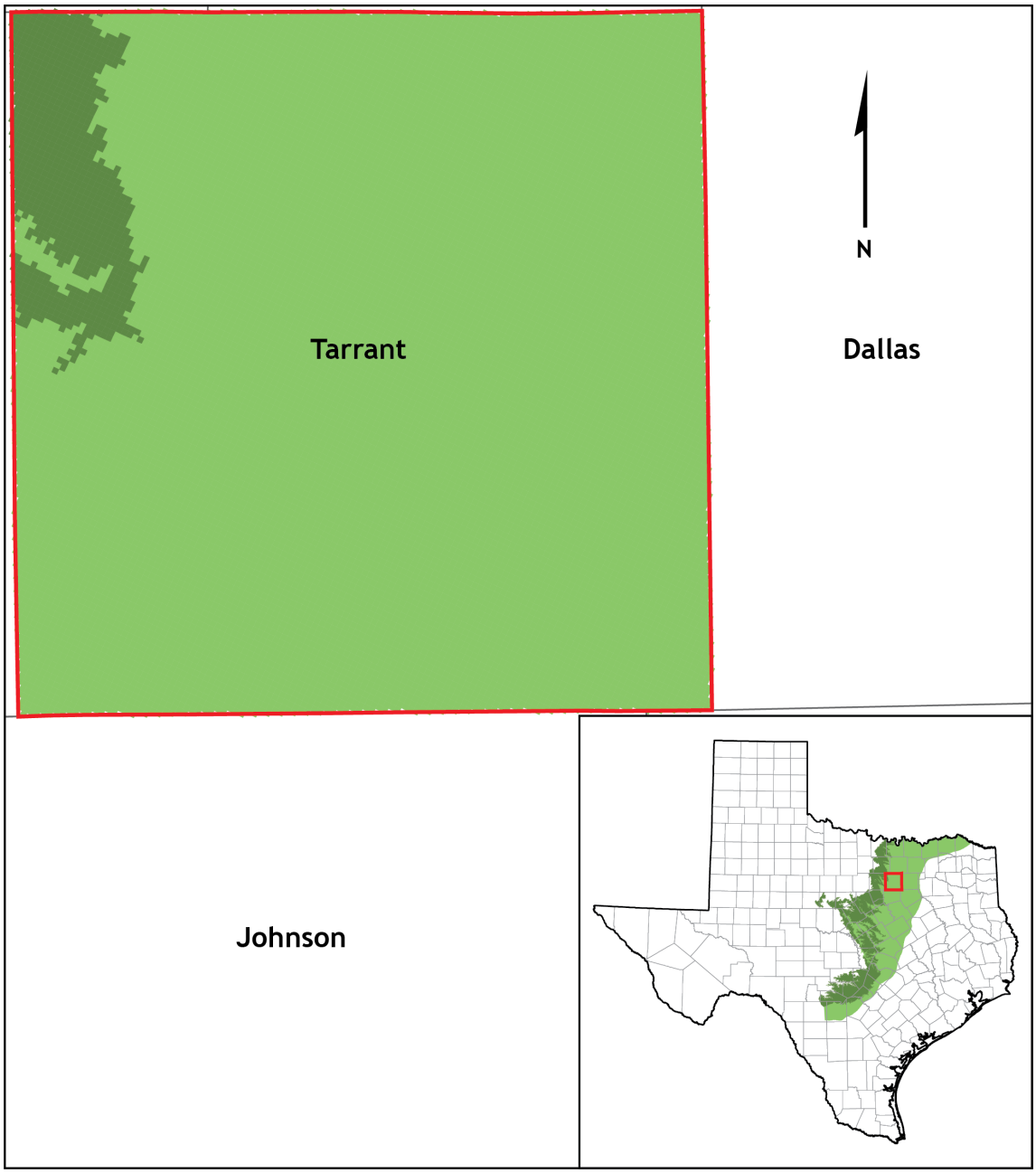

FIGURE 1: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF THE TRINITY AQUIFER AND WOODBINE AQUIFER FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE TRINITY AQUIFER FOOTPRINT EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 2: SUMMARIZED INFORMATION FOR THE WOODBINE AQUIFER THAT IS NEEDED FOR THE NORTHERN 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	Woodbine Aquifer	16,545
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Woodbine Aquifer	14,276
Estimated annual volume of flow into the district within each aquifer in the district	Woodbine Aquifer	1,135
Estimated annual volume of flow out of the district within each aquifer in the district	Woodbine Aquifer	1,916
Estimated net annual volume of flow between each aquifer in the district	From overlying Younger Confining Units into the Woodbine Aquifer	70
	From Woodbine Aquifer into underlying Washita and Fredericksburg Confining Units	1,816

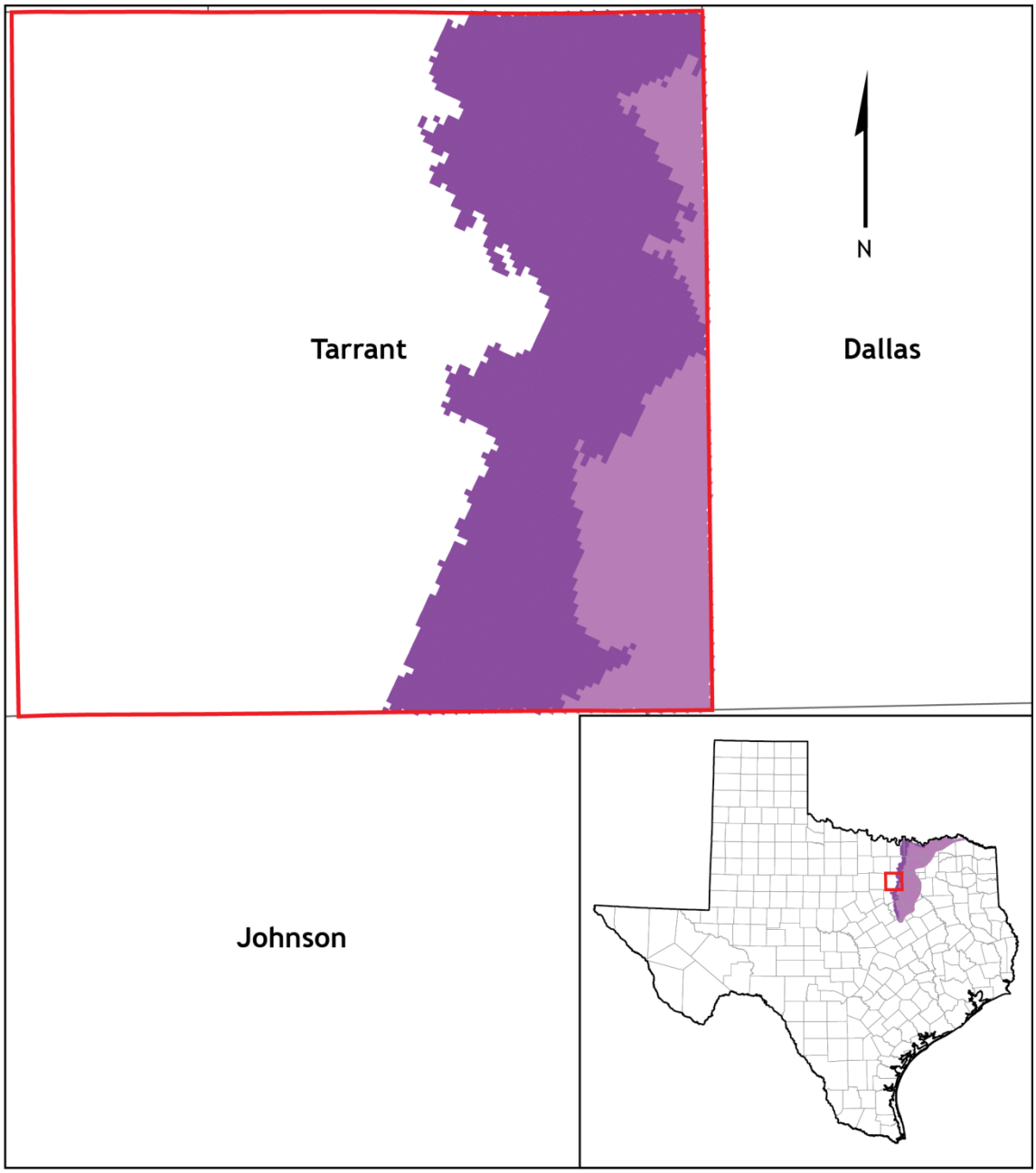

FIGURE 2: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF THE TRINITY AQUIFER AND WOODBINE AQUIFER FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE WOODBINE AQUIFER FOOTPRINT EXTENT WITHIN THE DISTRICT BOUNDARY).

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 interaction with streams are specific to particular historic time periods.

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

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

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APPENDIX I

Adopted Rules of the District

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Northern Trinity Groundwater Conservation District

Temporary Rules for Water Wells in Tarrant County, Texas

Amended December 8, 2011

Northern Trinity

Groundwater Conservation District

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PREAMBLE

The Northern Trinity Groundwater Conservation District ("District") was created in 2007 by the 80th Texas Legislature in order to conserve, preserve, protect, and prevent waste of the groundwater resources of Tarrant County, Texas, and to promote recharge of the aquifers within Tarrant County. The District's boundaries are coextensive with the boundaries of Tarrant County, and all lands and other property within these boundaries will benefit from the works and projects that will be accomplished by the District. These Temporary District Rules are adopted as the District's first step towards accomplishing those purposes.

The District is committed to manage and protect the groundwater resources within its jurisdiction and to work with others to ensure a sustainable, adequate, high quality and cost effective supply of water, now and in the future. Any action taken by the District shall only be after full consideration and respect has been afforded to the individual property rights of all citizens of the District.

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SECTION 1.
DEFINITION, CONCEPTS, AND GENERAL PROVISIONS

Rule 1.1 Definition of Terms.
In the administration of its duties, the District follows the definitions of terms set forth in Chapter 36, Texas Water Code, and other definitions as follows:

(1) "Agricultural irrigation" means the application of produced groundwater to soil for beneficial purposes as part of any of the following activities:

1. cultivating the soil to produce crops for human food, animal feed, or planting seed or for the production of fibers;

2. the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or nonsoil media, by a nursery grower;

3. raising, feeding, or keeping animals for breeding purposes or for the production of food or fiber, leather, pelts, or other tangible products having a commercial value;

4. planting cover crops, including cover crops cultivated for transplantation, or leaving land idle for the purpose of participating in any governmental program or normal crop or livestock rotation procedure;

5. wildlife management; and

6. raising or keeping equine animals.

(2) "Aquifer" means a water bearing geologic formation in the District.

(3) "As equipped" for purposes of determining the capacity of a well means visible pipes, plumbing, and equipment attached to the wellhead or adjacent plumbing that controls the maximum rate of flow of groundwater and that is permanently affixed to the well or adjacent plumbing by welding, glue or cement, bolts or related hardware, or other reasonably permanent means.

(4) "Beneficial use" or "beneficial purpose" means use of groundwater for:

1. agricultural, gardening, domestic, stock raising, municipal, mining, manufacturing, industrial, commercial, or recreational purposes;

2. exploring for, producing, handling, or treating oil, gas, sulfur, lignite, or other minerals; or

3. any other purpose that is useful and beneficial to the user that does not constitute waste.

(5) "Board" means the Board of Directors of the District.

(6) "Connection" means a single family residential unit or each commercial or industrial establishment to which drinking water is supplied from the system. As an example, the number of service connections in an apartment complex would be equal to the number of individual apartment units. When enough data is not available to accurately determine the number of connections to be served or being served, the population served divided by three will be used as the number of connections for calculating system capacity requirements. Conversely, if only the number of connections is known, the connection total multiplied by three will be the number used for population served.

(7) "District" means the Northern Trinity Groundwater Conservation District created in accordance with Section 59, Article XVI, Texas Constitution, Chapter 36, Texas Water Code, and the District Act.

(8) "District Act" means the Act of May 28, 2007, 80th Leg., R.S., ch. 1126, 2007 Tex. Gen. Laws 3794, codified at TEX. SPEC. DIST. LOC. LAWS CODE ANN. ch. 8820 ("the District Act"), as may be amended from time to time.

(9) "Domestic use" means the use of groundwater by an individual or a household to support domestic activity. Such use may include water for drinking, washing, or culinary purposes; for irrigation of lawns, or of a family garden and/or family orchard; for watering of domestic animals. Domestic use does not include water used to support activities for which consideration is given or received or for which the product of the activity is sold. Domestic use does not include use by or for a public water system. Domestic use does not include irrigation of crops in fields or pastures. Domestic use does not include water used for open-loop residential geothermal heating and cooling systems, but does include water used for closed-loop residential geothermal systems.

(10) "Existing Groundwater Regulatory Authority" means a conservation and reclamation district described by Section 8820.151 of the District Act.

(11) "Effective date" means March 11, 2010, which was the original date of adoption of these Temporary Rules.

(12) "General Manager" as used herein is the appointed chief administrative officer of the District, or the District staff or a third party acting at the direction of the General Manager or Board. Additionally, the Board President may perform the functions set forth herein to be performed by the General Manager.

(13) "Groundwater" means water percolating below the surface of the earth.

(14) "Groundwater reservoir" means a specific subsurface water-bearing stratum.

(15) "Landowner" means the person who holds possessory rights to the land surface or to the withdrawal of groundwater from wells located on the land surface.

(16) "Livestock" means, in the singular or plural, grass- or plant-eating, single- or cloven-hooved mammals raised in an agricultural setting for subsistence, profit or for its labor, or to make produce such as food or fiber, including cattle, horses, mules, asses, sheep, goats, llamas, alpacas, and hogs, as well as species known as ungulates that are not indigenous to this state from the swine, horse, tapir, rhinocerous, elephant, deer, and antelope families, but does not mean a mammal defined as a game animal in section 63.001, Parks and Wildlife Code, or as a fur-bearing animal in section 71.001, Parks and Wildlife Code, or any other indigenous mammal regulated by the Texas Department of Parks and Wildlife as an endangered or threatened species. The term does not include any animal that is stabled, confined, or fed at a facility that is defined by Texas Commission on Environmental Quality rules as an Animal Feeding Operation or a Concentrated Animal Feeding Operation.

(17) "Meter" or "measurement device" means a water flow measuring device that can measure within +/- 5% of accuracy the instantaneous rate of flow and record the amount of groundwater produced from a well or well system during a measure of time, except as provided under Rule 7.1.

(18) "Nursery grower" means a person who grows more than 50 percent of the products that the person either sells or leases, regardless of the variety sold, leased, or grown. For the purpose of this definition, "grow" means the actual cultivation or propagation of the product beyond the mere holding or maintaining of the item prior to sale or lease and typically includes activities associated with the production or multiplying of stock such as the development of new plants from cuttings, grafts, plugs, or seedlings.

(19) "Penalty" means a reasonable civil penalty set by rule under the express authority delegated to the District through Section 36.102(b) of the Texas Water Code.

(20) "Person" means an individual, corporation, limited liability company, organization, government, governmental subdivision, agency, business trust, estate, trust, partnership, association, or other legal entity.

(21) "Poultry" means chickens, turkeys, nonmigratory game birds, and other domestic nonmigratory fowl, but does not include any other bird regulated by the Parks and Wildlife as an endangered or threatened species. The term does not include any animal that is stabled, confined, or fed at a facility that is defined by Texas Commission on Environmental Quality rules as an Animal Feeding Operation or a Concentrated Animal Feeding Operation.

(22) "Production" or "producing" means the act of extracting groundwater from an aquifer by a pump or other method.

(23) "Public Water System" or "PWS" means a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, which includes all uses described under the definition for "drinking water" in 30 Texas Administrative Code, Section 290.38. Such a system must have at least 15 service connections or serve at least 25 individuals at least 60 days out of the year. This term includes any collection, treatment, storage, and distribution facilities under the control of the operator of such system and used primarily in connection with such system, and any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. Two or more systems with each having a potential to serve less than 15 connections or less than 25 individuals but owned by the same person, firm, or corporation and located on adjacent land will be considered a public water system when the total potential service connections in the combined systems are 15 or greater or if the total number of individuals served by the combined systems total 25 or greater at least 60 days out of the year. Without excluding other meanings of the terms "individual" or "served," an individual shall be deemed to be served by a water

system if he lives in, uses as his place of employment, or works in a place to which drinking water is supplied from the system.

(24) "Pump" means any facility, device, equipment, materials, or method used to obtain water from a well.

(25) "Registrant" means a person required to submit a registration.

(26) "Registration" means a well owner providing certain information about a well to the District, as more particularly described under Section 3.

(27) "Rule" or "Rules" or "Temporary Rules" means these Temporary Rules of the District regulating water wells, which shall continue to be effective until amended or repealed.

(28) "Substantially alter" with respect to the size or capacity of a well means to increase the inside diameter of the pump discharge column pipe size of the well in any way or to increase the size of the pump on the well.

(29) "Transfer" means a change in a registration as follows, except that the term "transfer" shall have its ordinary meaning as read in context when used in other contexts:

(a) ownership; or

(b) the person authorized to exercise the right to make withdrawals and place the groundwater to beneficial use.

(30) Types of wells:

(a) "Exempt well" means a new or an existing well that is exempt under Rule 2.1 from certain regulatory requirements in these rules.

(b) "Existing well" means a well that was in existence or for which drilling commenced prior to October 1, 2010.

(c) "Leachate well" means a well used to remove contamination from soil or groundwater.

(d) "Monitoring well" means a well installed to measure some property of the groundwater or the aquifer that it penetrates, and does not produce more than 5,000 gallons per year.

(e) "New well" means a well for which drilling commenced on or after October 1, 2010.

(f) "Public water supply well" means a well that supplies water to a public water system.

(31) "Waste" means one or more of the following:

(a) withdrawal of groundwater from the aquifer at a rate and in an amount that causes or threatens to cause an intrusion into the aquifer unsuitable for agriculture, gardening, domestic, stock raising, or other beneficial purposes;

(b) the flowing or producing of water from the aquifer by artificial means if the water produced is not used for a beneficial purpose;

(c) the escape of groundwater from the aquifer to any other underground reservoir or geologic stratum that does not contain groundwater;

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

(e) willfully or negligently causing, suffering, or allowing groundwater to escape into any river, creek, natural watercourse, depression, lake, reservoir, drain, sewer, street, highway, road, or road ditch, or onto any land other than that of the owner of the well unless such discharge is authorized by permit, rule, or other order issued by the Texas Commission on Environmental Quality under Chapters 11 or 26 of the Texas Water Code;

(f) groundwater pumped for irrigation that escapes as irrigation tailwater onto land other than that of the owner of the well unless permission has been granted by the occupant of the land receiving the discharge;

(g) for water produced from an artesian well, "waste" has the meaning assigned by Section 11.205, Texas Water Code;

(h) operating a deteriorated well; or

(i) producing groundwater in violation of any District rule governing the withdrawal of groundwater through production limits on wells, managed depletion, or both.

(32) "Well" means any artificial excavation located within the boundaries of the District dug or drilled for the purpose of exploring for or withdrawing groundwater from the aquifer.

(33) "Well owner" means the person who owns a possessory interest in: (1) the land upon which a well or well system is located or to be located; (2) the well or well system; or (3) the groundwater withdrawn from a well or well system.

(34) "Well system" means a well or group of wells tied to the same distribution system.

(35) "Withdraw" means the act of extracting or producing groundwater by pumping or other method.

(36) "Year" means a calendar year (January 1 through December 31), except where the usage of the term clearly suggests otherwise.

Rule 1.2 Authority of District.
The Northern Trinity Groundwater Conservation District is a political subdivision of the State of Texas organized and existing under Section 59, Article XVI, Texas Constitution, Chapter 36, Texas Water Code, and the District Act. The District is a governmental agency and a body politic and corporate. The District was created to serve a public use and benefit.

Rule 1.3 Purpose of Rules.
These Temporary Rules are adopted under the authority of Sections 36.101, Texas Water Code, and the District Act for the purpose of conserving, preserving, protecting, and recharging groundwater in the District in order to prevent subsidence, prevent degradation of water quality, prevent waste of groundwater, and to carry out the powers and duties of Chapter 36, Texas Water Code, and the District Act.

Rule 1.4 Use and Effect of Rules.
These rules are used by the District in the exercise of the powers conferred on the District by law and in the accomplishment of the purposes of the law creating the District. These rules may be used as guides in the exercise of discretion, where discretion is vested. However, under no circumstances and in no particular case will they, or any part therein, be construed as a limitation or restriction upon the District to exercise powers, duties and jurisdiction conferred by law. These rules create no rights or privileges in any person or water well, and shall not be construed to bind the Board in any manner in its promulgation of the District Management Plan, amendments to these Temporary Rules, or promulgation of permanent rules.

Rule 1.5 Purpose of District.
The purpose of the District is to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater, and of groundwater reservoirs or their subdivisions, consistent with the objectives of Section 59, Article XVI, Texas Constitution.

Rule 1.6 Construction.
A reference to a title or chapter without further identification is a reference to a title or chapter of the Texas Water Code. A reference to a section or rule without further identification is a reference to a section or rule in these Rules. Construction of words and phrases is governed by the Code Construction Act, Subchapter B, Chapter 311, Texas Government Code. The singular includes the plural, and the plural includes the singular. The masculine includes the feminine, and the feminine includes the masculine.

Rule 1.7 Methods of Service Under the Rules.
Except as provided in these rules, any notice or document required by these rules to be served or delivered may be delivered to the recipient or the recipient's authorized representative in person, by agent, by courier receipted delivery, by certified or registered mail sent to the recipient's last known

address, or by fax transfer to the recipient's current fax number and shall be accomplished by 5:00 p.m. on the date which it is due. Service by mail is complete upon deposit in a post office depository box or other official depository of the United States Postal Service. Service by fax transfer is complete upon transfer, except that any transfer completed after 5:00 p.m. shall be deemed complete the following business day. If service or delivery is by mail and the recipient has the right or is required to do some act within a prescribed period of time after service, three days will be added to the prescribed period. If service by other methods has proved unsuccessful, service will be deemed complete upon publication of the notice or document in a newspaper of general circulation in the District.

Rule 1.8 Severability.
If a provision contained in these Temporary Rules is for any reason held to be invalid, illegal, or unenforceable in any respect, the invalidity, illegality, or unenforceability does not affect any other rules or provisions of these Temporary Rules, and these Temporary Rules shall be construed as if the invalid, illegal, or unenforceable provision had never been contained in these rules.

Rule 1.9 Regulatory Compliance; Other Governmental Entities.
All registrants of the District shall comply with all applicable rules and regulations of the District and of all other governmental entities. If the District Rules and regulations are more stringent than those of other governmental entities, the District Rules and regulations are applicable.

Rule 1.10 Computing Time.
In computing any period of time prescribed or allowed by these Rules, order of the Board, or any applicable statute, the day of the act, event, or default from which the designated period of time begins to run is not included, but the last day of the period so computed is included, unless it is a Saturday, Sunday, or legal holiday, in which event the period runs until the end of the next day which is neither a Saturday, Sunday, or legal holiday.

Rule 1.11 Time Limits.
Applications, requests, or other papers or documents required or allowed to be filed under these Rules or by law must be received for filing by the District within the time limit for filing, if any. The date of receipt, not the date of posting, is determinative of the time of filing. Time periods set forth in these rules shall be measured by calendar days, unless otherwise specified.

Rule 1.12 Notification to Well Owners.
As soon as practicable after the effective date, the District shall publish notice to inform the well owners of the management authority of the District and the well owners' duties and responsibilities under these Rules. This provision does not apply to the adoption of amendments to these Rules.

Rule 1.13 Amending of Rules.
The Board may, following notice and hearing, amend or repeal these rules or adopt new rules from time to time.

SECTION 2.
APPLICABILITY OF REGULATORY REQUIREMENTS; EXEMPTIONS

Rule 2.1 Wells Exempt from Water Use Fee Payment, Metering, and Reporting Requirements of These Temporary Rules.

(a) The requirements of these Temporary Rules relating to the payment of water use fees under Section 6, the requirement to install and maintain a meter under Section 7, and the requirement to report to the District the amount of water produced from a well under Section 3 do not apply to the following types of wells:

1. All wells, existing or new, of any size or capacity that are used solely for domestic use, livestock use, poultry use, or agricultural irrigation use;

2. An existing well or new well that is not a public water supply well and:

(A) does not have the capacity, as equipped, to produce more than 40 gallons per minute, except as provided by Subsection (b) of this rule; and

(B) is used in whole or in part for any purpose of use other than solely for domestic, livestock, poultry, or agricultural irrigation use; or

3. Leachate wells and monitoring wells.

(b) For purposes of determining whether the exemption set forth under Subsection (a)(2) applies, the capacity of a well that is part of a well system shall be determined by taking the sum of the capacities of each of the individual wells, as equipped, in the system. If the total sum of the capacities is greater than 40 gallons per minute, the well system and the individual wells that are part of it are not exempt from the water use fee payment, metering, and reporting requirements of these rules.

(c) A well exempted under Subsection (a) will lose its exempt status if the well is subsequently used for a purpose or in a manner that is not exempt under Subsection (a).

(d) A well exempted under Subsection (a)(2) will lose its exempt status if, while the well was registered as an exempt well, the District determines that the well had the capacity, as equipped, to produce more than 40 gallons per minute. Such wells are subject to the water use fee payment, metering, reporting, and other requirements of these Temporary Rules, and may be subject to enforcement under Section 8.

(e) The owner of a new well that is exempt under this Rule shall nonetheless register the well with the District, as required under Section 3.

Rule 2.2 Wells Subject to Water Use Fee Payment, Metering, and Reporting Requirements of These Temporary Rules

(a) All wells not described as exempt under Rule 2.1 are subject to the water use fee payment, metering, reporting, and other requirements of these Temporary Rules, except as provided under Rule 2.3. Such wells include all public water supply wells and all wells or well systems with a capacity, as equipped, to produce more than 40 gallons per minute that are used in whole or in part for any purpose of use other than solely for domestic use, livestock use, poultry use, or agricultural irrigation use.

(b) Any well that is subject to fee payment under this rule and that provides water for both exempt purposes and purposes not exempt under Rule 2.1 or Rule 2.3 shall pay the water use fee rate established by the District for all water produced from the well, unless the owner or operator can demonstrate through convincing evidence to the satisfaction of the District that a system is or will be in place so as to assure an accurate accounting of water for each purpose of use. Subject to the District's discretion, a well owner or operator that can demonstrate an accurate accounting of water produced for each purpose of use shall only be subject to the water use fee payment and reporting requirements of these Temporary Rules for water produced from the well for non-exempt purposes of use.

Rule 2.3 Limited Exemption for Certain Hydrocarbon-Related Water Wells

The requirements of these Temporary Rules relating to production limitations under Section 5 and to the payment of water use fees under Section 6 do not apply to a well exempt from permitting under Section 36.117(b)(2) or (b)(3), Water Code, which relate to water wells used in certain oil and gas drilling or exploration operations and surface coal mining. However, such a well shall be subject to the other requirements of these rules, including without limitation the well registration, drilling records, metering, water production reporting, and new well registration fee and deposit provisions of these rules, unless such a well is exempted from certain of those requirements because its limited production capacity qualifies for an exemption under Rule 2.1.

Rule 2.4 Applicability of Rules in Existing Groundwater Regulatory Authority

The District may not regulate the drilling or equipping of, or the completion, operation, or production of, a well located within the District and within the boundaries of an Existing Groundwater Regulatory Authority, as defined under Rule 1.1. However, such a well located within the District and within the boundaries of an Existing Groundwater Regulatory Authority that is not exempt under Rule 2.1 shall be subject to the Water Use Fee payment requirements of these Rules. The District and an Existing Groundwater Regulatory Authority shall cooperate to provide for the sharing of information and the registration of such wells and payment of Water Use Fees to the District in a manner that accomplishes the intent and purposes of these Rules and the District Act but is not unduly burdensome on the owners of such wells, who may have already drilled, registered, or permitted their wells in accordance with the water well rules of the Existing Groundwater Regulatory Authority or who may do so in the future.

SECTION 3.
REGISTRATIONS, RECORDS, REPORTS, AND LOGS; PERMIT NOT REQUIRED

Rule 3.1 Purpose and Policy

The accurate and timely reporting to the District of activities governed by these Rules is a critical component to the District's ability to effectively and prudently manage the groundwater resources that it has been charged by law with regulating. The purpose of Section 3 is to require the submission, by the appropriate person or persons, of complete, accurate, and timely registrations, records, reports, and logs as required throughout the District Rules. Because of the important role that accurate and timely reporting plays in the District's understanding of past, current and anticipated groundwater conditions within the District, the failure to comply with these rules may result in the assessment of additional fees, civil penalties, or other enforcement action by the District, as specifically set forth under Section 8.

Rule 3.2 Permit Not Required Under Temporary Rules.

No permit of any kind is required under these Temporary Rules. Notwithstanding Chapter 36, Water Code, a permit is not required under these Temporary Rules to drill, equip, operate, or complete a well, produce water from a well, or to substantially alter the size or capacity of a well. Permitting requirements will be developed and adopted by the District in the future after it has had a sufficient opportunity to develop a management plan and carefully consider various regulatory approaches and how such approaches may impact landowners and other water users in the District while achieving proper management of the groundwater resources. Permitting rules will be adopted only after ample opportunity has been afforded the public to participate in the development of such rules.

Rule 3.3 Well Registration.

(a) The following wells must be registered with the District:

1. all new wells drilled on or after October 1, 2010, including new wells exempt under Rules 2.1 or 2.3;

2. all existing wells that are not exempt under Rule 2.1.

(b) A person seeking to register a well shall provide the District with the following information in the registration application on a form provided by the District:

1. the name and mailing address of the registrant and the owner of the property, if different from the registrant, on which the well is or will be located;

2. if the registrant is other than the owner of the property, documentation establishing the applicable authority to file the application for well registration, to

serve as the registrant in lieu of the property owner, and to construct and operate a well for the proposed use;

3. a statement of the nature and purpose of the existing or proposed use of water from the well;

4. the location or proposed location of the well, identified as a specific point measured by latitudinal and longitudinal coordinates;

5. the location or proposed location of the use of water from the well, if used or proposed to be used at a location other than the location of the well;

6. the production capacity or proposed production capacity of the well, as equipped, in gallons per minute;

7. a water well closure plan or a declaration that the applicant will comply with well plugging guidelines and report closure to the District;

8. a statement that the water withdrawn from the well will be put to beneficial use at all times; and

9. any other information deemed necessary by the Board.

(c) The timely filing of an application for registration shall provide the owner of a well described under Subsection (a)(2) with evidence that a well existed before October 1, 2010, for purposes of grandfathering the well from the requirement to comply with any well location or spacing requirements of the District and any other entitlements that existing wells may receive under these Temporary Rules or under permanent rules adopted by the District. A well that is required to be registered under this Rule and that is not exempt under Rule 2.1 shall not be operated after October 1, 2010, without first complying with the metering provisions set forth under Section 7.

(d) Once a registration is complete, which for new wells also includes receipt by the District of the well report required by Rule 3.7 and the well registration fee, the registration shall be perpetual in nature, subject to being amended or transferred and subject to enforcement for violations of these Rules.

Rule 3.4 Registration of Existing Non-Exempt Wells Required By October 1, 2010.

(a) The owner of an existing well that is not exempt under Rule 2.1 must register the well with the District between the Effective Date, and October 1, 2010, and must install a meter on the well as set forth under Section 7 of these rules by October 1, 2010. Failure of the owner of such a well to timely register or install a meter on the well under this Rule shall subject the well owner to enforcement under these Rules.

(b) Although not required under these Temporary Rules, the owner of an existing well exempt under Rule 2.1 may elect to register the well with the District to provide the owner with evidence that the well existed before October 1, 2010, for purposes of grandfathering the well from the requirement to comply with any well location or spacing requirements of the District and any other entitlements that existing wells may receive under these Temporary Rules or under permanent rules adopted by the District.

Rule 3.5 Registration of New Wells or Alterations to Existing Wells Required Prior to Drilling or Alteration.

(a) An owner or well driller, or any other person legally authorized to act on their behalf, must submit and obtain approval of a registration application and submit a well registration fee under Rule 6.4 and a well report deposit under Rule 6.7 with the District before any new well, except leachate wells or monitoring wells, may be drilled, equipped, or completed, or before an existing well may be substantially altered with respect to size or capacity, beginning on or after October 1, 2010.

(b) A registrant for a new well has 120 days from the date of approval of its application for well registration to drill and complete the new well, and must file the well report with the District within 60 days of completion. However, if the well is for a public water system, the registrant shall have 240 days to drill and complete the new well from the date of approval of its application for well registration, in order to allow time for Texas Commission on Environmental Quality (TCEQ) approval(s), and must file the well report within 60 days of well completion. Such a public water system registrant may apply for one extension of an additional 240 days or may resubmit an identical well registration without the need to pay an additional well registration fee.

(c) If the well report is timely submitted to the District, the District shall return the well report deposit to the owner or well driller. In the event that the well report required under this rule and Rule 3.7 is not filed within the deadlines set forth under Subsection (b) of this rule, the driller or owner shall forfeit the well report deposit and shall be subject to enforcement by the District for violation of this rule.

(d) Notwithstanding any other rule to the contrary, the owner and driller of a new well are jointly responsible for ensuring that a well registration required by this section is timely filed with the District and contains only information that is true and accurate. Each will be subject to enforcement action if a registration required by this section is not timely filed by either, or by any other person legally authorized to act on the behalf of either.

Rule 3.6 General Provisions Applicable to Registrations.

(a) Registration applications may be submitted to the District in person, by mail, or by fax transfer, using the registration form provided by the District.

(b) A determination of administrative completeness of a registration application shall be made by the General Manager within five business days after the date of receipt of an

application for registration and receipt of the well registration fee. If an application is not administratively complete, the District shall request the applicant to complete the application. The application will expire if the applicant does not complete the application within 120 days of the date of the District's request. An application will be considered administratively complete and may be approved by the General Manager without notice or hearing if:

(1) it substantially complies with the requirements set forth under Rule 3.3(b), including providing all information required to be included in the application that may be obtained through reasonable diligence; and

(2) if it is a registration for a new well:

(A) includes the well report deposit and well registration fee; and

(B) proposes a well that complies with the location and well completion requirements of Section 4.

A person may appeal the General Manager's ruling by filing a written request for a hearing before the Board. The Board will hear the applicant's appeal at the next regular Board meeting. The General Manager may set the application for consideration by the Board at the next available Board meeting or hearing in lieu of approving or denying an application.

(c) Upon approval or denial of an application, the General Manager shall inform the registrant in writing by regular mail of the approval or denial, as well as whether the well meets an exemption provided in Rule 2.1 or Rule 2.3 and whether it is subject to the metering, water use fee payment, or reporting requirements of these Rules.

(d) An application pursuant to which a registration has been issued is incorporated in the registration, and the registration is valid contingent upon the accuracy of the information supplied in the registration application. A finding that false information has been supplied in the application may be grounds to refuse to approve the registration or to revoke or suspend the registration.

(e) Submission of a registration application constitutes an acknowledgment by the registrant of receipt of the rules and regulations of the District and agreement that the registrant will comply with all rules and regulations of the District.

(f) The District may amend any registration, in accordance with these Rules, to accomplish the purposes of the District Rules, management plan, the District Act, or Chapter 36, Texas Water Code.

(g) If multiple wells have been aggregated under one registration and one or more wells under the registration will be transferred, the District will require separate registration applications from each new owner for the wells retained or obtained by that person.

(h) No person shall operate or otherwise produce groundwater from a well required under this Section to be registered with the District before:

(1) timely submitting an accurate application for registration for new wells or existing wells not exempt under Rule 2.1 by October 1, 2010, or submitting an accurate application to amend an existing registration as applicable, of the well to the District; and

(2) obtaining approval from the District of the application for registration or amendment application, if such approval is required under these Rules.

Rule 3.7 Records of Drilling, Pump Installation and Alteration Activity, and Plugging

(a) Each person who drills, deepens, completes or otherwise alters a well shall make, at the time of drilling, deepening, completing or otherwise altering the well, a legible and accurate well report recorded on forms prescribed by the District or by the Texas Department of Licensing and Regulation.

(b) Each well report required by subsection (a) of this Rule shall contain:

(1) the name and physical address of the well owner;

(2) the well driller's state license number, business address and phone number;

(3) the location of the drilled, deepened, completed or otherwise altered well, including the physical address of the property on which the well will be located, as well as the coordinates of the wellhead location, as determined by a properly functioning and calibrated global positioning system (GPS) unit;

(4) the type of work being undertaken on the well;

(5) the type of use or proposed use of water from the well;

(6) the diameter of the well bore;

(7) the date that drilling was commenced and completed, along with a description of the depth, thickness, and character of each strata penetrated;

(8) the drilling method used;

(9) the borehole completion method performed on the well, including the depth, size and character of the casing installed;

(10) a description of the annular seals installed in the well;

(11) the surface completion method performed on the well;

(12) the location of water bearing strata, including the static level and the date the level was encountered, as well as the measured rate of any artesian flow encountered;

(13) the type and depth of any packers installed;

(14) a description of the plugging methods used, if plugging a well;

(15) the type of pump installed on the well, including the horsepower rating of the pump, as assigned by the pump manufacturer;

(16) the type and results of any water test conducted on the well, including the yield, in gallons per minute, of the pump operated under optimal conditions in a pump test of the well; and

(17) a description of the water quality encountered in the well.

(c) The person who drilled, deepened, completed or otherwise altered a well pursuant to this rule shall, within 60 days after the date the well is completed, file a well report described in Subsections (a) and (b) of this Rule with the District.

(d) Not later than the 30th day after the date a well is plugged, a driller, licensed pump installer, or well owner who plugs the well shall submit a plugging report to the District.

(e) The plugging report described in Subsection (d) must be in substantially similar form to the Texas Department of Licensing and Regulation Form a004WWD (Plugging Report) and shall include all information required therein.

Rule 3.8 Transfer of Well Ownership

(a) Within 90 days after the date of a change in ownership of a new well exempt under Rule 2.1, the new well owner (transferee) shall notify the District in writing of the effective date of the change in ownership, the name, daytime telephone number, and mailing address of the transferee, along with any other contact or well-related information reasonably requested by the General Manager. The transferee may, in addition, be required to submit an application for registration of an existing well if a registration does not yet exist for the well.

(b) Within 90 days after the date of a change in ownership of a well that is not exempt under District Rule 2.1 from the water use fee payment, metering, and reporting requirements of these rules, the new well owner (transferee) shall submit to the District, on a form provided by the District staff, a signed and sworn-to application for transfer of ownership.

(c) If a registrant conveys by any lawful and legally enforceable means to another person the real property interests in one or more wells or a well system that is recognized in the registration so that the transferring party (the transferor) is no longer the "well owner" as defined herein, and if an application for change of ownership under subsection (b) has been approved by the District, the District shall recognize the person to whom such interests were conveyed (the transferee) as the legal holder of the registration, subject to the conditions and limitations of these District Rules.

(d) The burden of proof in any proceeding related to a question of well ownership or status as the legal holder of a registration issued by the District and the rights thereunder shall be on the person claiming such ownership or status. Notwithstanding anything to the contrary herein, any question of well ownership shall be determined pursuant to the laws of the State of Texas, regarding common law for real property rights in groundwater. Taking into consideration the very limited rights legislated to groundwater conservation districts, and nothing shall be construed in these Rules to effectively remove the real property right in water beneath the landowner, as well, ownership shall not be confused with water ownership under this provision, recognizing the two may be different.

(e) Notwithstanding any provision of this Rule to the contrary, no application made pursuant to Subsection (b) of this Rule shall be granted by the District unless all outstanding fees, penalties, and compliance matters have first been fully and finally paid or otherwise resolved by the transferring party (transferor) for all wells included in the application or existing registration, and each well and registration made the subject of the application is otherwise in good standing with the District.

(f) The new owner of a well that is the subject of a transfer described in this rule (transferee) may not operate or otherwise produce groundwater from the well after 90 days from the date of the change in ownership until the new owner has:

(1) submitted written notice to the District of the change in ownership, for wells described in subsection (a); or

(2) submitted to the District a completed application for transfer of ownership, for wells described in subsection (b).

A new owner of a well that intends to alter or use the well in a manner that would constitute a substantial change from the information in the existing registration or that would trigger the requirement to register the well under these Rules must also submit and obtain District approval of a registration application or registration amendment application, as applicable, prior to altering or operating the well in the new manner.

Rule 3.9 Amendment of Registration

A registrant shall file an application to amend an existing registration and obtain approval by the District of the application prior to engaging in any activity that would constitute a substantial change from the information in the existing registration. For purposes of this rule, a substantial

change includes a change that would substantially alter the size or capacity of a pump or well, a change in the type of use of the water produced, the addition of a new well to be included in an already registered aggregate system, a change in location of a well or proposed well, a change of the location of use of the groundwater, or a change in ownership of a well. A registration amendment is not required for maintenance or repair of a well if the maintenance or repair does not increase the designed production capabilities of the pump or pump systems in place as October 1, 2010.

Rule 3.10 Water Production Reports

(a) Not later than March 1 and September 1 of each calendar year beginning in 2011, the owner of any well within the District that is not exempt under Rule 2.1 must submit, on a form provided by the District, a report containing the following:

(1) the name of the registrant;

(2) the well numbers of each registered well within the District owned or operated by the registrant;

(3) the total amount of groundwater produced by each well or well system during the immediately preceding reporting period;

(4) the total amount of groundwater produced by each well or well system during each month of the immediately preceding reporting period; and

(5) the purposes for which the water was used.

(b) The report due March 1, 2011, shall report groundwater produced during the period of the immediately preceding October 1, 2010, to December 31, 2010. The report due September 1, 2011, shall report groundwater produced during the period of the immediately preceding January 1, 2011, to June 30, 2011. Beginning in 2012 and thereafter, the report due March 1 shall report groundwater produced during the period of the immediately preceding July 1 to December 31, and. the report due September 1 shall report groundwater produced during the period of the immediately preceding January 1 to June 30. To comply with this rule, the registrant of a well shall read each water meter associated with a well within 15 days before or after June 30th and within 15 days before or after December 31st each year and report the readings to the District on the form described in Subsection (a). Additionally, to comply with this rule, all applicable information required under Subsection (a) must be contained in the water production report filed with the District.

(c) The report required by Subsection (a) must also include a true and correct copy of the meter log required by District Rule 7.6.

(d) The first deadline to submit a report to the District under this Rule is:

(1) March 1, 2011, for existing wells not exempt under Rule 2.1 and for all new wells drilled on or after October 1, 2010, and prior to January 1, 2011; and

(2) no later than the first September 1 or March 1 following the expiration of 65 days from the date the well was completed for new wells drilled after January 1, 2011.

(e) Persons participating in the early fee payment incentive program under Rule 6.3 shall submit reports according to the timelines set forth under Rule 6.3 to the extent that the timelines under Rule 6.3 are in conflict with this rule.

Rule 3.11 Replacement Wells.

(a) No person may replace an existing well without first having obtained authorization for such work from the District first and, if required, by TCEQ. Authorization for the construction of a replacement well may only be granted following the submission to the District of an application for registration of a replacement well, subject to the TCEQ exclusion herein.

(b) Each application described in Subsection (a) shall include the information required under Rule 3.3(b), as well as any other information, fees, and deposits required by these rules for the registration of a new well. In addition, information submitted in the application must demonstrate to the satisfaction of the General Manager each of the following:

(1) the proposed location of the replacement well is within 50 feet of the location of the well being replaced;

(2) the replacement well and pump will not be larger in designed production capacity than the well and pump being replaced, unless the maximum designed production capacity is 40 gpm or less; and

(3) immediately upon commencing operation of the replacement well, the well owner will cease all production from the well being replaced and will begin efforts to plug the well being replaced, which plugging shall be completed within 90 days of commencing operation of the replacement well.

(c) Except as required under Subsection (d), applications for registration of replacement wells submitted under this rule may be granted by the General Manager without notice or hearing. A person may appeal the General Manager's ruling by filing a written request for a hearing before the Board. The Board will hear the applicant's appeal at the next available regular Board meeting or hearing called for that purpose, as determined by the General Manager in his discretion

(d) Notwithstanding Subsection (b)(1) of this Rule, the General Manager may authorize the drilling of a replacement well at a location that is beyond 50 feet of the location of the

well being replaced if the applicant demonstrates to the satisfaction of the General Manager that water quality, sanitation, or other issues prevent the replacement well from being located within 50 feet of the location of the well being replaced. Requests to locate a replacement well beyond 100 feet of the location of the well being replaced may be granted only by the Board.

SECTION 4.
SPACING AND LOCATION OF WELLS; WELL COMPLETION

Rule 4.1 Spacing and Location of Existing Wells.

Wells drilled prior to October 1, 2010, shall be drilled in accordance with state law in effect, if any, on the date such drilling commenced and are exempt from the spacing and location requirements of these rules to the extent that they were drilled lawfully.

Rule 4.2 Spacing and Location of New Wells.

(a) All new wells must comply with the spacing and location requirements set forth under the Texas Water Well Drillers and Pump Installers Administrative Rules, Title 16, Part 4, Chapter 76, Texas Administrative Code, unless a written variance is granted by the Texas Department of Licensing and Regulation and a copy of the variance is forwarded to the District by the applicant or registrant, and must be drilled and located in compliance with applicable rules and regulations of other political subdivisions.

(b) After authorization to drill a new well has been granted by the District, the well may only be drilled at a location that is within ten (10) yards (30 feet) of the location specified in the registration.

(c) Replacement wells must be actually drilled and completed so that they are located no more than 50 feet from the well being replaced, unless otherwise authorized by Rule 3.11(d).

(d) Compliance with the spacing and location requirements of these rules does not necessarily authorize a person to drill a well at a specified location in the District. Agencies or other political subdivisions of the State of Texas that are located in whole or in part within the boundaries of the District may impose additional requirements related to the drilling or completion of water wells.

(e) The owner and driller of a well are jointly responsible for ensuring that the well is drilled at a location that strictly complies with the location requirements of Subsection (b). If the board determines that a well is drilled at a location that does not strictly comply with the location requirements of Subsection (b), the Board may, in addition to taking all other appropriate enforcement action, require the well to be permanently closed or authorize the institution of legal action to enjoin any continued drilling activity or the operation of the well.

Rule 4.3 Standards of Completion for All Wells

(a) All wells must be completed in accordance with the well completion standards set forth under the Texas Water Well Drillers and Pump Installers Administrative Rules, Title 16, Part 4, Chapter 76, Texas Administrative Code, and under these Rules, and must be completed in compliance with applicable rules and regulations of other political subdivisions.

(b) Water well drillers shall indicate the method of completion performed on the well report.

(c) To prevent the commingling of water between the aquifers which can result in a loss of artesian (or static) head pressure or the degradation of water quality, each well penetrating more than one aquifer or subdivision thereof must be completed in a manner so as to prevent the commingling of groundwater between aquifers or between subdivisions of an aquifer if required by the Texas Water Well Drillers and Pump Installers Administrative Rules, Title 16, Part 4, Chapter 76, Texas Administrative Code. The driller shall indicate the method of completion used to prevent the commingling of water on the well report. The well driller may use any lawful method of completion calculated to prevent the commingling of groundwater.

(d) In order to protect water quality, the integrity of the well, or loss of groundwater from the well, the District may impose additional well completion requirements on any well as determined necessary or appropriate by the Board.

SECTION 5.
REGULATION OF PRODUCTION; WASTE PROHIBITED

Rule 5.1 Temporary Production Limitations.

The maximum quantity of water that a person may withdraw after October 1, 2010, from a well that is not exempt under Rule 2.1 or Rule 2.3 is the amount of water the person produces and timely:

(1) submits payment to the District for in accordance with the fee rate adopted by the District under Section 6; and

(2) reports pumpage volumes to the District under Rule 3.10.

Rule 5.2 Regular Production Limitations.

In order to accomplish the purposes of Chapter 36, Texas Water Code, and the District Act, and to achieve the goals of the District Management Plan, the District may, after notice and hearing, establish groundwater production limitations for all wells when it adopts permanent rules for the District.

Rule 5.3 Waste Prohibited.

No person shall engage in any conduct subject to the District's regulatory jurisdiction that constitutes waste, as that term is defined herein.

SECTION 6.
FEES AND PAYMENT OF FEES

Rule 6.1 Water Use Fees.

(a) A water use fee shall be established by the Board annually at least 60 days before the end of the calendar year to be applied to the groundwater pumpage in the ensuing calendar year for each well not exempt under Rule 2.1 or Rule 2.3. The Board may adjust the rate from time to time. The rate shall not exceed twenty (20) cents per 1,000 gallons of groundwater produced.

(b) Wells exempt under Rule 2.1 or Rule 2.3 shall be exempt from payment of water use fees. However, if exempt well status is withdrawn, the District may assess fees and penalties in accordance with the District Rules.

(c) No later than 60 days prior to the end of the calendar year, beginning with calendar year 2010, the District shall send by regular mail to the owner or operator of each registered well that is required to pay the water use fee a reminder statement setting forth the water use fee rate applicable to the water produced in the ensuing year, setting forth deadlines for submission of fee payments and production reports of meter readings, and other information deemed appropriate by the District.

(d) For fees applied to groundwater produced in calendar year 2012, the Board may adopt the rate schedule at any time before January 1, 2012, and shall thereafter notify by regular mail the owner or operator of each registered well that is required to pay the fee. This subsection expires on January 1, 2013.

Rule 6.2 Payment of Water Use Fees; Deadlines

Fees for water produced between January 1st and June 30th each year are due to the District by September 1 of the same calendar year; fees for water produced between July 1st and December 31st each year are due to the District by March 1 of the following calendar year. On March 1, 2011, fees will only be due for water produced between October 1, 2010 and December 31, 2010. Fee payments shall be submitted in conjunction with the Water Production Reports and monthly logs.

Rule 6.3 Early Fee Payment Incentive.

(a) A person required to pay the Water Use Fee may elect to make early payments in accordance with the provisions of this rule and receive a reduction in the payment amount due.

(b) Annual Pre-payment Option. A person who complies with the provisions of this subsection will be entitled to a discount of 10 percent off the total fees due for groundwater production in a calendar year, as specifically set forth herein.

(1) Calendar Year 2010: A well owner or operator may estimate their water use fee payment for estimated groundwater production for the October 1 to December 31, 2010, water use fee payment period and submit such estimate and water use fee payment to the District no later than October 1, 2010.

(2) Calendar Year 2011: A well owner or operator may estimate their water use fee payment for estimated groundwater production for all of calendar year 2011 and submit such estimate and water use fee payment to the District no later than March 1, 2011.

The water use fee rate applicable to the early payment under this Rule shall be a rate of 90% of the regular water use fee rate established by the Board for that calendar year. Within 15 days before or after the end of the period for which payment is submitted under this Rule, the person shall be required to take final water meter readings for the period and compare the difference in the estimated amount of water for which an early payment was submitted to the District and the actual amount of water produced during the period. If the person actually produced less water than the estimated amount and corresponding early payment submitted, the District shall provide a refund to the person within 60 days or credit the person's account with the District for the ensuing water use payment period, as set forth under Subsection (d) of this rule. If the person actually produced more water than the estimated amount and corresponding early payment submitted, the person shall submit payment for the difference to the District by March 1 of the ensuing calendar year at 100 percent of the regular water use fee rate only for that amount of water produced in excess of the early estimate submitted to the District. A person who participates in the annual pre-pay option under this subsection shall submit water production reports and monthly production records not later than March 1 of the ensuing calendar year.

(c) Notwithstanding Rule 3.4, a person who desires to participate in an early fee payment incentive must register the well with the District in accordance with Section 3 of these rules no later than the deadline under Subsection (b) for submission of the estimate and early fee payment.

(d) A person that participates in the Annual Pre-Pay Option under Subsection (b), actually produces less water that the estimate and payment submitted early, and that desires to have a refund issued rather than have the credit applied to the person's account for the

following year must submit a written request for a refund no later than March 1 of the year following the year in which the groundwater was produced. The amount of the refund due from the District to the person must be equal to or greater than $50.00, or the refund will not be granted and will instead be applied to the person's account for the ensuing year. The General Manager may rule on requests for water use fee refunds without notice, hearing, or further action by the Board. An applicant may appeal the General Manager's ruling by filing a written request for a hearing before the Board. The Board will hear the applicant's appeal at the next available Board meeting.

Rule 6.4 Well Registration Fees

The owner of any new well for which drilling commences on or after October 1, 2010, including a new well exempt under Rule 2.1, shall submit payment to the District of a $500 non-refundable well registration fee per well, which is due by the same deadline established under these rules for registration of the well. The well registration fee must be received by the District in order for the District to find a registration application administratively complete. The purpose of the well registration fee is to cover the administrative costs to the District associated with registering the well and administering the rules of the District related to the well. The amount of the well registration fee has been determined by the District to be less than the actual administrative costs to the District of registering the well and administering the rules of the District with respect to the well, even in light of anticipated revenues to be received from the Water Use Fee.

Rule 6.5 Failure to Make Fee Payments.

(a) Payments not received within 30 days following the date that Water Use Fees are due and owing to the District will be subject to a late payment fee of the greater of the following:

(1) $25.00; or

(2) ten percent (10 %) of the total amount of water use fees due and owing to the District.

(b) Persons failing to remit all water use fees due and owing to the District within 60 days of the date such fees are due shall be subject to a civil penalty not to exceed three times the amount of the outstanding water use fees due and owing, in addition to the late fee penalty prescribed in Subsection (a) of this Rule, and may be subject to additional enforcement measures provided for by these Rules or by order of the Board.

Rule 6.6 Returned Check Fee.

The District may assess a fee not to exceed $25 for checks returned to the District for insufficient funds, account closed, signature missing, or any other reason causing a check to be returned by the District's depository.

Rule 6.7 Well Report Deposit.

For all new wells and certain alterations of existing wells, as specifically described under Rule 3.5(a), the District shall assess a $200 well report deposit per well to be held by the District as part of the well registration procedures. The District shall return the deposit to the depositor if the completed well report is timely submitted to the District in accordance with these Rules. In the event the District does not timely receive the completed well report, or if rights granted within the registration are not timely used, the deposit shall become the property of the District.

Rule 6.8 Enforcement.

After a well is determined to be in violation of these rules for failure to make payment of water use fees on or before the 60th day following the date such fees are due pursuant to Rule 6.2, all enforcement mechanisms provided by law and these Rules shall be available to prevent unauthorized use of the well and may be initiated by the General Manager without further authorization from the Board.

SECTION 7.
METERING

Rule 7.1 Water Meter Required.

(a) Except as provided in Rule 7.2, the owner of a well located in the District and not exempt under Rule 2.1 shall equip the well with a flow measurement device meeting the specifications of these Rules and shall operate the meter on the well to measure the flow rate and cumulative amount of groundwater withdrawn from the well. All meters that are existing at the time of the Effective Date of these rules, and at a minimum have the ability to measure the cumulative amount of groundwater withdrawn from the well, shall be considered existing and will not have to be replaced with meters that can also measure the flow rate, provided that the meter meets all other requirements herein. Except as provided in Rule 7.2, the owner of a new or existing well not exempt under Rule 2.1 that is located in the District shall install a meter on the well prior to producing groundwater from the well after October 1, 2010.

(b) A mechanically driven, totalizing water meter is the only type of meter that may be installed on a well registered with the District unless an approval for another type of meter is applied for and granted by the District. The totalizer must not be resetable by the registrant and must be capable of a maximum reading greater than the maximum expected annual pumpage. Battery operated registers must have a minimum five-year life expectancy and must be permanently hermetically sealed. Battery operated registers must visibly display the expiration date of the battery. All meters must meet the requirements for registration accuracy set forth in the American Water Works Association standards for cold-water meters as those standards existed on the date of adoption of these Rules.

(c) The water meter must be installed according to the manufacturer's published specifications in effect at the time of the meter installation, or the meter's accuracy must be verified by the registrant in accordance with Rule 7.4. If no specifications are published, there must be a minimum length of five pipe diameters of straight pipe upstream of the water meter and one pipe diameter of straight pipe downstream of the water meter. These lengths of straight pipe must contain no check valves, tees, gate valves, back flow preventers, blow-off valves, or any other fixture other than those flanges or welds necessary to connect the straight pipe to the meter. In addition, the pipe must be completely full of water throughout the region. All installed meters must measure only groundwater.

(d) Each meter shall be installed, operated, maintained, and repaired in accordance with the manufacturer's standards, instructions, or recommendations, and shall be calibrated to ensure an accuracy reading range of 95% to 105% of actual flow.

(e) The owner of a well is responsible for the purchase, installation, operation, maintenance, and repair of the meter associated with the well.

(f) Bypasses are prohibited unless they are also metered.

Rule 7.2 Water Meter Exemption.

Wells exempt under Rule 2.1 shall be exempt from the requirement to obtain a water meter under Rule 7.1.

Rule 7.3 Metering Aggregate Withdrawal.

Where wells are part of an aggregate system, one or more water meters may be used for the aggregate well system if the water meter or meters are installed so as to measure the groundwater production from all wells included in the system. The provisions of Rule 7.1 apply to meters measuring aggregate pumpage.

Rule 7.4 Accuracy Verification.

(a) **Meter Accuracy to be Tested:** The General Manager may require the registrant, at the registrant's expense, to test the accuracy of a water meter and submit a certificate of the test results. The certificate shall be on a form provided by the District. The General Manager may further require that such test be performed by a third party qualified to perform such tests. The third party must be approved by the General Manager prior to the test. Except as otherwise provided herein, certification tests will be required no more than once every three years for the same meter. If the test results indicate that the water meter is registering an accuracy reading outside the range of 95% to 105% of the actual flow, then appropriate steps shall be taken by the registrant to repair or replace the water meter within 90 calendar days from the date of the test. The District, at its own expense,

may undertake random tests and other investigations at any time for the purpose of verifying water meter readings. If the District's tests or investigations reveal that a water meter is not registering within the accuracy range of 95% to 105% of the actual flow, or is not properly recording the total flow of groundwater withdrawn from the well or wells, the registrant shall reimburse the District for the cost of those tests and investigations within 90 calendar days from the date of the tests or investigations, and the registrant shall take appropriate steps to bring the meter or meters into compliance with these Rules within 90 calendar days from the date of the tests or investigations. If a water meter or related piping or equipment is tampered with or damaged so that the measurement of accuracy is impaired, the District may require the registrant, at the registrant's expense, to take appropriate steps to remedy the problem and to retest the water meter within 90 calendar days from the date the problem is discovered and reported to the registrant.

(b) **Meter Testing and Calibration Equipment:** Only equipment capable of accuracy results of plus or minus two percent of actual flow may be used to calibrate or test meters.

(c) **Calibration of Testing Equipment:** All approved testing equipment must be calibrated every two years by an independent testing laboratory or company capable of accuracy verification. A copy of the accuracy verification must be presented to the District before any further tests may be performed using that equipment.

Rule 7.5 Removal of Meter for Repairs.

A water meter may be removed for repairs and the well remain operational provided that the District is notified prior to removal and the repairs are completed in a timely manner. The readings on the meter must be recorded immediately prior to removal and at the time of reinstallation. The record of pumpage must include an estimate of the amount of groundwater withdrawn during the period the meter was not installed and operating.

Rule 7.6 Water Meter Readings.

The registrant of a well not exempt under Rule 2.1 must read each water meter associated with the well and record the meter readings and the actual amount of pumpage in a log at least monthly. The logs containing the recordings shall be available for inspection by the District at reasonable business hours. Copies of the logs must be included with the Water Production Report required by District Rule 3.10, along with fee payments as set forth under Section 6. Except as otherwise provided under Rule 6.3 for early payment incentive participants, the registrant of a well shall read each water meter associated with a well within 15 days before or after June 30th and within 15 days before or after December 31st each year, as applicable to the respective immediately preceding semi-annual reporting period, and report the readings to the District on a form provided by the District along with copies of the monthly logs and payment of all Water Use Fees by the deadlines set forth for fee payment under Rule 6.2.

Rule 7.7 Installation of Meters.

A meter required to be installed under these Rules shall be installed before producing water from the well on or after October 1, 2010.

Rule 7.8 Enforcement.

It is a major violation of these Rules to fail to meter a well and report meter readings in accordance with this Section. After a well is determined to be in violation of these rules for failure to meter or maintain and report meter readings, all enforcement mechanisms provided by law and these Rules shall be available to prevent unauthorized use of the well and may be initiated by the General Manager without further authorization from the Board.

SECTION 8.
INSPECTION AND ENFORCEMENT OF RULES

Rule 8.1 Purpose and Policy.

The District's ability to effectively and efficiently manage the limited groundwater resources within its boundaries depends entirely upon the adherence to the rules promulgated by the Board to carry out the District's purposes. Those purposes include providing for the conservation, preservation, protection and recharge of the groundwater resources within the District, to protect against subsidence, degradation of water quality, and to prevent waste of those resources. Without the ability to enforce these rules in a fair, effective manner, it would not be possible to accomplish the District's express groundwater management purposes. The enforcement rules and procedures that follow are consistent with the responsibilities delegated to it by the Texas Legislature through the District Act, and through Chapter 36 of the Texas Water Code.

Rule 8.2 Rules Enforcement.

(a) If it appears that a person or entity has violated, is violating, or is threatening to violate any provision of the District Rules, the Board may institute and conduct a suit in a court of competent jurisdiction in the name of the District for injunctive relief, recovery of a civil penalty in an amount set by District Rule per violation, both injunctive relief and a civil penalty, or any other appropriate remedy. Each day of a continuing violation constitutes a separate violation.

(b) Unless otherwise provided in these rules, the penalty for a violation of any District rule shall be either:

(1) $10,000.00 per violation; or

(2) a lesser amount, based on the severity of the violation, as set forth in the Enforcement Policy and Civil Penalty Schedule under Rule 8.7.

(c) A penalty under this section is in addition to any other penalty provided by law and may be enforced by filing a complaint in a court of competent jurisdiction in the county in which the District's principal office or meeting place is located.

(d) If the District prevails in a suit to enforce its Rules, the District may seek, in the same action, recovery of attorney's fees, costs for expert witnesses, and other costs incurred by the District before the court. The amount of attorney's fees awarded by a court under this Rule shall be fixed by the court.

Rule 8.3 Failure to Report Pumpage

The accurate reporting and timely submission of pumpage volumes is necessary for the proper management of water resources in the District. Failure of a well owner required by these Temporary Rules to submit complete, accurate, and timely pumpage reports may result in:

(a) the assessment of any fees or penalties adopted under Rule 8.2 for meter reading and inspection as a result of District inspections to obtain current and accurate pumpage volumes; and

(b) additional enforcement measures provided by these Rules or by order of the Board.

Rule 8.4 District Inspections.

No person shall unreasonably interfere with the District's efforts to conduct inspections or otherwise comply with the requirements, obligations, and authority provided in Section 36.123 of the Texas Water Code.

Rule 8.5 Notices of Violation.

Whenever the District determines that any person has violated or is violating any provision of the District's Rules, including the terms of any rule or order issued by the District, it may use any of the following means of notifying the person or persons of the violation:

(a) Informal Notice: The officers, staff or agents of the District acting on behalf of the District or the Board may inform the person of the violation by telephone by speaking or attempting to speak to the appropriate person to explain the violation and the Enforcement Policy and Civil Penalty Schedule referenced in Rule 8.7 herein and the steps necessary to satisfactorily remedy the violation. The information received by the District through this informal notice concerning the violation will be documented, along with the date and time of the call, and will be kept on file with the District. Nothing in this subsection shall limit the authority of the District to take action, including emergency actions or any other enforcement action, without first providing notice under this subsection.

(b) Notice of Violation: The District may inform the person of the violation through a written notice of violation issued pursuant to this rule. Each notice of violation issued hereunder shall explain the basis of the violation, identify the rule or order that has been violated or is being violated, and list specific required actions that must be satisfactorily completed—which may include the payment of applicable civil penalties—to address

each violation raised in the notice as well as the timetable to complete any remedial work or enforce the penalty. Notices of violation issued hereunder shall be tendered by a delivery method that complies with District Rule 1.7. Nothing in this rule subsection shall limit the authority of the District to take action, including emergency actions or any other enforcement action, without first issuing a notice of violation.

(c) Compliance Meeting: The District may hold a meeting with any person whom the District believes to have violated, or to be violating, a District Rule or District order to discuss each such violation and the steps necessary to satisfactorily remedy each such violation. The information received in any meeting conducted pursuant to this rule subsection concerning the violation will be documented, along with the date and time of the meeting, and will be kept on file with the District. Nothing in this rule subsection shall limit the authority of the District to take action, including emergency actions or any other enforcement action, without first conducting a meeting under this subsection.

Rule 8.6 Show Cause Hearing.

(a) Upon recommendation of the General Manager to the Board or upon the Board's own motion, the Board may order any person that it believes has violated or is violating any provision of the District's Rules a District order to appear before the Board at a public meeting called for such purpose and show cause why an enforcement action, including the initiation of a suit in a court of competent jurisdiction, should not be pursued by the District against the person or persons made the subject of the show cause hearing.

(b) No show cause hearing under subsection (a) of this Rule may be held unless the District first serves, on each person to be made the subject of the hearing, written notice not less than 20 days prior to the date of the hearing. Such notice shall include the following:

1. the time and place for the hearing;

2. the basis of each asserted violation; and

3. the rule or order that the District believes has been violated or is being violated; and

4. a request that the person cited duly appear and show cause why enforcement action should not be pursued.

(c) The District may pursue immediate enforcement action against the person cited to appear in any show cause order issued by the District where the person so cited fails to appear and show cause why an enforcement action should not be pursued.

(d) Nothing in this rule shall limit the authority of the District to take action, including emergency actions or any other enforcement action, against a person at any time regardless of whether the District holds a hearing under this Rule.

Rule 8.7 Enforcement Policy and Civil Penalty Schedule.

(a) General Guidelines.

When the General Manager discovers a violation of the District Rules that either (1) constitutes a Major Violation, or (2) constitutes a Minor Violation that the General Manager is unable to resolve within 60 days of discovering the Minor Violation, the General Manager shall bring the Major Violation or the unresolved Minor Violation and the pertinent facts surrounding it to the attention of the Board. Violations related to water well construction and completion requirements shall also be brought to the attention of the Board.

The General Manager shall recommend to the Board of Directors an appropriate settlement offer to settle the violation in lieu of litigation based upon the Civil Penalty Schedule set forth below. The Board may instruct the General Manager to tender an offer to settle the violation or to institute a civil suit in the appropriate court to seek civil penalties, injunctive relief, and costs of court and expert witnesses, damages, and attorneys' fees.

(b) Minor Violations.

The following acts each constitute a minor violation:

1. Failure to timely file a registration on a new well that qualifies for an exemption under Rule 2.1.

2. Failure to conduct a meter reading within the required period.

3. Failure to timely notify District regarding change of ownership.

4. Failure to timely file a Well Report.

5. Failure to timely submit required documentation reflecting alterations or increased production.

6. Operating a meter that is not accurately calibrated.

CIVIL PENALTY SCHEDULE FOR MINOR VIOLATIONS

First Violation:	**$50.00**
Second Violation:	**$100.00**
Third Violation:	**Major Violation**

A second violation shall be any minor violation within 3 years of the first minor violation. A third violation shall be any minor violation following the second minor violation within 5 years of the first minor violation. Each day of a continuing violation constitutes a separate violation.

(c) Major Violations.

The following acts each constitute a major violation:

1. Failure to register a well where mandated by rules, including drilling, equipping, completing, altering, or operating a well without a compliant and approved registration.

2. Failure to timely meter a well when required.

3. Drilling a well in violation of spacing or location requirements.*****

4. Failure to close or cap an open or uncovered well.

5. Failure to submit Water Use Fees within 60 days of the date the fees are due.******

6. Committing waste.

CIVIL PENALTY SCHEDULE FOR MAJOR VIOLATIONS

First Violation:	**$250.00**
Second Violation:	**$500.00**
Third Violation:	**Civil Suit for injunction and damages**

A second violation shall be any major violation within 3 years of the first major violation of the same level. A third violation shall be any major violation following the second major violation within 5 years of the first major violation. Each day of a continuing violation constitutes a separate violation.

***** In addition to the applicable penalty provided for in the Civil Penalty Schedule for Major Violations, persons who drill a well in violation of applicable spacing requirements may be required to plug the well.

****** In addition to the applicable penalty provided for in the Civil Penalty Schedule for Major Violations, persons who do not submit all Water Use Fees due and owing within 60 days of the date the fees are due will be assessed a civil penalty equal to three times the total amount of outstanding Water Use Fees that are due and owing.

(d) Water Well Construction and Completion Requirements.

Failure to use approved construction materials: $250 + total costs of remediation
Failure to properly cement annular space: $500 + total costs of remediation

In addition to the civil penalties provided for in this schedule, persons who drill a well in violation of applicable completion requirements may be required to recomplete or reconstruct the well in accordance with the District's rules, or may be ordered to plug the well.

(e) Other Violations of District Rules Not Specifically Listed Herein.

Any violation of a District Rule not specifically set forth herein shall be presented to the Board of Directors for a determination of whether the violation is Minor or Major, based upon the severity of the violation and the particular facts and issues involved, whereupon the procedures and the appropriate civil penalty amount set forth herein for Minor and Major Violations shall apply to the violation.

SECTION 9.
OTHER DISTRICT MANAGEMENT ACTIONS AND DUTIES

Rule 9.1 District Management Plan.

Following notice and hearing, the District shall adopt a comprehensive Management Plan. The District Management Plan shall specify the acts and procedures and performance and avoidance measures necessary to prevent waste, the reduction of artesian pressure, or draw-down of the water table. The District shall use the Rules to implement the Management Plan. The Board must review the Management Plan at least every five years. If the Board considers a new Management Plan necessary or desirable based on evidence presented at a hearing, a new Management Plan will be developed and adopted. A Management Plan, once adopted, remains in effect until the subsequent adoption of another Management Plan.

SECTION 10.
EFFECTIVE DATE

Rule 10.1. Effective Date.

These Rules take effect on March 11, 2010, which was the date of their original adoption. An amendment to these Rules takes effect on the date of its original adoption. It is the District's intention that the rules and amendments thereto be applied retroactively to activities involving the production and use of groundwater resources located in the District, as specifically set forth in these Rules.