Regional Water Supply and Facilities Planning Study

Parker and Wise Counties

DRAFT

Upper Trinity Groundwater Conservation District

Regional Water Supply and Facilities Planning Study

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TO THE READER

The Upper Trinity Groundwater Conservation District (UTGCD) was formed to help protect and manage the groundwater within the Northern Trinity Aquifer. Through the registration of wells, education and outreach to citizens, and cooperation with local government, we seek to maintain accessible and clean water for generations to come. We aim to respect and protect the property rights of landowners and operate the UTGCD in a manner that is fair and equitable to all residents in the district.

From the very first days of its existence the UTGCD has taken a proactive position on protecting the quality and the quantity of the groundwater resource within its boundaries. It is for this reason that we have spearheaded a Regional Water Supply and Facilities Planning Study focusing specifically on developing an implementable, future water supply solution for the growing demands within Parker and Wise counties. Today the population within these counties is experiencing significant growth; however, there continues to be a growing reliance on the already strained groundwater supplies. Much of the population growth in Wise and Parker counties presently rely wholly or partially on groundwater wells pumping water from the Northern Trinity Aquifer. The availability of groundwater resources from the aquifer to meet the growing water supply demands within this area is and will remain limited.

UTGCD, along with water providers and community leaders in both Parker and Wise counties, are charged with the task of supporting a rapidly growing region in need of a safe, reliable water supply. A cultural shift towards water efficiency is vital since new water supply sources can take many years to plan, permit and develop. While there are many obstacles to overcome, we are committed to our mission to support the lives that reside within our community. This study aims to summarize the issues the counties face while highlighting possible water supply options to preserve the quality of life for both existing and future residents.

Sincerely,

Doug Shaw, General Manager

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AF ..... Acre-Feet

AFY ..... Acre-Feet per Year

ASR ..... Aquifer Storage and Recovery

CCN ..... Certificate of Convenience and Necessity

DFC ..... Desired Future Condition

EPA ..... Environmental Protection Agency

ETJ ..... Extra-Territorial Jurisdiction

FNI ..... Freese and Nichols, Inc.

FWSD ..... Fresh Water Supply District

GAM ..... Groundwater Availability Model

GAC ..... Groundwater Availability Certification

GCD ..... Groundwater Conservation District

GPCD ..... Gallons per Capita Day

GPD ..... Gallons per Day

GPM ..... Gallons per Minute

GWTF ..... Groundwater Treatment Facility

IOU ..... Investor-Owned Utility

MAG ..... Modeled Available Groundwater

MCL ..... Maximum Contaminant Level

MGD ..... Million Gallons per Day

MSL ..... Mean Sea Level

MUD ..... Municipal Utility District

NCTCOG .... North Central Texas Council of Governments

PES ..... Post Enumeration Survey

PUC ..... Public Utility Commission

PWS ..... Public Water System

RA ..... River Authority

RWPG ..... Regional Water Planning Group

SUD ..... Special Utility District

TAC ..... Texas Administrative Code

TCEQ ..... Texas Commission on Environmental Quality

TDC ..... Texas Demographic Center

TDS ..... Total Dissolved Solids

TRA ..... Trinity River Authority

TRWD ..... Tarrant Regional Water District

TWDB ..... Texas Water Development Board

TWSBV ..... Texas Water Service Boundary Viewer

USACE ..... United States Army Corps of Engineers

USGS ..... United States Geological Survey

UTGCD ..... Upper Trinity Groundwater Conservation District

WCID ..... Water Control and Improvement District

WCSUD ..... Walnut Creek SUD

WSC ..... Water Supply Corporation

WTP ..... Water Treatment Plant

WUG ..... Water User Group

WWP ..... Wholesale Water Provider

WWTP ..... Wastewater Treatment Plant

1

PROJECT BACKGROUND

Bridgeport Reservoir

CHAPTER AT-A-GLANCE

Highlights of Chapter 1 include:

1. Project Background and Goals of the Study
2. Types of Water Users within Study Area
3. Main Issues

1.00 Project Background

The mission of the Upper Trinity Groundwater Conservation District (UTGCD or District) is to develop rules to provide protection to existing wells, prevent water waste, promote conservation, provide a framework that will support availability and accessibility of groundwater for future generations, protect the quality of the groundwater in the recharge zone of the aquifer, ensure that the residents of Montague, Wise, Parker and Hood Counties maintain local control over their groundwater, respect and protect the property rights of landowners in groundwater, and operate the District in a fair and equitable manner for all residents of the District. UTGCD commissioned this study to evaluate future water supply solutions for growing demands specifically within Parker and Wise counties.

In 1999, the Cities of Willow Park, Aledo, Hudson Oaks, and Parker County, with grant funding by the Texas Water Development Board (TWDB), completed a *Southeastern Parker County Regional Water Study* that explored options available for providing water to southeastern Parker County during the then next 30 years. The study concluded, in part, that **"the longer term continued use of well water is probably not reliable due to overmining of the aquifer as a result of population growth"**. Today the population continues to experience significant growth, particularly within Parker and Wise Counties. The *2021 Region C Water Plan* projects significant population growth over the next 50 years within this region of the state. Much of the population growth in Parker and Wise counties presently relies wholly or partially on groundwater wells pumping water from the Northern Trinity Aquifer. This is particularly true for rural users who have more limited options.

The availability of groundwater resources from the Northern Trinity Aquifer to meet the growing water supply demands within this area is and will remain limited. In response, the *2021 Region C Water Plan* identifies expanded development and delivery of raw or treated surface water from various sources as the primary water management strategies to meet that increase in demand at a capital cost of approximately $650 million. However, the plan is vague regarding the implementation and sponsor of the strategies, and in some instances the plan lacks specificity as to the source of surface water.

The 2020 Census data also shows greater population growth in these two counties than projected in the *2021 Region C Water Plan*. This growth is occurring in the rural communities that are not well defined in the regional planning process. The development of water supplies in the two counties continues to follow the historical pattern of drilling additional groundwater wells in the Northern Trinity Aquifer—either through additional public water system wells or individual water wells. This cannot be sustained indefinitely considering the projected increases in water demand in the two counties. Although the state planning process shows some availability of groundwater based on the use of groundwater modeling, the reality is that water levels in the aquifer and well yields are declining. Also, the groundwater availability is dependent on the characteristics of the aquifer and varies across the study area. Some areas with higher demands are located where there is less groundwater available. These challenges with groundwater have led several public water providers to invest in converting from groundwater to surface water to meet the growing demands. One such example includes the City of Aledo. The City grew over 203% from 2000 and is growing faster than a majority of similarly sized cities. Originally the City's water source came only from self-supplied groundwater however they began purchasing treated water supplies from the City of Fort Worth in 2013. There are similar areas, such as the City of Brock and south of the City of Rhome, that are expected to grow as rapidly as the City of Aledo.

This study includes (1) an assessment of population projections and associated water demands within the study area, (2) the assessment of current water supplies (3) review of previously identified water management strategies, and (4) the assessment of new water management strategies and regional facilities to facilitate water supply distribution to rural communities. New water management strategies include the evaluation of the feasibility of the construction of a new reservoir within the study area.

1.01 Goals

As Parker and Wise Counties become more populated, water supply continues to be a major concern for local residences as well as the agencies responsible for protecting this limited resource. In the rural portions of the counties, many of the residents receive their water supplies through individual, privately owned wells. As population continues to grow and the density of wells increases in these rural areas, the reliability of these groundwater supplies decreases. ***The primary goals of this study are to understand the demands within the study area, evaluate***

future water supply solutions, and propose a potential implementation guide for a more sustainable future. Please note that the recommendations within this study are subject to several factors and will require stakeholder involvement to move forward. The water development approaches discussed within this plan are only recommendations and wholesale water providers and water users are under no obligation to adhere to the suggested implementation guide.

1.02 Types of Water Users

There are several types of municipal water users within Parker and Wise Counties. To better understand the issues and develop a path forward it is important to understand the authority, responsibilities, and restrictions of each. Water systems can be broken down into three categories: (1) Publicly Owned Water Systems (2) Investor-Owned Utilities and (3) Rural Water Users. Both publicly owned water systems and investor-owned utilities are considered public water systems. A public water system is defined as a water user that provides potable water for the public's use and is a certain size (must have at least 15 service connections or serve at least 25 individuals at least 60 days out of the year). Public water systems are monitored and must adhere to certain state and federal drinking water quality and quantity standards whereas rural water users do not and are largely unregulated.

A. Publicly Owned Water Systems

Publicly owned water systems include municipal water suppliers, water districts and water service corporations.

1. Municipal Water System

A municipal water system is a public water system owned by a city, village, county, town, town sanitary district, utility district, public inland lake and rehabilitation district, municipal water district or a federal, state, county or municipal owned institution for congregate care or correction, or a privately owned water utility. Municipal water suppliers provide water to city residents and oftentimes to communities surrounding the city. Municipalities are political subdivisions with elected governing bodies responsible for setting the rates and service policies for the provision of retail water and sewer service to customers. The Public Utility Commission (PUC) has appellate jurisdiction over customers living outside the city limits receiving retail water or sewer service from a city. A city may surrender its jurisdiction over investor-owned utilities located inside the city limits to the PUC. Municipal water suppliers are operated and established by the city government and set the water rates for their customers. Within city limits, city councils oversee the municipal water system and elected officials are responsible for acting in the best interest of their constituents, including the setting of appropriate water rates. Municipal water supplier projections are generally based on more detailed planning information such as master plans, impact fee reports, and/or feedback from city staff.

2. Water District

A water district is a local governmental entity that provides limited services to its customers and residents, depending on the type of district. Water districts are created through general law by either the TCEQ or a county commissioners court. Through special law, a district can be created or altered by an act of the Texas Legislature. The most common types of districts that provide services to residential customers are municipal utility districts (MUDs), water control and improvement districts (WCIDs), fresh water supply districts (FWSDs), special utility districts (SUDs), and river authorities (RAs).

- **WCIDs** – Water control and improvement districts have broad authority to supply and store water for domestic, commercial, and industrial use; operate sanitary wastewater systems; and provide irrigation, drainage, and water-quality services.
- **MUDs** – MUDs provide water, wastewater, drainage, and other services within the district's boundaries. These other services can include water conservation, irrigation, firefighting, solid-waste collection and disposal, and recreational facilities.
- **SUDs** – SUDs provide water, wastewater, and firefighting services.
- **FWSDs** – FWSDs manage fresh water supply in a defined area. They may be created to conserve, transport, and distribute fresh water from any sources for domestic and commercial purposes.
- **RAs** – River authorities are political subdivisions of the state government that have the power to conserve, control, and distribute the waters of a designated geographic region.

Water districts essentially provide services in areas not in a city, where a city cannot afford to extend these services itself and/or where the city wants the new development to bear the costs of the new infrastructure for the development. Water Districts can incur debt, charge for services, and adopt rules for those services, enter contracts, obtain easements, exercise eminent domain and some districts can also levy taxes.

The PUC has appellate jurisdiction over the water, sewer, and drainage fees charged by a district to its customers (both inside and outside the district's boundaries). The TCEQ is responsible for general supervision and oversight of water and sewer utility districts and river authorities. TABLE 1 summarizes some of the major differences between each type of water district.

TABLE 1: DISTRICT TYPES

Water District Type	Use and Purpose	Created By	Board Members	Levy Taxes	Right to Own, Operate & Maintain Facility	Debt Issuance	Debt Repayment	Eminent Domain
Municipal Utility District	Reclamation, Drainage, Irrigation, Preservation	TCEQ & Election of Members	Elected	Yes	Yes	Yes	Taxes & Service Fees	Yes
Special Utility District	Water Utility	Resolution of Water Supply Corp. and TCEQ Approval	Elected	No	Yes	Yes	Service Fees	Yes
General Law District	Water & Wastewater	TCEQ	Elected	Yes	Yes	Yes	Taxes & Service Fees	Yes
Special Law District	Water & Wastewater	Legislative Act	Elected or Appointed	Yes or No	Yes	Yes	Taxes and/or Service Fees	Yes
Public Utility Agency	Wastewater	Ordinance of Participating Entities	Appointed	No	Yes	Yes	Service Fees	Yes
Water Improvement District	Irrigation, Drainage, Water Supply	Consumers Court & Election	Elected	Yes	Yes	Yes	Taxes & Service Fees	Yes

3. Water Supply Corporation

Water supply corporations are non-profit, member-owned and member-controlled corporations organized under Chapter 67 of the Texas Water Code. WSCs are subject to the laws and regulations governing the operations of non-profit corporations. The operation of a WSC is the responsibility of its elected board of directors where directors are elected by the corporation's members. The PUC issues CCNs that grant the right and the obligation to provide retail water or sewer utility service in a specified geographic boundary or service area. Texas Law requires WSCs to obtain a CCN to lawfully provide retail water or sewer service to customers for a fee. A WSC can be converted to a SUD by either the TCEQ or the Texas Legislature. Once a WSC has approval to convert to a SUD, a confirmation election is held. If the election is successful, the SUD must submit evidence of the successful election to the TCEQ and PUC and then the SUD is created.

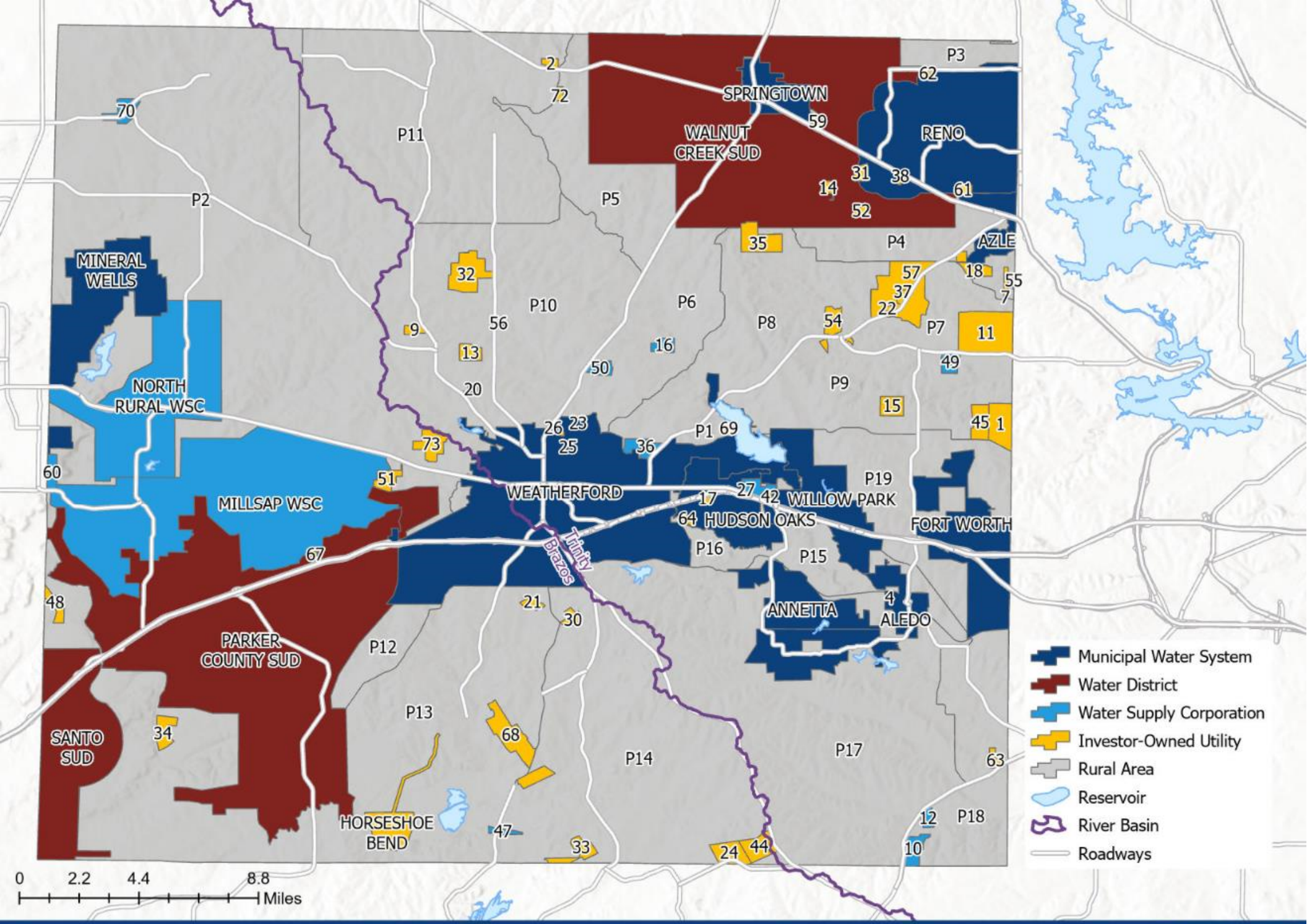
B. Investor-Owned Utilities (IOUs)

IOUs are private enterprises acting as public utilities. Privately owned water systems must adhere to state and federal drinking water quality standards however they do operate for profit. Privately owned utilities do not elect their utility's decision makers and rates and customer service practices are regulated by the PUC. PUC has jurisdiction over rates and service policies of IOUs outside the corporate limits of a city. Inside the corporate limits of a city, the city has jurisdiction to set the IOU's rates, unless the city has surrendered its jurisdiction to the PUC. IOUs set rates that cover their regular expenses while also allowing for the opportunity to earn a reasonable rate of return on their investment without undercharging or overcharging customers.

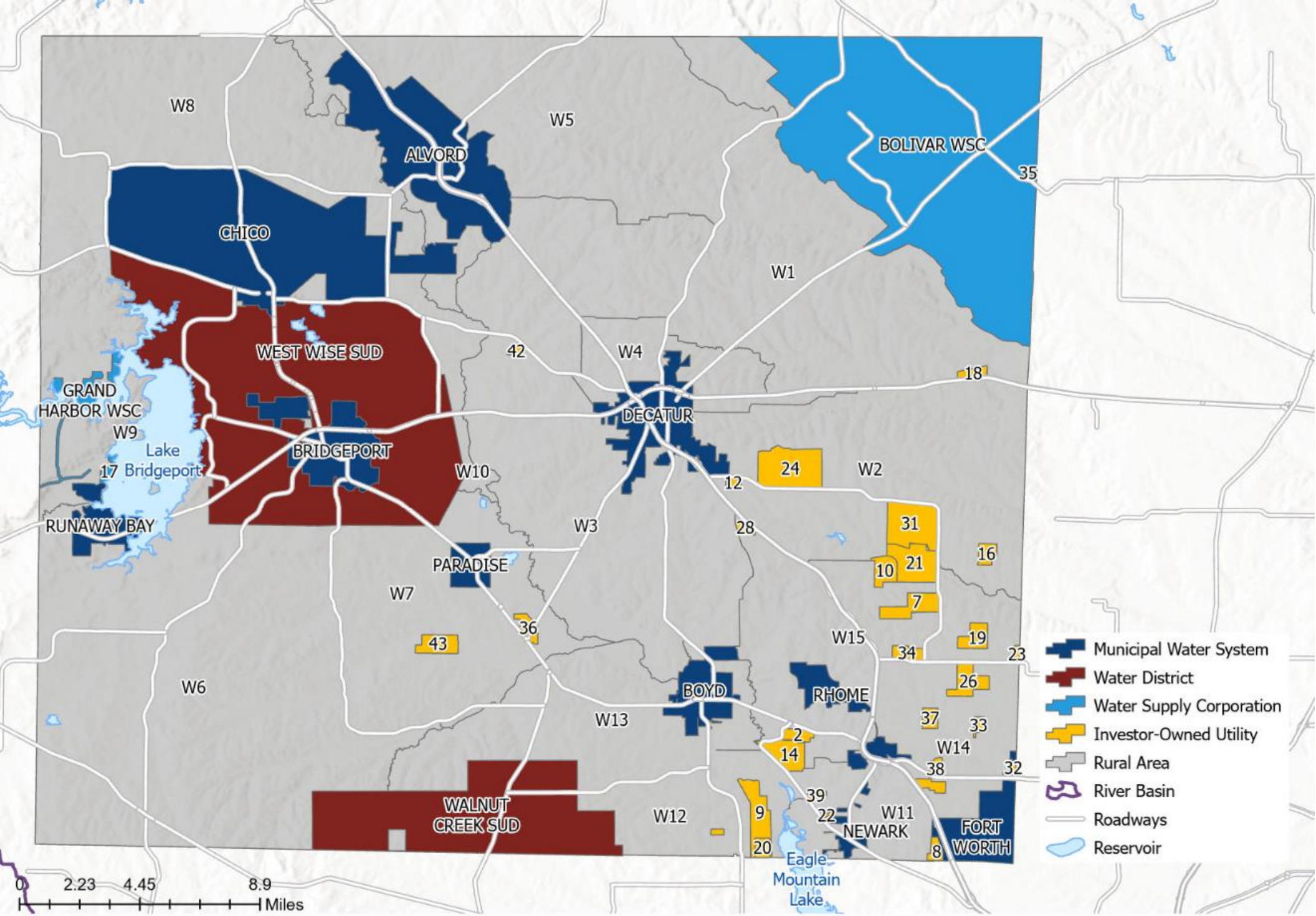
C. Rural Water Users

A large portion of the population within both Parker and Wise Counties do not reside within the service areas of a publicly owned water system or an investor-owned utility. These rural communities depend solely on privately owned groundwater wells. In Texas, groundwater is governed by the modified rule of capture, which grants landowners the right to capture the water beneath their property subject to the regulations of a groundwater conservation district. The landowners do not own the water but have a right to pump and capture whatever water is available, regardless of the effects of that pumping on neighboring wells. As the population continues to grow, new demand is being placed on the aquifer which strains groundwater supplies for existing water users. There is no guarantee that the quantity of water desired will be accessible. Additionally, private water wells are largely unregulated. For domestic water well owners there are no federal or state requirements for monitoring drinking water quality as there are for public water supply systems. There are no requirements for treatment and no "right to know" reports that inform well owners of the quality of their drinking water. While proper well practices are crucial, they are left fully in the hands of the landowner.

A map showing the types of water users is shown in FIGURE 1 and FIGURE 2.



Parker County Water Users



Wise County Water Users

Esri, NASA, NGA, USGS

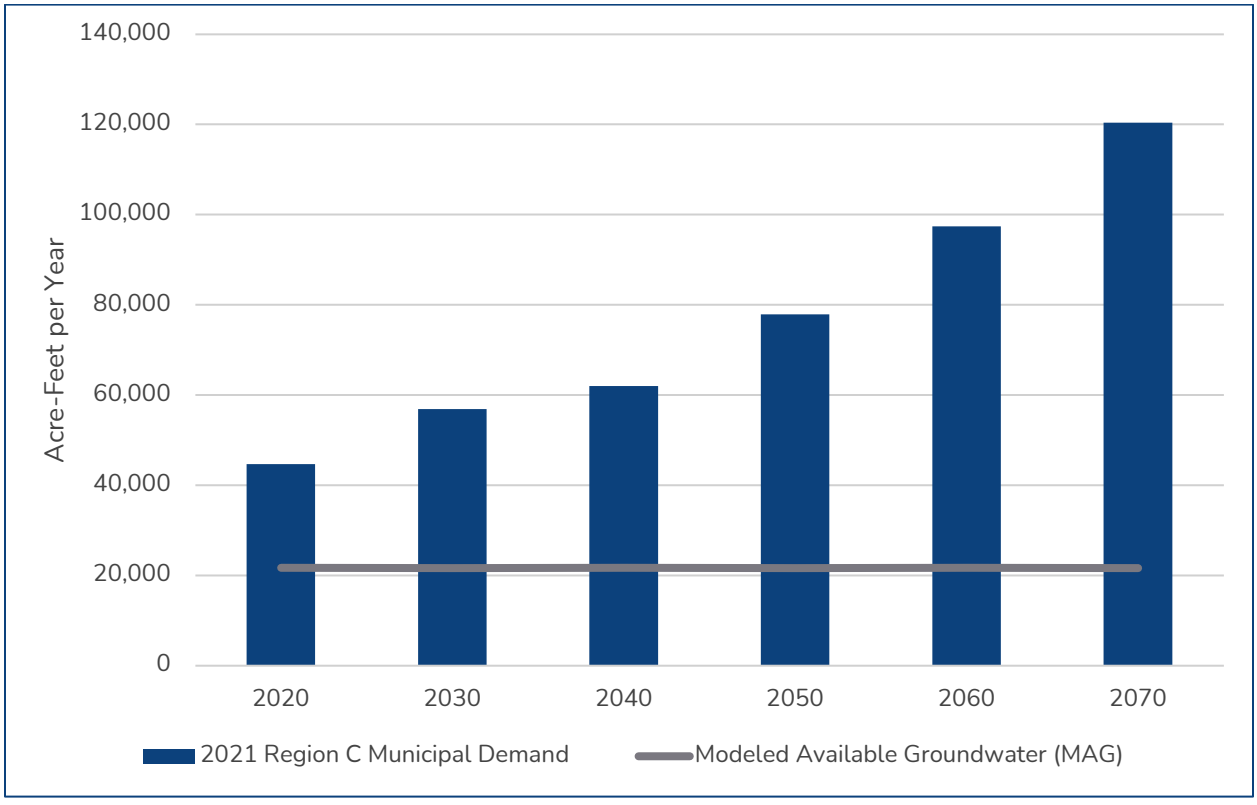
1.03 Issues

The following sections summarize the main water supply issues identified and the input received during this study. While each issue is important, the issues overlap and often affect each other. The most pressing issues identified are described below. ***If these issues are not addressed, a lack of reliable water supplies will impact Parker and Wise County growth and economic development.***

A. Unsustainable Demand on Groundwater

There is a limited supply of groundwater available to water users within Parker and Wise Counties. FIGURE 3 shows the total municipal demands from the *2021 Region C Regional Water Plan* versus the modeled available groundwater (MAG) within the study area. A MAG is essentially the amount of groundwater production, on an average annual basis, that will achieve a desired future condition (DFC). A DFC is the desired, quantified condition of groundwater resources (i.e., water levels or volumes) within a groundwater management area at one or more specified future time as defined by the groundwater conservation district. These DFCs might not be achieved if pumping quantities exceed the MAG volume over a period. As a part of the regional planning process, existing supplies and planned future groundwater supplies are not allowed to exceed the MAG. By 2070 the municipal demands within Parker and Wise Counties are projected to be over five times the combined MAG. Higher growth rates than shown in the *2021 Region C Water Plan* will only further increase the projected groundwater deficit.

FIGURE 3: MUNICIPAL DEMAND VERSUS MODELED AVAILABLE GROUNDWATER



The long term continued use of groundwater is not reliable due to overmining of the aquifer and projected demands. As more developments are constructed that rely on groundwater alone, the demand on the limited resource increases. Excessive demand leads to a decrease in the reliability of both existing and new wells. Over time, groundwater users will either need to drill deeper and costlier wells, find alternative sources, or move. Issues that well owners face include:

- Lower water levels due to well interference, mining of storage, and reduced recharge,
- Reduced pumping capacity, and
- Poorer water quality.

The UTGCD established well spacing requirements to try to limit the off-property impacts of new wells to existing registered wells and adjoining landowners. However, UTGCD has compiled historical water level and other data for wells within both Parker and Wise Counties and has found that wells located in more populated areas with higher groundwater demands continue to show a negative trend for historical water levels even with the current restrictions.

Key Takeaways

- *There is a limited supply of groundwater available to water users within Parker and Wise Counties.*
- *As demand increases groundwater users will continue to face lower water levels, reduced pumping capacity and poorer water quality.*
- *The UTGCD has implemented measures to address declining water levels and well interference, but it is not enough considering the projected future demands on the aquifer.*

B. Little Incentive to Connect to Public Water Supply Systems

Many rural water users depend on private wells. Historically, it has been less expensive to build individual wells than connect to a public water supply system. However, developers don't guarantee the reliability of well supplies after construction. It was relayed that in one instance, instead of connecting to a public water system less than a mile away, developers chose to drill wells due to cost savings. This same development is now having serious water quality and quantity issues. Many of the homeowners had to install costly advanced treatment systems, which ultimately cost more than if the developers connected to the public water system initially. These same users have also reported reduced pumping capacity.

Not belonging to a public water supply system is advantageous to the homeowner because there are no water use fees or limitations on use. Since private wells are not required to adhere to state and federal drinking water regulations, water quality testing is left solely as the responsibility of the individual well owner. Some rural users are unaware of the testing that should be done to ensure that the water is safe to drink. Some individuals within the study area

were unaware that the water they were drinking was contaminated until their livestock began to fall ill.

Additionally, because there is no limitation on use beyond what can be pumped and costs are minimal, there is little incentive to conserve water. When water users belong to a public water system, the state requires that the system have a water conservation and drought contingency plan in place. The purpose of a water conservation plan is to ensure water user efficiency within the public water system and a drought contingency plan focuses on procedures to enable public water systems to provide adequate water during prolonged drought. Both are necessary to ensure that communities are being good stewards of water supplies as a vital resource. A public water system can also call for watering restrictions given an emergency such as a fire.

Key Takeaways

- *There is little incentive for developers to connect to existing public water supply systems.*
- *Rural water users that do not belong to a public water supply system are solely responsible for ensuring that their water meets drinking water quality standards.*
- *There is little incentive to conserve groundwater supplies outside of a public water supply system even during drought or emergency situations .*
- *Developers do not guarantee reliability of private wells after construction.*

C. Difficulties Connecting to Existing Infrastructure

Although several public water supply systems have transitioned to surface water supplies, there is limited transmission infrastructure within the more rural parts of the study area. This lack of infrastructure has historically made it economically infeasible for new developments to connect to existing water systems. Due to the ease of decertification and current requirements for municipal annexation, water suppliers are also more reluctant to expand their existing infrastructure without some level of assurance that there will be an ability to recoup costs. Although it is possible to consider providing water on a wholesale basis, it will be challenging for several water suppliers to provide retail water to rural areas without significant infrastructure improvements. Several of the larger water suppliers within the study area recognize that it isn't feasible for developers to extend water service from an entity's existing infrastructure to their own. Other growth within the study area, such as school districts, is also affected by the inability to connect to reliable water supplies.

Key Takeaways

- *Some non-rural water users have begun to transition to surface water due to unreliable groundwater supplies.*
- *There is a reluctance of water providers to provide water service outside of their CCN.*
- *There is a need to develop a strategic approach to infrastructure development to reach rural water users.*
- *Connecting to existing infrastructure is costly.*

D. Limited Alternate Supplies Available

There are limited water supplies that are currently accessible to the study area. Surface water supplies within the study area are limited to Lake Weatherford, Bridgeport Reservoir, and local supplies/river diversions. Several water suppliers agreed that shifting from groundwater to surface water within the study area is likely the only way to continue current development patterns without negatively impacting existing groundwater wells. Development of any additional supply will require both treatment, transmission, and storage infrastructure. Additionally, Parker County is split between the Trinity and Brazos river basins which can complicate service from surface water providers that may be reluctant to provide water outside of their service area drawn along basin boundaries. Neither the City of Fort Worth nor the City of Weatherford currently has the resources or interest to serve the rural communities within the study area. Additionally, much of the raw water sources near the study area are controlled by TRWD and are utilized to meet both current local customer and system demands. Purchasing supplies from Weatherford is also limited since the contract between TRWD and the City does not allow them to resell TRWD raw water. Even if raw water can be obtained and transported to the areas in need, the issue remains as to how the water will be treated and distributed.

Key Takeaways

- *The shift from groundwater to surface water is vital to support the continued growth of Parker and Wise counties.*
- *Surface water supplies from outside of the study area will need to be utilized to meet the growing demands.*

E. Funding

Development of necessary infrastructure to support the growing water demands of the study area will require funding. The availability of funding is a significant issue for many of the water suppliers. It will be particularly important for water suppliers within the study area to continue to work closely with the state's regional water planning process to ensure that the appropriate water management strategies are recommended within the regional and state water plans so that the projects can be eligible for SWIFT funding administered by TWDB. The study area is in

the Region C water region created by the 1997 Senate Bill 1 for water planning and drought response.

Generally, most of the cities and towns do not have a dedicated water utility workforce capable of running a surface water treatment plant. This would mean that operating a water treatment plant would be a large step for many of these cities. Additionally funding the development of treatment facilities and dedicating staff can be steep. Most water users within the area would currently prefer to purchase wholesale treated water supplies. These water users, however, would still be responsible for upgrading and maintaining their own transmission system.

Key Takeaways

- *Acquiring funding will be a vital step towards expanding existing infrastructure.*
- *Assisting smaller entities with the funding application process could facilitate necessary improvements to secure water supplies.*

F. Culture Shift

Conservation of water supplies is inherently more enforceable when a home is connected to a water system. There are no limits to how much groundwater is used by exempt wells (which includes private municipal use wells). Summer of 2022 was a very hot and dry summer for much of Texas and several water suppliers within the study area had to enforce drought restrictions. These restrictions did not apply to private well owners. Discussions with developers also relayed that there was not much of an incentive to them to include water conservation measures within the homes and communities they are developing. It was relayed that the homeowners did not view these as incentives to purchase the home. There is an issue when the public is unaware of how tenuous the future of water supplies is within the study area. It would be beneficial to encourage a cultural shift within the community before a crisis forces one. Education is key to conveying this message. Conservation of groundwater sources could potentially delay the need for new surface water supplies.

Key Takeaways

- *Conservation is vital to the protection of water supplies and only enforceable when municipal use is connected to a water supply system.*
- *Protecting Texas's natural resources is an effort that spans from private homeowners to large public water suppliers.*

G. Groundwater Conservation District Limitations

Groundwater conservation districts are the only entities in the state with the specific responsibility to manage vital groundwater resources and safeguard the natural resource for future generations. However, their authority is limited in the case of exempt wells and many

domestic wells. Under the Texas Constitution, Article III, Section 52 or Article XVI, Section 59, the GCD has the authority to regulate the spacing of water wells, the production from water wells, or both. These requirements are developed by the GCD to limit off-property impacts of new wells to existing registered wells and adjoining landowners. Historically changes to these spacing requirements have been met with significant pushback despite the stress on groundwater supplies. Even with the current limitations in place, the groundwater demand is leading to declining groundwater levels as evidenced by the UTGCD's observation wells.

Key Takeaways

- *GCDs are limited in what they can do to protect groundwater supplies.*
- *Historically, there has been pushback when updates to spacing requirements or production limits have been proposed to conserve groundwater supplies.*

2 DEMAND PROJECTIONS

Downtown Weatherford

CHAPTER AT-A-GLANCE

Highlights of Chapter 2 include:

1. Methodology
2. Parker County Projections
3. Wise County Projections

2.00 Population and Demand Projections

FNI summarized and assessed the 50-year water demands of Parker and Wise Counties on a decadal basis. Projections encompass 2030-2080 which coincides with the planning period covered in the current cycle of the state's regional water planning process.

The demand projections included in this report are dry year average annual demands. Dry year demands are typically 10% or more higher than normal year demands.

2.01 Methodology

A. Step One – Gather Data

FNI gathered historical and available data from several different sources. FNI coordinated with the District to send out a data request/survey to water suppliers within Parker and Wise Counties. The survey was sent to over 50 individual water suppliers and there was a response rate of ~38%. Data requested included planning reports, population demand projections, water service area boundaries, existing infrastructure, and other information as deemed applicable. A copy of the survey that was sent out is included in **Appendix A**. In addition, individual meetings were held with select water providers and developers. Those met with included the following:

- Brazos River Authority
- City of Fort Worth
- City of Rhome
- City of Weatherford
- City of Willow Park
- Parker County SUD
- Tarrant Regional Water District

- Upper Trinity Regional Water District
- Walnut Creek SUD
- West Wise SUD
- Wise County Stakeholders

Information on new developments and demands was considered in the projections. Other information used to inform draft population and demand projections included:

- Population and demand projections from the *2021 Region C Regional Water Plan* (note: while the name may suggest otherwise, the population and water demand for the *2021 Regional Water Plan* are finalized much earlier in the process and have not been updated since 2017). Draft projections for the *2026 Region C Regional Water Plan* were released January 2023.
- Population from the 2020 U.S. Census
- Historical population and demand information from the TWDB Water Use Surveys
- Historical demand information from UTGCD well production reports

Each large public water system is individually planned for as part of the state's regional planning process. As part of this process, the State Demographer develops county level population projections that are distributed among the public water systems and unincorporated/rural communities. These projections are given the opportunity to be reviewed by each public water system and adjusted to reflect the best available data within certain limitations. Historically the unincorporated/rural communities are not adjusted and reviewed in the way that larger public water systems are due to a lack of participation and specific representation. Since the 2021 regional water plans were developed, the 2020 U.S. Census was published. The data indicates there may be some undercounts of the populations within Parker and Wise counties. Based on these concerns, the 2020 U.S. Census data were considered but not relied upon for baseline populations.

Additionally, Texas State Law requires all public community water systems to submit a completed Water Use Survey annually. Although required, several water systems do not report water use and the accuracy of the data is contingent upon the understanding of the recipient filling out the survey. Because of this, there are both gaps and human error in the data. Historical demand information from UTGCD well production reports are typically the most accurate representation of use, however these reports are limited to non-exempt groundwater users only.

B. Step Two – Set up Boundaries

Using the information gathered, FNI assigned a classification for each portion of Parker and Wise counties to be used for further evaluation. The study area was subdivided into three main classifications as previously discussed: (1) Publicly Owned Water Systems (2) Investor-Owned Utilities and (3) Rural Water Users.

Boundaries for publicly owned water systems and investor-owned utilities are set as the water service area for the water system. These boundaries are not necessarily the same as city limits or CCNs, but instead only contain the area in which the public water system provides retail water service. The TWDB has developed a statewide public water system service area mapping application called the Texas Water Service Boundary Viewer ("the Viewer"). This mapping application strives to collect and provide the most up-to-date and best data available on the water service areas for all community public water systems within Texas. Water systems are asked to use the Viewer to update or verify their service boundaries to reflect current retail water service areas annually with the submittal of their water use survey. Changes were only made to these boundaries if feedback was given directly from the public water system.

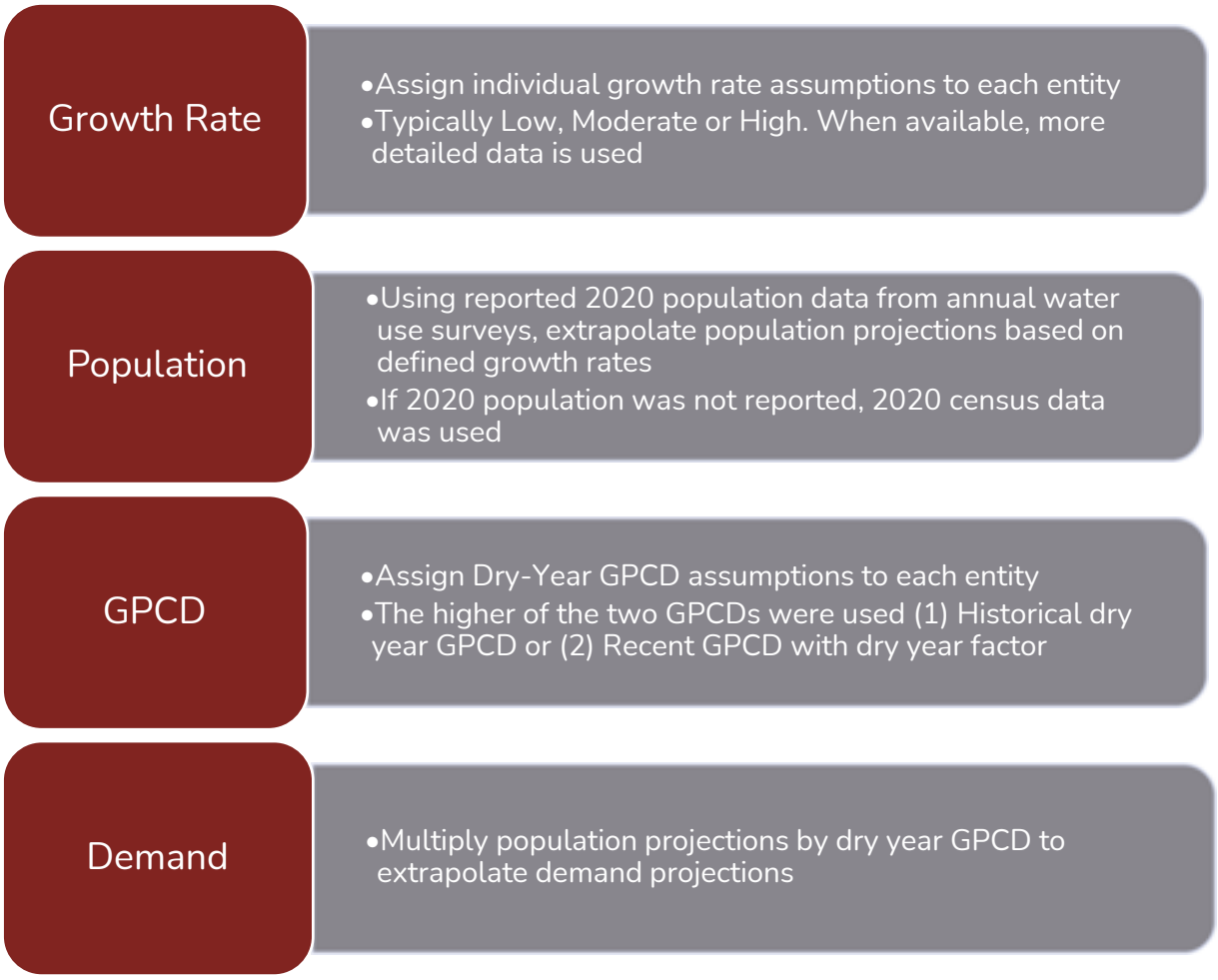
A large portion of Parker and Wise counties is not included within the service area of a public water system. For these areas, boundaries were developed based on census tracts. Census tracts are small, relatively permanent statistical subdivisions of a county or statistically equivalent entity. These tracts are further subdivided into units known as block groups and Census blocks. Although projections were developed on a tract level, census blocks are the smallest census unit and were used when determining how much of the reported census population was included in a public water system service area and how much was left in the remaining portion of the tract.

These boundaries are shown in FIGURE 1 and FIGURE 2.

C. Step Three – Develop Population and Demand Projections

The final step was to develop population and demand projections. The projections were developed within each county for defined public water system service areas and rural areas. All projections were developed following the general methodology outlined in FIGURE 4 below.

FIGURE 4: GENERAL PROJECTION METHODOLOGY



Individual growth rate assumptions were assigned to each entity. If any detailed data was availble, whether from past studies or relayed through the entity themselves, that information took precedence. If no data was availble (typically true for all rural water users) a low, moderate, or high growth rate was assigned. These assumptions are shown in TABLE 2.

TABLE 2: GROWTH RATE ASSUMPTIONS[1]

Growth Rate Scenario	2030	2040	2050	2060	2070	2080
Low	1.5%	1.5%	1.5%	1.0%	1.0%	1.0%
Moderate	3.5%	3.5%	3.5%	1.5%	1.5%	1.5%
High	5.0%	5.0%	5.0%	5.0%	3.5%	3.5%

Population projections were developed by using reported 2020 populations and extrapolating to 2080 based on the assumed growth rates. Typically the 2020 population data that was used was as reported in the submitted 2020 annual water use survey that is required to be submitted

annually to the TWDB. If a population was not reported (typically not reported for smaller public water systems and not required from rural water users) 2020 census data was used. However, in regards to the 2020 census data, the US Census Bureau released their Post-Enumeration Survey (PES) results that estimated that the state of Texas had an undercount of about 1.92% (approximately 550,000 people). Adjustments were made to 2020 baseline data if the census data did not seem reasonable.

Demand projections for public water systems (both publicly owned and investor owned utilities) were developed by multiplying the selected dry-year GPCD by the population projections. The higher of two GPCDs were used – either historical dry year (maximum GPCD from 2010-2014) or recent dry year (maximum GPCD from 2015 – 2020). Additionally, the TWDB released draft dry-year GPCDs for the ongoing round of regional water planning. These baseline GPCDs were also taken into consideration for the larger public water systems. Smaller public water systems and rural water users are aggregated and planned for jointly in the regional planning process and as such do not have individually recommended GPCDs. For rural water users a weighted average of the selected dry-year GPCDs for the public water systems was used. This equated to 164 GPCD for Parker County and 171 GPCD for Wise County. All population and demand projections were reviewed and updated based on both feedback from UTGCD as well as any additional feedback from water users.

2.02 Parker County Projections

Parker County is located immediately west of the metroplex, which makes it a prime area for growth. Historically the county has been considered agricultural but is currently becoming more urbanized as people move out of the metroplex. Water for domestic uses has typically been supplied by wells drilled to Paluxy or lower Trinity formations. The Brazos River flows along the southwestern side of the county and the Clear Fork of the Trinity River flows through the eastern portion of the county.

A. Population

According to the U.S Census Bureau, the estimated population for the entire county in 2021 was over 156,000 people. Parker County's population has grown 27.4 percent from 2010 to 2020. This growth rate exceeds that of the country (7.2 percent increase) as well as that of the state (15.8 percent increase). It is expected that this growth will not slow down and may increase in the near-term. Parker County population projections are shown in FIGURE 5.

Population projections from this study are shown by type of water user. Total and rural projections from the *2021 Region C Regional Water Plan* are shown by the solid and dotted black line respectfully. The solid and dotted yellow line represents total and rural projections from the *DRAFT 2026 Region C Regional Water Plan* data developed by the TWDB. This study projects that the county population will increase between 26 to 30 percent each decade from 2030 to 2080. This is like the growth that was recorded from 2010 to 2020. The numerical data from this graph is summarized in TABLE 3.

Growth is expected to occur throughout the county, but particularly in the eastern portion as people move out of the metroplex. Although there are several developments being planned for within the county, there were several specific developments that were requested to be included within the rural demand projections.

- **P8** – A developer reached out to the City of Weatherford with the request to provide wholesale water services to a new community of about 2,000 1-acre lots on the northwest side of the Azle Highway.
- **P9** – A developer reached out to the City of Willow Park with the request to provide wholesale water services to a new community of about 950 residential lots.
- **P10** – Although not related to a specific development, this area is where Peaster is located. Several water suppliers relayed that this area is rapidly growing.
- **P13** – Eagle's Bluff is located within this currently unincorporated rural area. This community is also experiencing rapid growth.

Although denser growth is expected to occur in the portion of the county within the Trinity River Basin to the east, the western side of the county also faces future water supply issues. Several water users in the Brazos River Basin currently purchase wholesale water supplies from the City of Mineral Wells, however, the city will need to implement improvements to its water system to continue to serve these customers. Parker County is also experiencing growth due to people wanting to move further out from the metroplex directly located east of the county. Population density maps for 2030 and 2080 are shown in FIGURE 6 and FIGURE 7.

FIGURE 5: PARKER COUNTY POPULATION PROJECTIONS

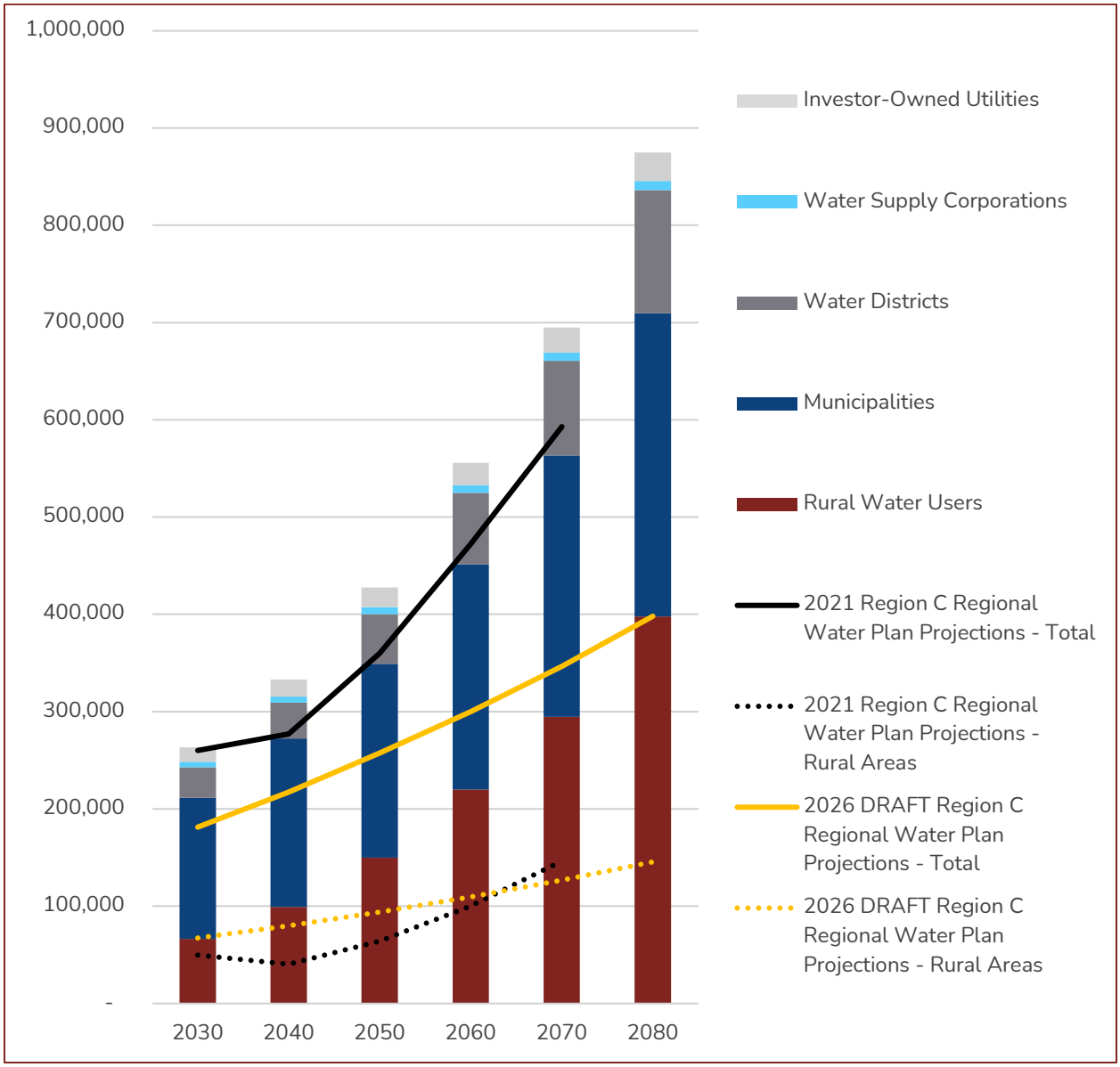
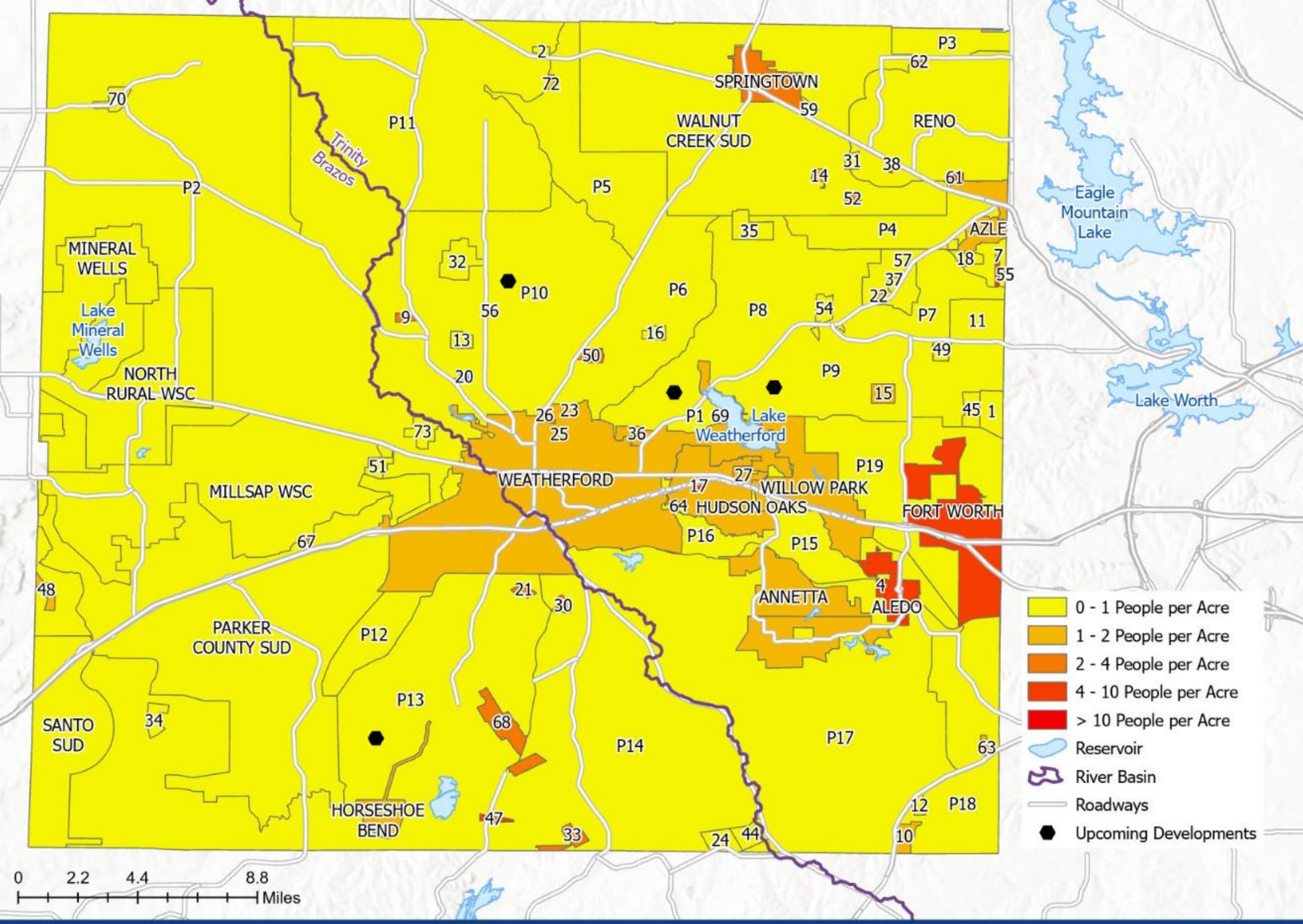


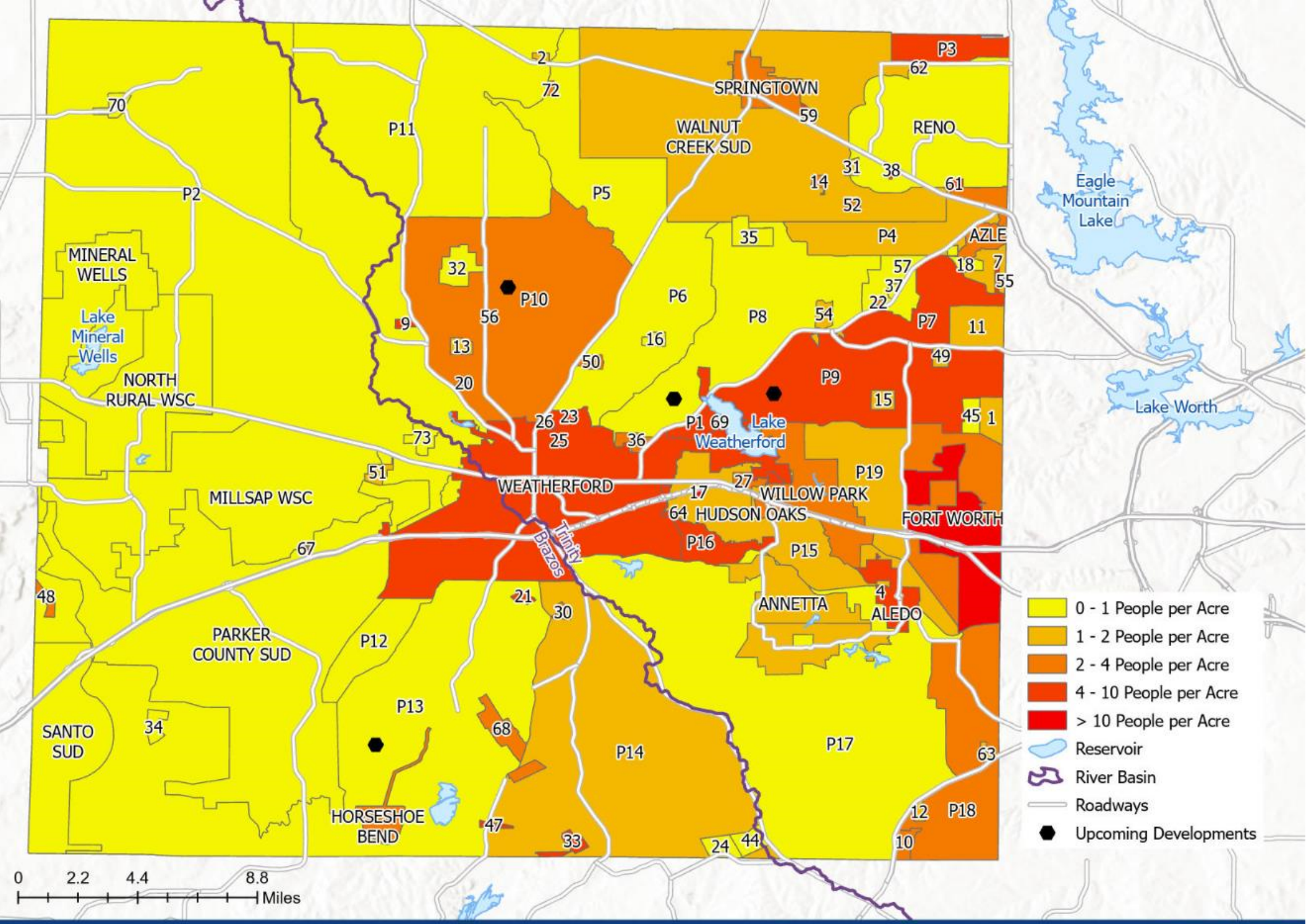
TABLE 3: PARKER COUNTY POPULATION PROJECTIONS

Water User	2030	2040	2050	2060	2070	2080
Municipalities	145,000	173,100	199,200	231,700	268,800	311,800
Water Districts	31,300	36,900	51,000	73,500	97,200	126,600
Water Supply Corporations	5,500	6,300	7,200	7,900	8,600	9,400
Investor-Owned Utilities	15,000	17,400	20,300	22,900	25,800	29,200
Rural Water Users	66,500	99,200	150,000	219,800	294,600	397,800
TOTAL	***263,300***	***332,900***	***427,700***	***555,800***	***695,000***	***874,800***



Esri, NASA, NGA, USGS

Parker County Population Density - 2030



Esri, NASA, NGA, USGS

Parker County Population Density - 2080

B. Demand

Municipal demand was determined by multiplying the population projections by dry-year GPCD for each water user within Parker County. Selected GPCD and demand projections broken out by water user can be found in **Appendix C**. A summary of demand projections for Parker County is shown in FIGURE 8 and TABLE 4.

This study predominately focuses on population and municipal demand projections. However, it is important to note that Parker County also has non-municipal demands as well. Non-municipal demand accounts for about 7% of the county's total projected demands in 2030. Parker County has the following non-municipal demands.

- **Livestock** – The majority of livestock needs are met from local surface water supplies. There are some livestock wells, but these are comparatively small next to the other demands on the groundwater supplies in the area. It is assumed that livestock demands will continue to be met primarily through local surface water supplies.
- **Mining** –Demands are typically met through groundwater wells and local surface water supplies. In Parker County demands are also met through supplies purchased from the Brazos River Authority.
- **Irrigation** –Annetta, Millsap and Weatherford have implemented direct reuse programs to meet irrigation demands. Other irrigation demands are met through local surface water supplies, some groundwater wells, and purchased water from TRWD.
- **Manufacturing** – TRWD supplies are purchased through Weatherford or Walnut Creek SUD. Additional supplies are from Lake Palo Pinto purchased through Parker County SUD as well as some groundwater wells.
- **Steam Electric Power** – There currently is no demand for steam electric power. The Brazos Electric Power Coop, Inc., has closed its facility.

Non-municipal demands for Parker County are summarized in TABLE 5.

FIGURE 8: PARKER COUNTY MUNICIPAL DEMAND PROJECTIONS

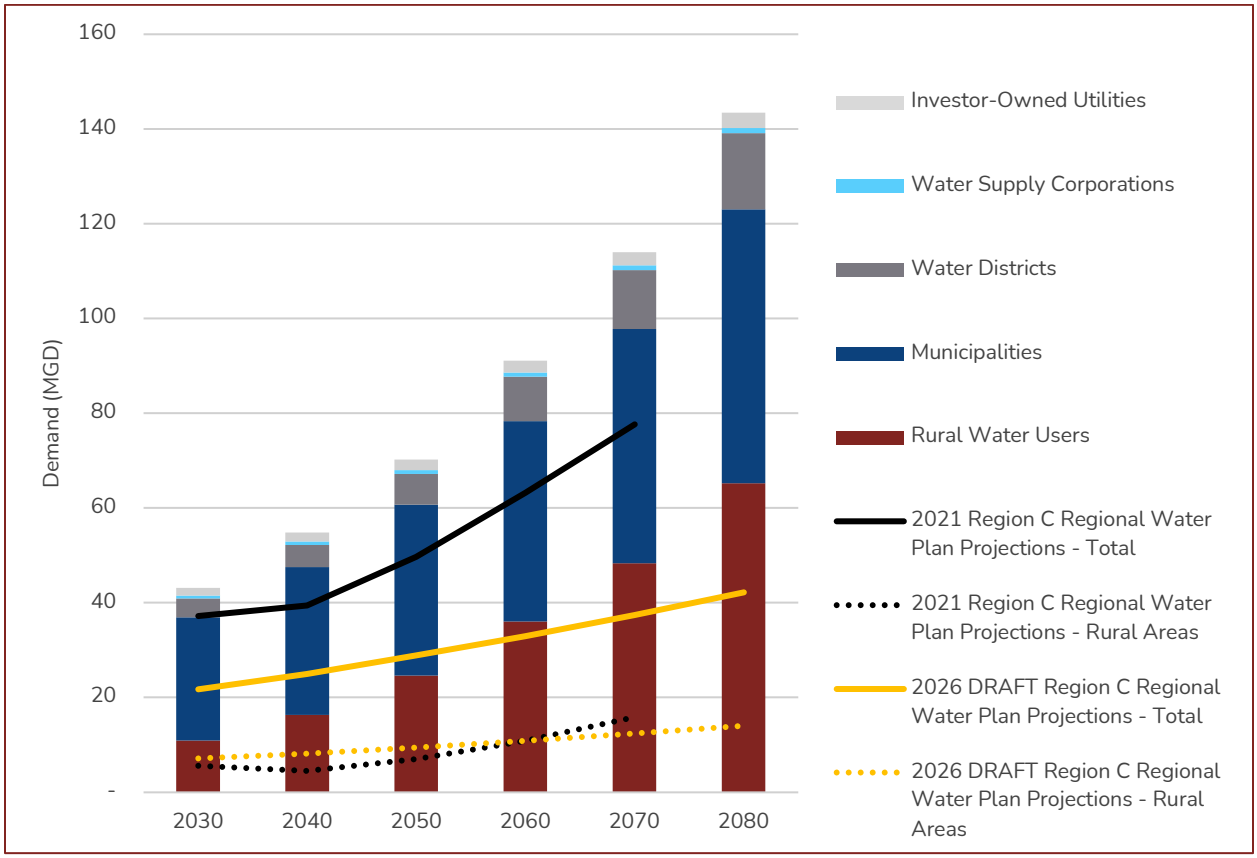


TABLE 4: PARKER COUNTY MUNICIPAL DEMAND PROJECTIONS (MGD)

Water User	2030	2040	2050	2060	2070	2080
Municipalities	26.0	31.2	36.1	42.3	49.5	57.8
Water Districts	4.0	4.7	6.5	9.4	12.4	16.1
Water Supply Corporations	0.6	0.7	0.8	0.9	1.0	1.1
Investor-Owned Utilities	1.6	1.9	2.2	2.5	2.8	3.2
Rural Water Users	10.9	16.3	24.6	36.0	48.3	65.2
TOTAL	***43.1***	***54.8***	***70.2***	***91.1***	***114.0***	***143.4***

TABLE 5: PARKER COUNTY NON-MUNICIPAL DEMAND PROJECTIONS (MGD)

Water User	2030	2040	2050	2060	2070	2080
Irrigation	1.01	1.01	1.01	1.01	1.01	1.01
Livestock	1.34	1.34	1.34	1.34	1.34	1.34
Manufacturing	0.08	0.08	0.08	0.08	0.09	0.09
Mining	0.95	1.00	1.24	1.53	1.84	2.15
Steam Electric Power	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	***3.38***	***3.44***	***3.67***	***3.97***	***4.28***	***4.60***

2.03 Wise County Projections

Wise County is bounded on the north by Montague and Cooke counties, on the east by Denton County, on the south by Parker and Tarrant counties, and on the west by Jack County. The county covers about 922 square miles. Historically the county has been primarily composed of farmland, forest and grazing land but is becoming more urbanized as people move out of the metroplex. Water for domestic use has typically been supplied by Bridgeport Reservoir or groundwater wells in the eastern portion of the county. As you move to the west, groundwater supplies become scarcer. About two-thirds of the county lies within the watershed of the West Fork of the Trinity River.

A. Population

According to the U.S. Census Bureau, the estimate population for the entire county as of 2021 was over 71,700 people. Wise County's population has grown 16.6 percent from 2010 to 2020. This growth rate exceeds that of the country (7.2 percent increase) as well as that of the state (15.8 percent increase). It is expected that this growth will continue. Wise County population projections are shown in FIGURE 9.

Population projections from this study are shown by type of water user. Total and rural projections from the *2021 Region C Regional Water Plan* are shown by the solid and dotted black line respectfully. The solid and dotted yellow line represents total and rural projections from the *DRAFT 2026 Region C Regional Water Plan* data developed by the TWDB. This study projects that the county population will increase between 21 to 40 percent each decade from 2030 to 2080. Much of the growth is projected to occur between 2030 to 2040 based on known developments being built in the county and is summarized in TABLE 6.

Growth is expected to occur throughout the county, but particularly in the southeastern portion as people move out of the metroplex. Although there are several developments being planned for within the county, there were several specific developments that were requested to be included within the rural demand projections.

- **W11** – Rolling V is a 3,600-acre master planned community expected to have approximately 10,000 residential lots at buildout. It is projected that the first phase will be fully implemented prior to 2030. The first phase is expected to be supported by groundwater wells; however, the development is planning on transitioning to surface water supplies for the following phases. The development is projected to be built out by 2050.
- **W14** – Prairie Point is a known development located in this area that will have approximately 1,000 residential lots.
- **W15** – Although not related to a specific development, it was relayed that this area is growing rapidly.

Population density maps for 2030 and 2080 are shown in FIGURE 10 and FIGURE 11.

FIGURE 9: WISE COUNTY POPULATION PROJECTIONS

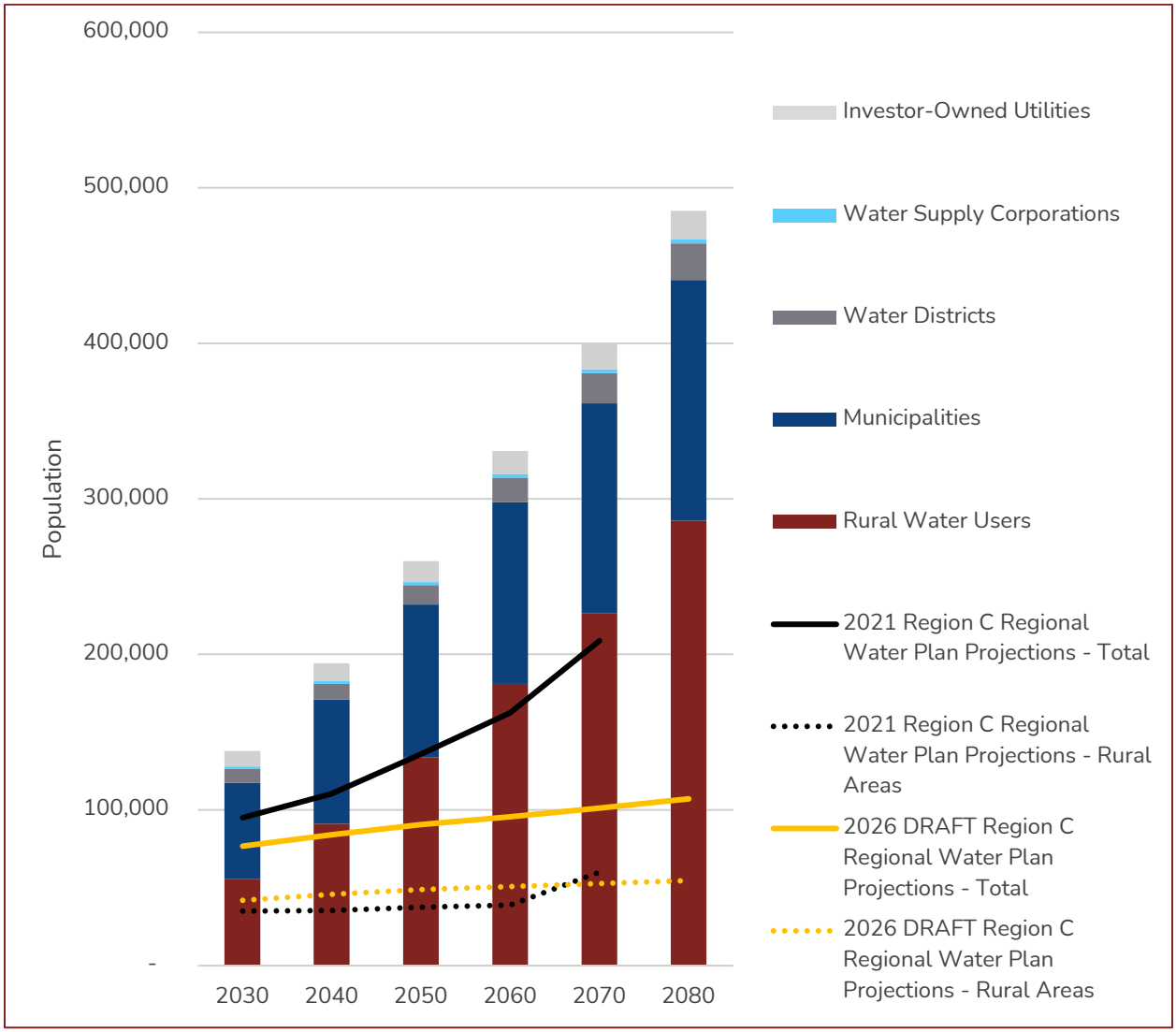
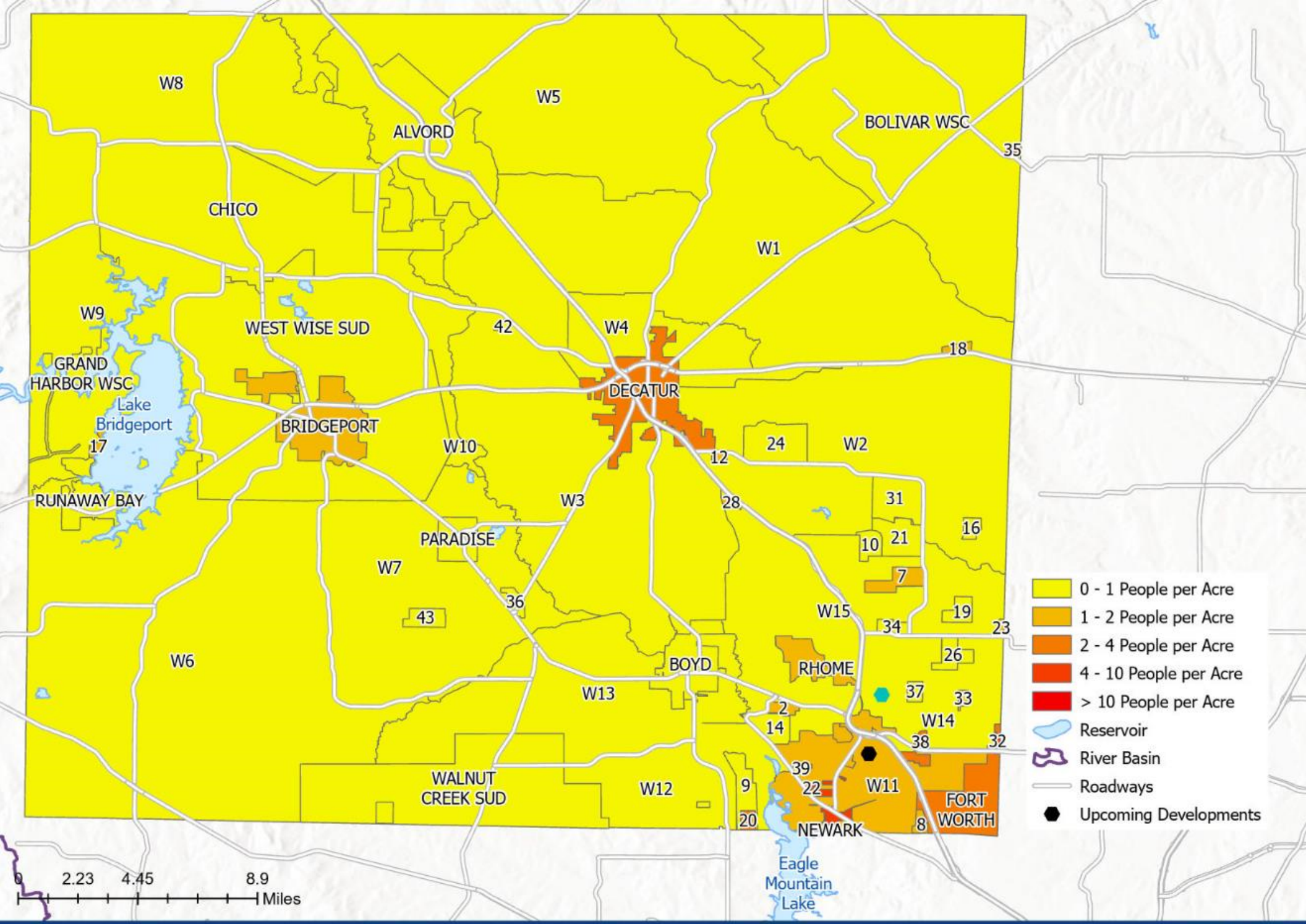
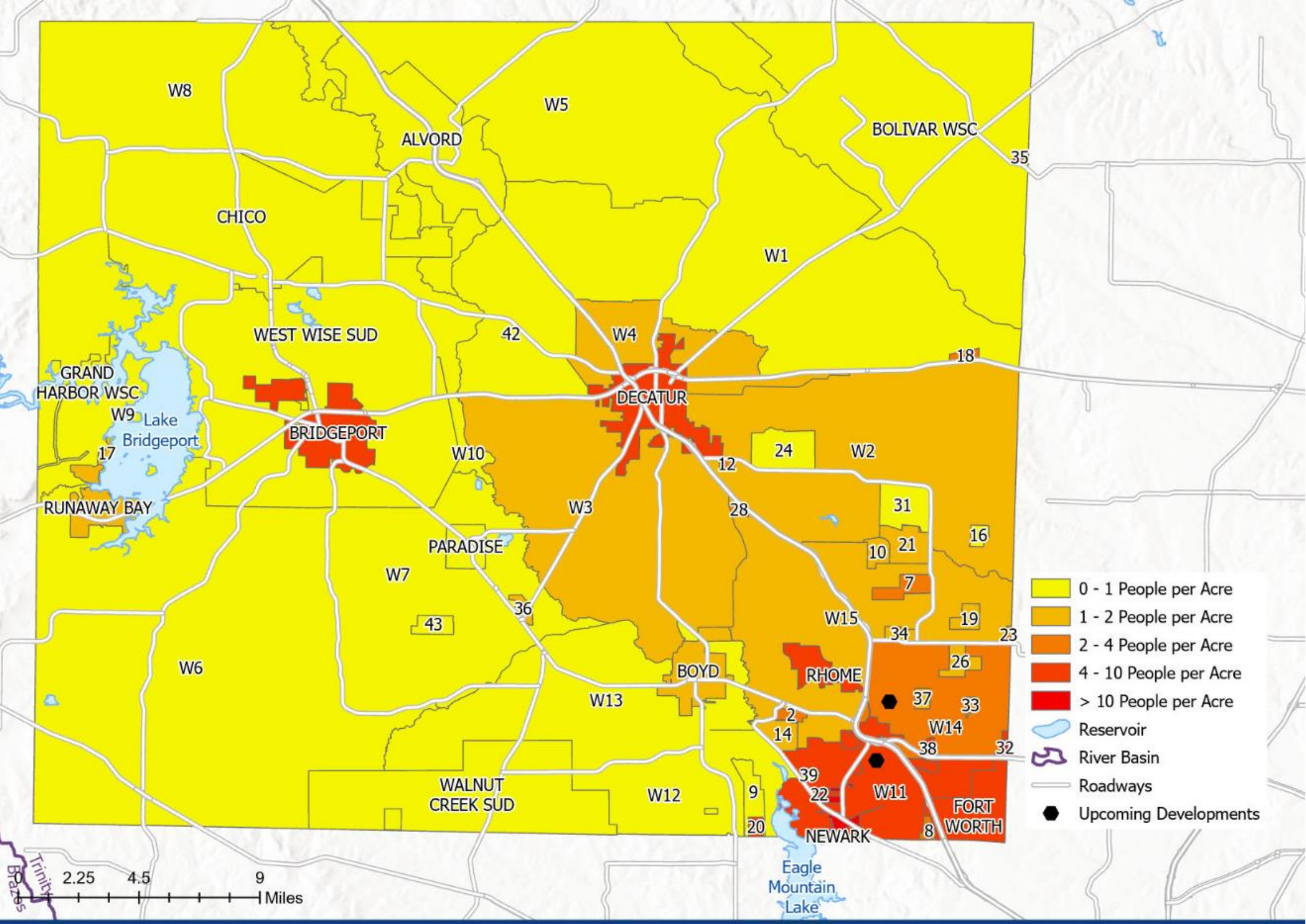


TABLE 6: WISE COUNTY POPULATION PROJECTIONS

Water User	2030	2040	2050	2060	2070	2080
Municipalities	61,600	79,800	98,400	116,800	135,200	154,800
Water Districts	9,200	10,100	12,400	15,900	19,400	23,400
Water Supply Corporations	1,400	1,600	1,900	2,200	2,500	2,900
Investor-Owned Utilities	10,000	11,600	13,500	14,900	16,500	18,200
Rural Water Users	55,700	91,200	133,700	181,000	226,300	286,000
TOTAL	***137,900***	***194,300***	***259,900***	***330,800***	***399,900***	***485,300***



Wise County Population Density - 2030



Wise County Population Density - 2080

B. Demand

Municipal demand was determined by multiplying the population projections by dry-year GPCD for each water user within Wise County. The GPCD and demand projections broken out by water user can be found in **Appendix C**. A summary of demand projections for Wise County is shown in FIGURE 12 and TABLE 7.

This study predominately focuses on population and municipal demand projections. However, it is important to note that Wise County also has non-municipal demands as well. Non-municipal demand accounts for less than 25% of the county's total projected demands in 2030. Wise County has the following non-municipal demands:

- **Livestock** – The majority of livestock needs are met from local surface water supplies. There are some livestock wells, but these are comparatively small next to the other demands on the groundwater supplies in the area. It is assumed that livestock demands will continue to be met primarily through local surface water supplies.
- **Mining** – Demands are typically met through groundwater wells and local surface water supplies. In Wise County demands are also met through a direct connection with TRWD as well as purchased supplies from the City of Bridgeport. Future demands are expected to be met with additional TRWD supplies.
- **Irrigation** – Irrigation demands are met through local surface water supplies, some groundwater wells, and purchased water from TRWD.
- **Manufacturing** – Manufacturing demands are met through TRWD supplies purchased from West Wise SUD as well as some groundwater wells.
- **Steam Electric Power** – Steam electric power demand in Wise County associated with the Wise County Power Company LLC is met through supplies purchased from TRWD.

Non-municipal demands for Wise County are summarized in TABLE 8.

FIGURE 12: WISE COUNTY MUNICIPAL DEMAND PROJECTIONS

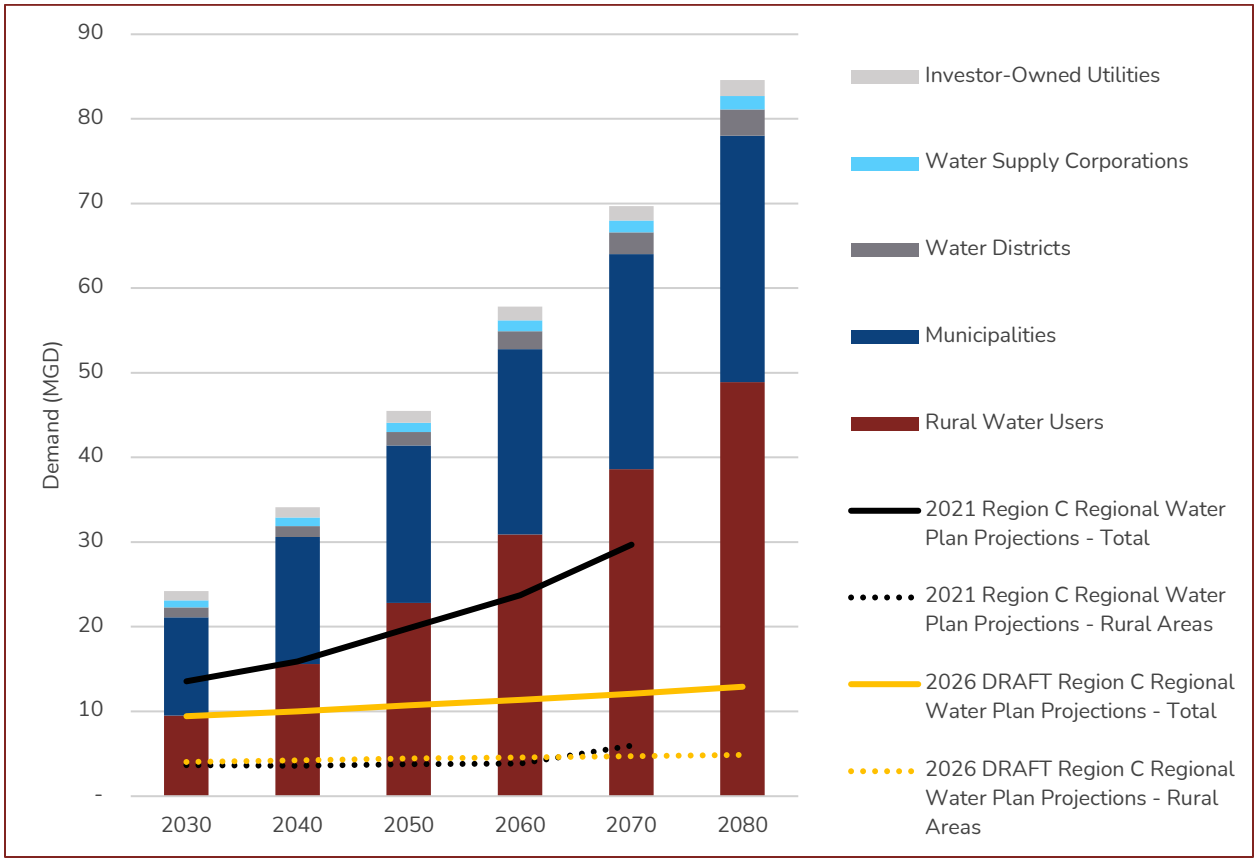


TABLE 7: WISE COUNTY MUNICIPAL DEMAND PROJECTIONS (MGD)

Water User	2030	2040	2050	2060	2070	2080
Municipalities	11.6	15.0	18.6	21.9	25.4	29.1
Water Districts	1.2	1.3	1.6	2.1	2.6	3.1
Water Supply Corporations	0.2	0.2	0.2	0.3	0.3	0.4
Investor-Owned Utilities	1.1	1.2	1.4	1.6	1.7	1.9
Rural Water Users	9.6	15.8	23.1	31.3	39.1	49.5
TOTAL	***23.7***	***33.5***	***44.9***	***57.2***	***69.1***	***84.0***

TABLE 8: WISE COUNTY NON-MUNICIPAL DEMAND PROJECTIONS

Water User	2030	2040	2050	2060	2070	2080
Irrigation	1.25	1.25	1.25	1.25	1.25	1.25
Livestock	1.26	1.26	1.26	1.26	1.26	1.26
Manufacturing	0.23	0.23	0.24	0.25	0.26	0.27
Mining	2.75	2.74	3.26	3.79	4.63	5.94
Steam Electric Power	2.54	2.54	2.54	2.54	2.54	2.54
TOTAL	***8.03***	***8.03***	***8.55***	***9.09***	***9.94***	***11.26***

3

SUPPLY ASSESSMENT

Lake Weatherford

CHAPTER AT-A-GLANCE

Highlights of Chapter 3 include:

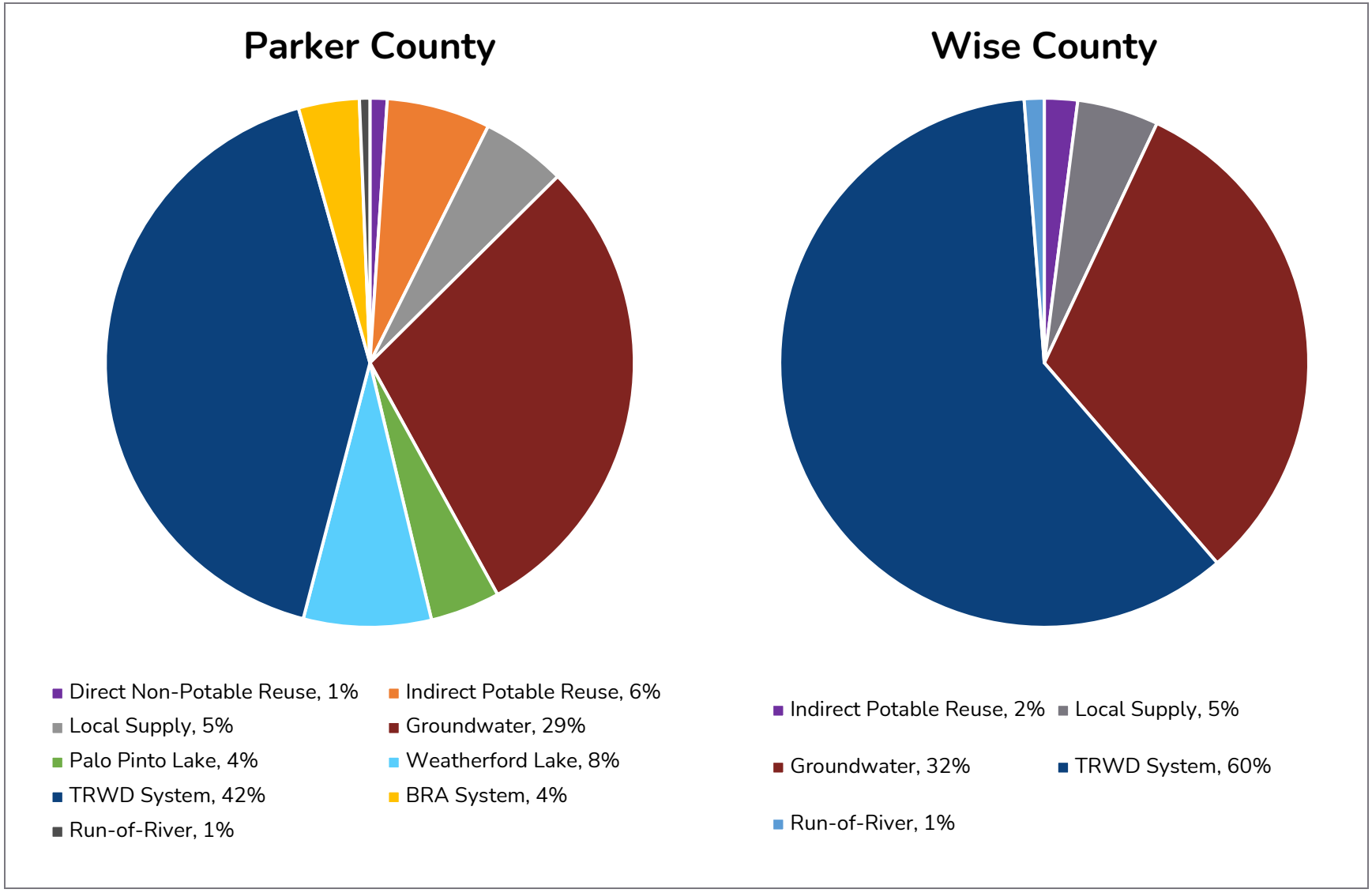
1. Groundwater Resources
2. Surface Water Resources
3. Needs

3.00 Water Supply Assessment

Currently connected supplies are limited within the study area. Most water users rely on either groundwater supplies or surface water supplies from the TRWD reservoir system. FIGURE 13 shows the connected supplies in 2020 as shown in the current regional water plan. It is expected that development will occur in the more rural and undeveloped areas within the study area. At this point in time, those who are moving into the study area are moving into homes and developments that rely on private, groundwater wells. If this trend continues, the portion of groundwater supplies will increase until it is no longer sustainable.

TRWD is the most feasible solution for additional surface water supplies, however there are limitations that will be discussed in the following sections.

FIGURE 13: CURRENTLY CONNECTED SUPPLIES IN 2020 BASED ON STATE WATER PLAN DATA



3.01 Groundwater Resources

There is one major aquifer (Trinity) and one minor (Cross Timbers) aquifer located within the study area.

A. Major Aquifer – Trinity Aquifer

The Trinity Aquifer is defined by the TWDB as a major aquifer composed of several individual aquifers contained within the Trinity group. Within the study area the Trinity Aquifer consists of the aquifers of the Paluxy Sand, the Glen Rose Formation, the Twin Mountains Formation, and the Antlers Formation. The Antlers Formation is the coalescent of the Paluxy and Twin Mountains formations north of the line where the Glen Rose Formation thins to extinction. This occurs approximately in central Wise County. The Cretaceous-age Fredericksburg and Washita Groups are generally considered confining units and they overlie the subcrop portion of the Trinity Aquifer in the easternmost areas of the study area.

- **Paluxy Sand** – consists of sand, silt, and clay with sand dominating. The sand and silts in the aquifer are primarily fine grained, well-sorted, and poorly cemented. Coarse-grained sand in the lower sections grading up to fine-grained sand with shale and clay in the upper section. In general, natural groundwater flow in the Paluxy Sand is east to southeast. Wells completed in to the Paluxy Sand typically yield small to moderate quantities of water that is fresh to slightly saline. Where the Glen Rose formation is absent, the Paluxy Sand is equivalent to the upper sands of the Antlers Formation.
- **Glen Rose Formation** – consists primarily of limestone with some shale, sandy-shale, and anhydrite. In general, the aquifer yields small quantities of water in localized areas. Groundwater flows in the Glen Rose formation is generally to the east and southeast.
- **Twin Mountains Formation** – consists predominately of medium- to coarse-grained sand, silty clay, and conglomerates. A massive sand is found in the lower portion of the formation while less sand is found in the upper portion of the aquifer due to increased interbedding of shale and clay. In general, wells are primarily completed into the lower part of the aquifer. Where the Glen Rose Formation is absent, the Twin Mountains Formation is equivalent to the lower sands of the Antlers Formation. Typically, wells completed into the Twin Mountains Formation yield fresh and slightly saline water in moderate to large quantities. Groundwater flow in this formation is generally to the east and southeast.
- **Antlers Formation** – typically consists of a basal conglomerate and sand overlain by poorly consolidated sand interbed with discontinuous clay lawyers. Considerably more clay is found in the middle portion of the formation than in the upper and lower portions. Limestone is also found in the middle portion near the updip limit of the Glen Rose Formation. Generally, groundwater flow in the Antlers Formation is like that in the Twin Mountains Formation with subcrop wells generally more productive than those in the outcrop areas.

TABLE 9 summarizes the current MAG as of the current regional water plan, proposed new MAG with updated DFCs, and an estimate of pumping in 2020. Across the different formations, current pumping ranges from 50% to 90% of the proposed new MAG.

TABLE 9: GROUNDWATER AVAILABILITY AND PUMPING

	Current MAG (AFY)	Proposed New MAG with Updated DFCs (AFY)	2020 Actual Pumping (AFY)
Parker - Antlers	2,897	2,905	1,823
Wise – Antlers (Outcrop)	7,677	9,106	5,088
Wise – Antlers (Downdip)	2,057	2,439	1,549
Parker – Glen Rose (Outcrop)	2,289	3,684	2,552
Parker – Glen Rose (Downdip)	873	1,406	9
Parker – Paluxy (Outcrop)	2,607	2,614	1,527
Parker – Paluxy (Downdip)	50	50	55
Parker – Twin Mountains (Outcrop)	1,066	1,294	1,779
Parker – Twin Mountains (Downdip)	2,082	2,527	1,647
TOTAL	***21,598***	***26,025***	***16,029***

B. Minor Aquifer – Cross Timbers Aquifer

Several Pennsylvanian- and Permian-age formations in UTGCD can produce usable quantities of groundwater. These formations were previously referred to collectively as the Paleozoic aquifers, however recently, in response to a request from UTGCD, the TWDB designated these formations as the Cross Timbers Aquifer, a minor aquifer. Literature regarding these formations is very limited and therefore, information regarding their hydrologic characteristics is also limited. The Paleozoic aquifers are a source of groundwater in northern and western portions of west-central Wise County and western Parker County where the Trinity Aquifer is absent.

From youngest to oldest, the formation of the Wichita, Cisco-Bowie, Canyon, and Strawn groups make up the Cross Timbers Aquifer. The Bowie Group consists of the Nocona Formation (mudstone with sandstone and siltstone in thin lenticular beds throughout), the Archer City Formation (predominately mudstone with thin siltstone beds and sandstone), the Markley Formation (mudstone with local thin beds of sandstone in upper portion and mudstone and shale with some coal and limestone below) and the undivided Thrift and Graham formations (predominately mudstone and shale with thin sandstone beds and some sandstone sheet locally and two limestone members).

The underlying Canyon Group is comprised of the Colony Creek Shale (shale with some siltstone, local thin to medium beds of sandstone, and limestone lentils), the Ranger Limestone (predominately limestone with local thin shale beds), the Ventioner Formation (shale and mudstone with numerous sandy and silty lenses and thin to medium beds, the Jasper Creek

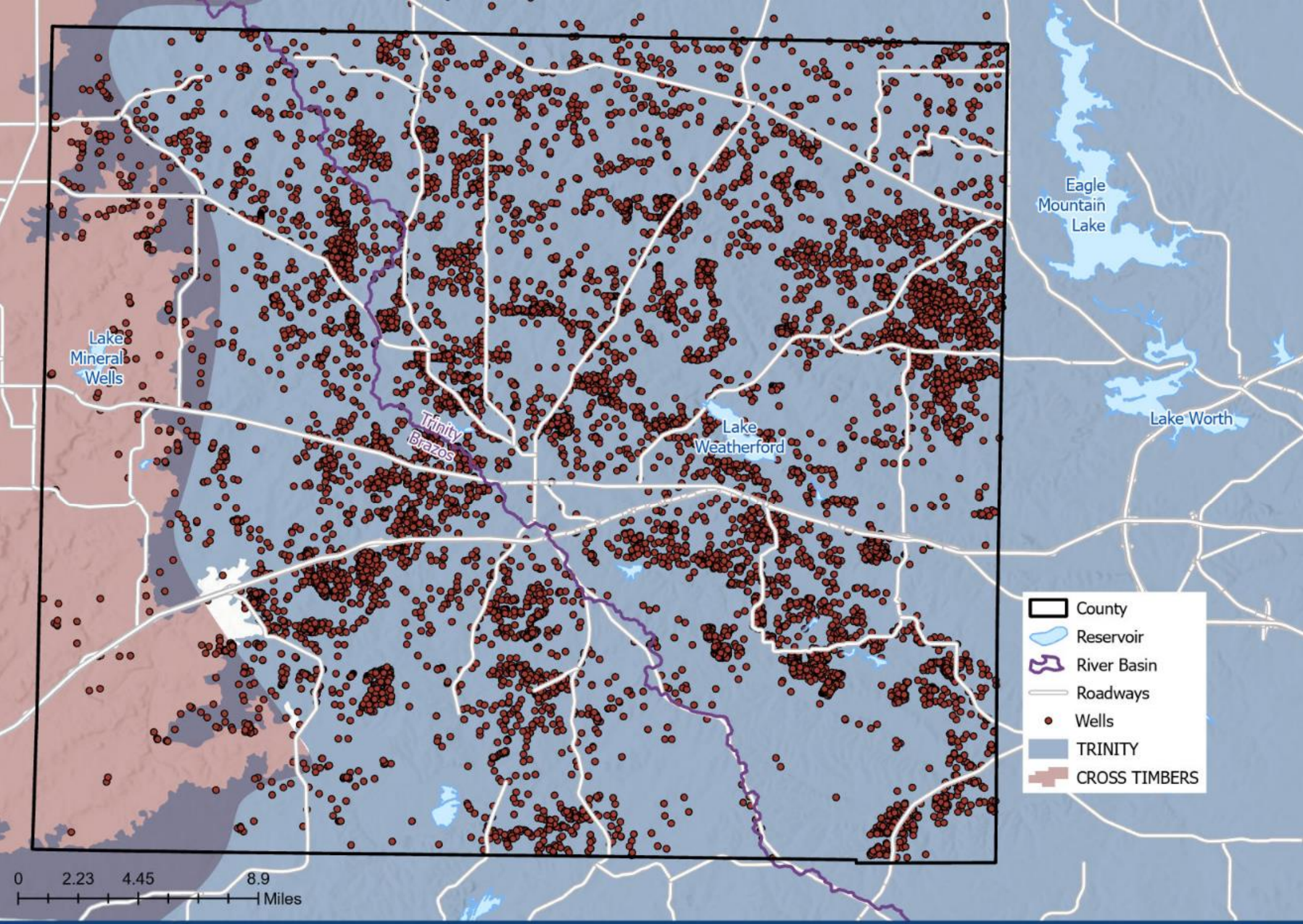
Formation (upper portion predominately shale with thin siltstone beds throughout and isolated massive sandstone lenses and lower portion shale with thin limestone lentils and local thin and lenticular sandstone beds), the Chico Ridge Limestone (predominately limestone with local shale beds), the Willow Point Formation (shale and claystone locally silty and sandy with local thin beds of sandstone and several limestone beds in lower portion and a single coal bed), and the Palo Pinto Formation (predominately limestone and marl with some sandstone and shale). Sandstone lenses found in the Canyon Group are locally important to the occurrence of groundwater.

The Strawn Group consists of the Mineral Wells Formation (shale containing local sandstone beds and a few limestone beds), the Brazos River Formation (sandstone with local lenses of conglomerate and mudstone), the Mingus Formation (sandy shale with one thin coal seam and some limestone beds), the Buck Creek Sandstone (sandstone), the Grindstone Creek Formation (shale, in part sandy, with local thin coal beds and sandstone lentils and limestone beds with some shale), and the Lazy Bend Formation (shale, in part sandy or silty, with local coal beds and limestone beds).

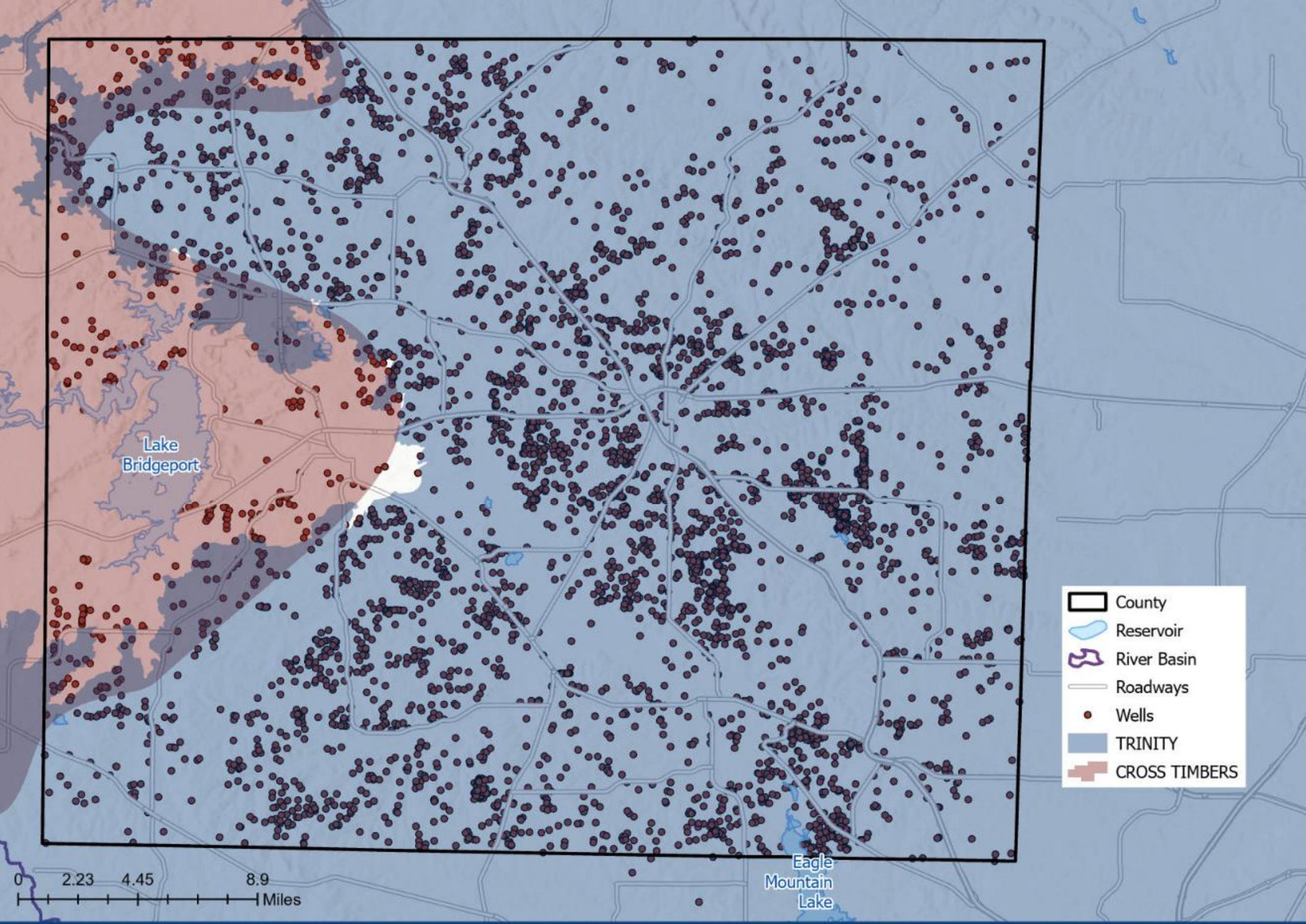
Water supply from the Cross Timbers Aquifer can vary significantly, even across small areas. The eastern edge of the formation lies in the study area and is generally not very productive. This aquifer was deemed “non-relevant” within the study area by GMA 6 therefore, there are no MAGs defined for the Cross Timbers. However, the TWDB contracted with Daniel B. Stephens & Associates to develop a conceptual model of the Cross Timbers Aquifer.

C. Other Water-Bearing Formations

Some alluvial deposits of Pleistocene to Recent age can produce water in the UTGCD, especially along the Brazos River in Parker County. Most of these sediments are stream deposits, but some are of windblown origin. The alluvial deposits, consisting of sand, gravel, silt, and clay, yield small to large quantities of fresh water.



Parker County Groundwater



Wise County Groundwater

3.02 Surface Water Resources

There are two major reservoirs located within the study area. There is Lake Weatherford in Parker County and Bridgeport Reservoir in Wise County. Water users within the study area receive surface water supplies from several sources including the TRWD reservoir system, Lake Weatherford, BRA system, Palo Pinto Reservoir, as well as local supplies and run-of-river rights.

A. TRWD Reservoir System

Most of the developed raw surface water sources used within the study area are controlled by TRWD. The current sources of supply for TRWD include four supply reservoirs (Bridgeport Reservoir, Eagle Mountain Lake and the Cedar Creek and Richland-Chambers Reservoirs), three terminal storage reservoirs (Lake Arlington, Lake Benbrook, and Lake Worth), and permitted reuse projects associated with Cedar Creek and Richland-Chambers Reservoirs. Wise and the portion of Parker County that is part of the Trinity River Basin is included in TRWD's service area. Potential future sources include the new reservoir development, groundwater, and reuse.

TRWD currently supplies only raw water and TRWD's agreements with cities such as Fort Worth, Arlington, Mansfield and TRA preclude TRWD from treating water in its current system.

The West Fork system includes Bridgeport Reservoir and Eagle Mountain Lake and is constrained by permit limitations, contracts, and supply availability. Firm yield represents how much water would be available during a repeat of the worst recorded drought period, which can limit availability regardless of permits and contracts. TRWD also uses safe yield as part of planning. Safe yield is defined as the water that could have been supplied from a reservoir or reservoir system during repeat of drought-of-record conditions, leaving some amount (in TRWD's cases one year's supply) in reserve as the minimum content.

TRWD operates its reservoirs as a system with the ability to move water from the West Fork system to serve customers across the metroplex. TRWD also can pump water from its East Texas reservoirs (Cedar Creek and Richland Chambers) to any of its other reservoirs except for Bridgeport Reservoir. Water from Bridgeport Reservoir can only be used locally or released downstream to TRWD's other water sources. This limits the ability of TRWD to move additional water from its other system sources to Bridgeport Reservoir to serve increasing local demands.

TABLE 10 summarizes the firm and safe yield of TRWD's reservoirs for 2020 and 2070. This table does not account for infrastructure or contractual limitations.

TABLE 10: TRWD RESERVOIR SUMMARY

	Permit (AFY)	Firm Yield 2020	Firm Yield 2070	Safe Yield 2020	Safe Yield 2070
East Texas Water Supply Reservoirs					
Cedar Creek Reservoir	*175,000*	*204,587*	*202,700*	*158,891*	*150,400*
Richland-Chambers Reservoir	*210,000*	*221,565*	*207,201*	*185,230*	*164,000*
Terminal Storage Reservoirs					
Lake Arlington	*9,100*	*9,700*	*8,950*	*7,640*	*7,090*
Lake Benbrook	*72,500*	*6,740*	*6,671*	*5,391*	*5,370*
West Fork Water Supply Reservoirs		115,908	102,825	94,192	85,525
Bridgeport Reservoir	*78,000*				
Eagle Mountain Lake	*159,600*				
TOTAL		***558,500***	***528,347***	***451,344***	***412,385***

NOTE: Bridgeport Reservoir and Eagle Mountain Lake are modeled together and only the total West Fork System Firm and Safe Yield are shown in the table.

TRWD is the most feasible solution for acquiring raw water supplies in the Trinity River basin. Parker and Wise counties are both at least partially located within TRWD's service area and TRWD is not opposed to taking on additional customers within their service area. TRWD already has raw water supplies and has a robust plan to continue to develop their raw water portfolio to meet growing demands. TRWD also has the benefit of already having an organizational and financial structure in place.

For TRWD to meet its system demands and the increase in local demands around Bridgeport Reservoir, it will need to develop additional supplies. TRWD is currently updating its long-range water supply plan that would provide a path for future water development, but it may be several decades before these supplies will be online. In the meantime, TRWD could consider developing an interconnection within the West Fork system that would provide greater flexibility in moving water supplies to where they are needed. Another option to acquire supplies from TRWD is to connect directly to Eagle Mountain or Benbrook Lake, which are farther from the study area than Bridgeport Reservoir. However, pursuing these routes would require additional coordination with the cities of Fort Worth, Benbrook and/or Weatherford.

B. Lake Weatherford

Lake Weatherford is a water supply lake constructed by the City of Weatherford in 1957. It has a watershed of approximately 121 square miles and supplies the City of Weatherford. The firm yield of the lake is 2,923 AFY in 2020 and decreases to 2,707 AFY in 2070 due to sedimentation.

The City of Weatherford currently has a 14 MGD WTP to treat raw water supplies from Weatherford and Benbrook Lake.

C. Brazos River Authority Main Stem Reservoir System

The Brazos River Authority (BRA) is authorized to develop, manage, and protect the water resources of the Brazos River basin. The BRA Main Stem Lake Reservoir System includes Granbury Lake, Limestone Lake, Possum Kingdom Lake, Somerville Lake, and Whitney Lake. The firm yield of the system is 336,036 AFY in 2020 and decreases to 315,436 AFY in 2070 due to sedimentation. Supplies from the Brazos River require advanced treatment or blending to utilize for municipal use. Currently the only water user using supplies from BRA is Parker County SUD. Parker County SUD owns and operates a desalination water treatment plant that treats supplies from the Brazos River.

D. Palo Pinto Reservoir

Palo Pinto Reservoir is a water supply reservoir that is owned by the Palo Pinto Municipal Water District and is operated by the City of Mineral Wells for municipal, industrial, and recreational purposes. The firm yield of the lake is 7,800 AFY in 2020 and decreases to 7,100 AFY in 2070 due to sedimentation. Currently Mineral Wells supplies treated water to North Rural WSC, Palo Pinto WSC, Parker County SUD, Santo SUD, and Sturdivant Progress WSC. The City of Mineral Wells has a WTP originally constructed to treat 12 MGD but is currently rated at 7.9 MGD due to aging infrastructure.

E. Local Supplies and Run-Of-River

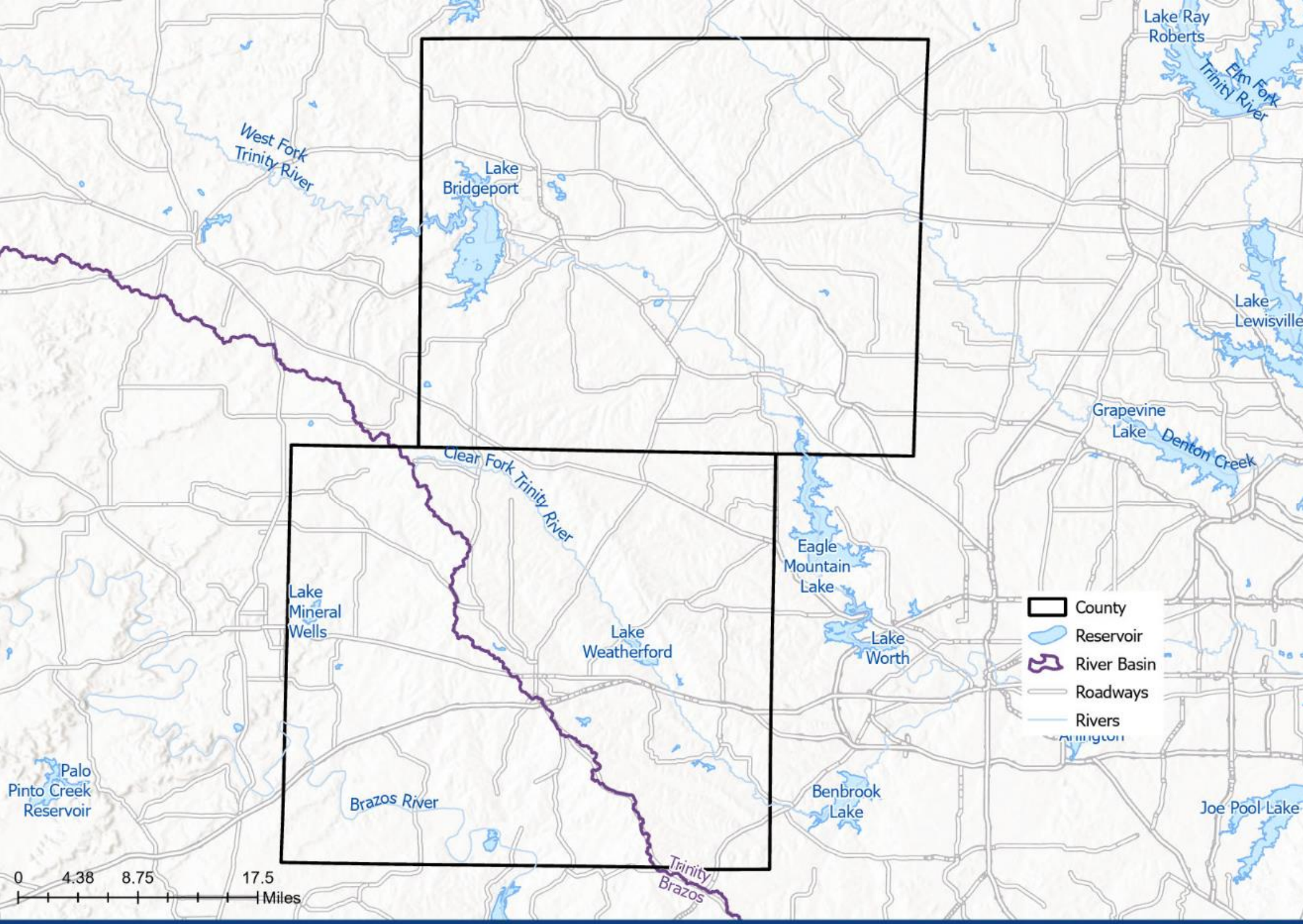
Several non-municipal entities hold small run-of-river rights and utilize local supplies. These include irrigation, livestock, and mining users within the study area.

F. Current Surface Water Users

The water users that currently use a surface water source is summarized in TABLE 11.

TABLE 11: WATER USERS UTILIZING SURFACE WATER SOURCES

Source	Water User	Secondary Water User
TRWD System	Fort Worth [Benbrook, Cedar Creek, Eagle Mountain, Richland Chambers]	Aledo
		Hudson Oaks
		Willow Park
	Paradise [Bridgeport]	-
	Bridgeport [Bridgeport]	-
	Runaway Bay [Bridgeport]	Grand Harbor WSC
		Hideaway Bay Lake Shores WSC
	Walnut Creek SUD [Bridgeport]	Boyd
		Reno
		Rhome
		West Wise SUD (Chico)
	Weatherford [Benbrook]	-
	Wise County WSD [Bridgeport]	Decatur
	Azle [Eagle Mountain]	-
	Springtown [Eagle Mountain]	-
Lake Palo Pinto	Mineral Wells	Parker County SUD
		Santo SUD
		Millsap WSC
		North Rural WSC
		Rollins Hills Estates WSC
BRA System	Parker County SUD	-
Lake Weatherford	Weatherford	-



Surface Water

3.03 Needs

Water supply needs are obtained by comparing the total demand to the existing available supplies. If demand exceeds the supply available, then there is a need for further development of the water supply. Total municipal needs for Parker and Wise counties are summarized in FIGURE 16 and FIGURE 17, and TABLE 12 and TABLE 13. Supplies are divided into two categories – non-groundwater sources (surface water and reuse) and modeled available groundwater. It is assumed that if a water user is currently utilizing a non-groundwater source of supply, then it will continue to do so throughout the planning horizon to meet any growing demands. For example, the City of Azle is assumed to continue purchasing and treating supplies from TRWD. While current groundwater use is less than the MAG, it is assumed that growth associated with existing users and increased domestic wells will quickly account for the available groundwater. The remaining need consists of either new water users or existing groundwater users who also do not have a non-groundwater source.

FIGURE 16: PARKER COUNTY NEEDS SUMMARY

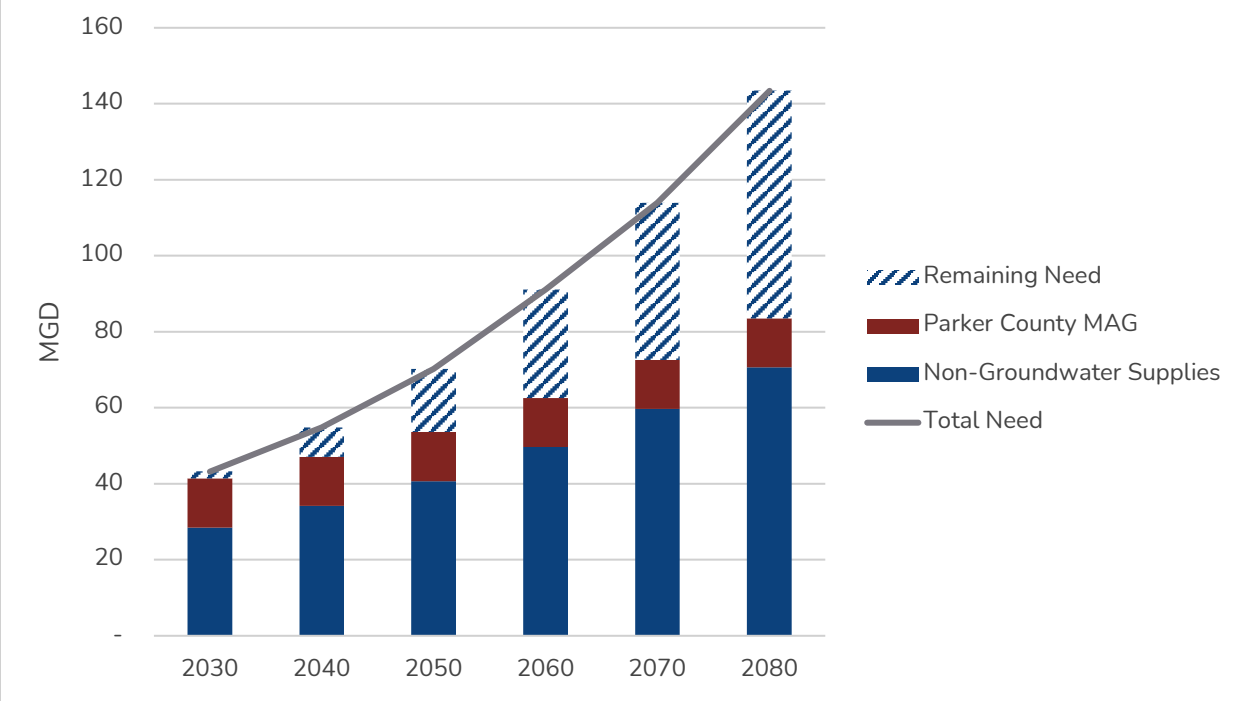


TABLE 12: PARKER COUNTY NEEDS SUMMARY (MGD)

	2030	2040	2050	2060	2070	2080
Total Demand	43	55	70	91	114	143
Non-Groundwater Supplies	*27*	*33*	*39*	*48*	*58*	*68*
Groundwater Supplies	*13*	*13*	*13*	*13*	*13*	*13*
REMAINING NEED	***3***	***9***	***18***	***30***	***43***	***62***

FIGURE 17: WISE COUNTY NEEDS SUMMARY

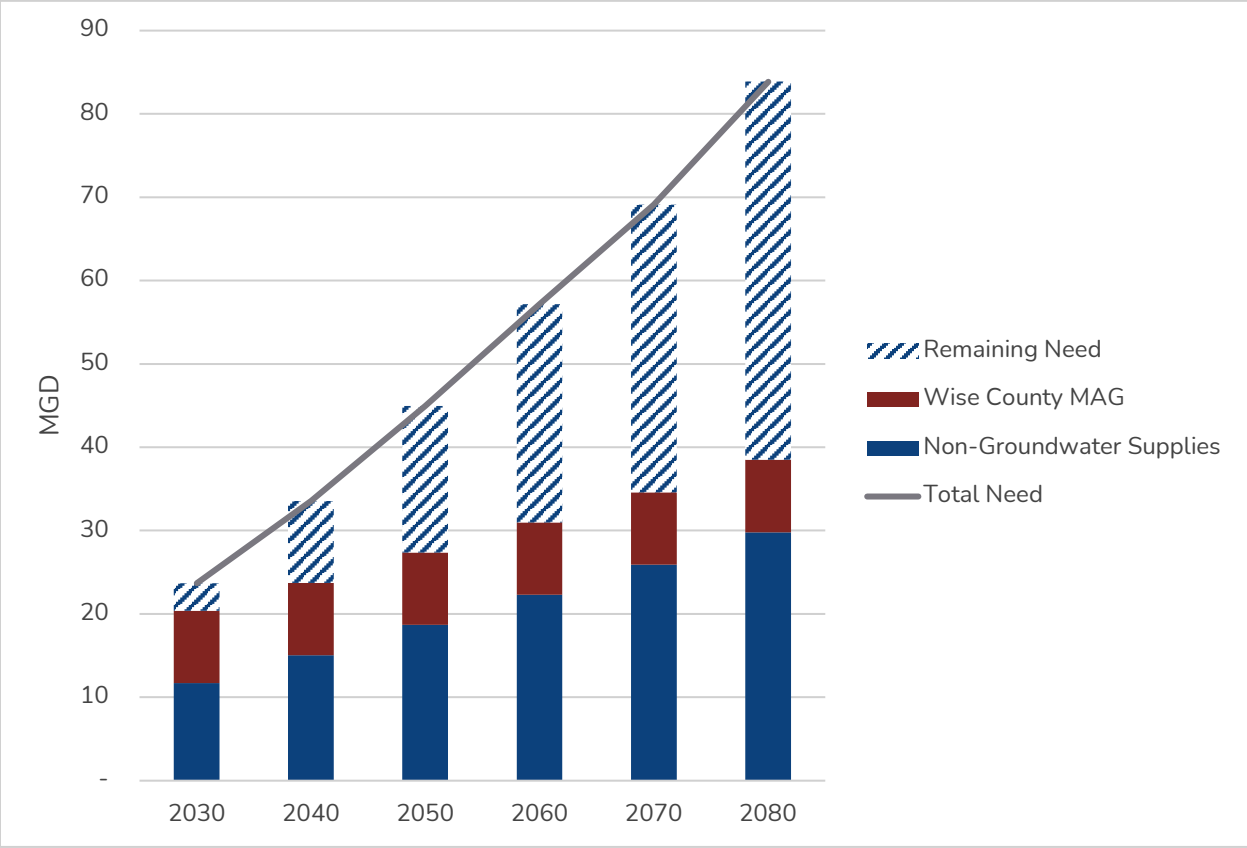


TABLE 13: WISE COUNTY NEEDS SUMMARY (MGD)

	2030	2040	2050	2060	2070	2080
Total Demand	24	33	45	57	69	84
Non-Groundwater Supplies	*12*	*15*	*19*	*22*	*26*	*30*
Groundwater	*10*	*10*	*10*	*10*	*10*	*10*
REMAINING NEED	***2***	***8***	***16***	***25***	***33***	***44***

This shows that even with the assumption that any water users who use non-groundwater supplies continue to do so to meet growing demands within their service area and full development of theoretically available groundwater supplies, Parker and Wise Counties will still have an average day dry year need of more than 6 MGD by 2030 and more than 18 MGD by 2040. If growth continues at a similar rate, the need could increase to over 107 MGD by 2080. A reliable and sustainable source of water supply will be vital to supporting the population growth and economic development of the study area.

This study does not attempt to plan for each individual water user within Parker and Wise Counties. However, the study area's needs can be subdivided into three subregions with similar issues.

- **Parker County Brazos Basin** - Parker County is split between the Trinity and the Brazos River basin. Transferring surface water supplies that originate from one river basin into another requires an interbasin transfer. Additionally, the Brazos River basin is outside of TRWD's service area. The City of Mineral Wells and the Parker County SUD are currently the main treated water service providers within the area. Groundwater supplies are limited on the western edge of the county where the Cross Timbers Aquifer is predominately located. This area is also undergoing significant growth, specifically in the rural areas adjacent to the City of Weatherford.
- **Parker County Trinity Basin** – The other portion of Parker County is located in the Trinity River basin. Non-groundwater supplies primarily originate from the TRWD system and are treated by Walnut Creek SUD or Fort Worth. The City of Weatherford is split between the Brazos and Trinity river basins, however it is expected that the City will continue to utilize supplies primarily from Lake Weatherford as well as purchased supplies from TRWD. This area is growing as popoulation moves west out of the metroplex.
- **Wise County Trinity Basin** – Unlike Parker County, Wise County is located completely within the Trinity River basin. As such it is within the service area of TRWD. Groundwater supplies in western Wise County are limited where the Cross Timbers Aquifer is predominately located, however groundwater is more plentiful as you travel east. In western Wise County, non-groundwater supplies are wholly from the TRWD system via intakes on Bridgeport Reservoir. Walnut Creek SUD has a large CCN however only serves a portion of the area within Wise County. Most of eastern Wise County is either still rural or belongs to investor-owned utilities that rely solely on groundwater supplies. Non-groundwater supplies originate from TRWD either through Bridgeport (Decatur, Rhome, Boyd) or the rest of the TRWD system (Fort Worth). Bolivar WSC's system is currently groundwater only however this water user is within UTRWD's service area and is a planned future customer. It is projected that the area betweeen Fort Worth and Decatur will experience significant growth. One planned development alone located in this area is expected to develop approximately 10,000 residential lots.

4

IMPLEMENTATION PLAN

Lake Weatherford

CHAPTER AT-A-GLANCE

Highlights of Chapter 4 include:

1. General Implementation Plan for Study Area
2. Parker County Brazos Basin
3. Parker County Trinity Basin
4. Wise County

4.00 Implementation Plan

The two main questions facing this area are (1) Where will the water supply come from and (2) Who will treat and transport the supplies to the water users?

The goal of this study is to provide an implementation plan outlining a potential path forward to both questions above. It is important to note that the strategies discussed in this section represent a possible path forward for the counties and do not necessarily reflect what water users will do. It is the ultimate responsibility of the water provider to develop and implement their own water plan. **The counties, with assistance from the state and possible federal funding sources, can help fund some of these options.**

This study aims to highlight water supply options to preserve the quality of life for both existing and future residents while also safeguarding groundwater supplies for future generations. Potentially feasible water management strategies that were evaluated are summarized in TABLE 14. More detailed information on the evaluation of a potential new reservoir can be found in **Appendix B**.

The following sections are divided into three main subregions with a proposed implementation plan. These plans discuss potential steps for each subregion for the near-term (prior to 2030), the mid-term (prior to 2050) and the long-term (prior to 2080).

TABLE 14: POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES CONSIDERED

STRATEGY CONSIDERED	PROS	CONS	FEASIBILITY
Additional Groundwater Wells	• Easy to implement and maintain • Could potentially bridge the gap before surface water supplies come online	• Not viable long term • Reduced production with increasing demand • Limited groundwater in western part of region	MODERATE
Brackish Groundwater	• Potential additional availability from Cross Timbers Aquifer • Could potentially bridge the gap before surface water supplies come online	• Advanced treatment required	MODERATE
Purchase Treated Water from the City of Mineral Wells	• Developing additional supplies with Turkey Peak Reservoir • Already have wholesale water connections	• Will require major infrastructure improvements to continue to meet growing demand	MODERATE
Purchase Treated Water from the City of Fort Worth	• Large, wholesale water provider with treatment • Eastern border of the study area • Has agreed to supply wholesale water to select new customers within the study area (Willow Park and Hudson Oaks)	• Currently focused on providing supplies within their existing service area • Not interested in serving additional customers	LOW
Purchase Treated Water from the City of Weatherford	• Extremely familiar with local entities	• Existing supplies cannot sustain growth within the existing service area	LOW

STRATEGY CONSIDERED	PROS	CONS	FEASIBILITY
	• Has treatment expertise and local WTP • Has intake at Lake Benbrook (TRWD source)	• Not interested in serving additional customers • Cannot resell water from TRWD	
Purchase Treated Water from the Walnut Creek SUD	• Already supplies a large area of northern Parker and southern Wise counties • Has treatment expertise and can easily expand to 14 MGD (also has a plat considered for new 24 MGD plant)	• Purchases water from TRWD and intake is at Bridgeport Reservoir (local and system demands are high during drought) • Would like to serve their whole CCN but is limited by terrain, funding and existing infrastructure • Currently prioritizing existing customers	MODERATE
Purchase Treated Water from UTRWD	• Willing to build a WTP in the west side of their service area if raw water is available • Has treatment expertise • Interested in pursuing alternative supplies such as conjunctive use • Bolivar WSC is a planned future customer	• Facing water supply issues without adding new customers • Currently have no infrastructure in the western portion of their service area (Krum and Sanger are served by Denton)	MODERATE
Purchase Treated Water from Parker County SUD	• Interested in being a regional provider • Advanced treatment capacity • Can provide supplies to the Brazos Basin in Parker County • Interested in pursuing alternative supplies such as	• Limited by funding options • Limited by raw water supply options	HIGH

STRATEGY CONSIDERED	PROS	CONS	FEASIBILITY
	reuse and brackish groundwater		
Treat Raw Surface Water from TRWD	• Controls most nearby raw water supplies and most of the study area is within their service area • Organizationally and financially established entity • Future projects could increase the water supplies in Bridgeport Reservoir	• Only provides raw water supplies • Competing needs with current customers • Currently unable to move other TRWD supplies to Bridgeport Reservoir • Expensive initial buy-in	HIGH
Treat Raw Surface Water from Brazos River Authority	• Parker County SUD currently uses supplies from BRA and is familiar with the treatment process • Limited additional supplies available	• Limited to serving demand in southwestern Parker County (Brazos Basin) • Requires advanced treatment • Need to commit soon for limited available supply	MODERATE
Treat Raw Surface Water from a New Reservoir	• Would bring accessible surface water to the study area	• Significant costs and political obstacles • Limited yield for new surface water right • Requires water purchase from downstream water right holder(s)	LOW
Treat Raw Surface Water from Turkey Peak	• Would bring accessible surface water to the study area	• Unknown availability of supplies • Would require partnering discussion with Palo Pinto County Municipal Water District No. 1 (Mineral Wells)	HIGH
Aquifer Storage and Recovery	• Opportunities when excess supplies available	• Not a supply but a tool to more efficiently use supplies	VARIES

STRATEGY CONSIDERED	PROS	CONS	FEASIBILITY
	• Increases reliability of water portfolios	• Requires sponsor • Feasibility varies	
Conservation and Drought Measures	• Reduces demand without needing to procure an alternate water source	• Requires culture shift • No enforcement in unincorporated/rural areas	VARIES
Reuse	• Potential additional source of supply	• Requires advanced treatment – potable • Requires separate distribution for non-potable • Availability dependent on population • Already using reuse from largest city - Weatherford	MODERATE
Rainwater Harvesting	• State sales tax exemption on rainwater harvesting equipment • Source of high quality supplies • Particularly beneficial in rural areas that are not connected to a public water system • UTGCD & Parker County Livestock Improvement Association Rain Catcher Winner	• Requires culture shift • Relatively variable quantity of supplies • Limited applicability • Requires supplemental source during drought	VARIES

4.01 General Implementation Plan for All Regions

There are some water management strategies that are feasible and recommended to be implemented for all subregions.

A. Regional Water Provider

Developing multiple small water treatment facilities across the region is not efficient and likely not economical in the long-term. A regional water provider can provide the expertise and resources to efficiently treat and deliver water to customers. There are several options for regionalization including working with an existing regional level entity or creating a new regional entity. However, several items would need to be addressed prior to a final decision as to who or how the regional entity should be structured.

There are benefits to using an existing entity, but the entity would need to express interest in leading efforts and establish a plan on how the water would be supplied to the surrounding areas. For example, would the existing entity expand its retail services, provide only wholesale water to areas outside its CCN, or do both. There are pros and cons for each scenario and ultimately, it would depend upon agreements between the existing entity and the recipient of the water. Many of the cities and towns in the study area are already distributing well water and may choose to engage with a regional water provider on a wholesale basis. Expanding water service to areas that are currently self-supplied or smaller utility districts may prefer retail service. Switching to a regional provider in areas that are self-supplied can take time to transition as many users may continue to use their well water. In general, most of the entities in the study area are groundwater-based and do not have a large, dedicated workforce capable of running a surface water treatment plant that may be needed to meet the growing demands in the region. It is impractical for each water user or small groups of water users to operate their own surface water facilities.

Based on the long-term options to meet the growing demands in Parker and Wise County, it is likely that treatment of surface water and/or brackish groundwater are the best options. In light of these options, it would be more cost effective to construct one large, single treatment plant that is operated by a regional entity. One regional entity consolidates ownership, permitting, and operations. It also allows for one plant with economies of scale. Existing cities, WCSs, and water utilities could participate in the forming of a regional entity. Several existing regional entities were developed in a similar fashion, such as UTRWD and NTMWD, when the need arose. Parker and Wise counties are growing quickly enough to justify the need to develop a new regional entity that is focused solely on securing supplies for this area. The new regional entity could be set up in such a way that the Board of Directors, or some similar governing body, would have representation from each of the subregions and/or existing providers. A benefit to the single, new entity is that it can demonstrate the need to develop water for the entire service area and provides the best opportunity for streamlining both decision making and implementation of large projects. This is particularly true for any projects that require permitting. ***There are significant***

benefits to the development of a new, regional entity to lead the charge in securing future water supplies for the region. If development of a new regional entity is pursued, then the groundwork will need to begin as soon as possible for maximum benefit.

B. County Actions

County officials are vital to the success of this plan and there are several actions the counties can take.

- **Groundwater Study Requirements.** Section 230.0032 of the Local Government Code allows for the county to adopt requirements for a groundwater study. Additionally, 30 TAC 230.1(a) states that if a city or county chooses to exercise its authority to require a groundwater availability certification (GAC) the form and content of the chapter must be used. However, 30 TAC 230.1(b) states that the TCEQ rules do not replace the authority of counties within PGMAs under Section 35.019, Water Code, or the authority of GCDs under Chapter 36. Parker and Wise counties are both within the North-Central Texas Trinity and Woodbine Aquifers PGMA. Since the counties are located within a PGMA, it is recommended that the counties adopt their own requirements for groundwater studies to ensure that groundwater supplies are protected.
- **Interlocal Agreement with UTGCD to Review and/or Oversee GAC.** The UTGCD has secured the services of a highly qualified team of experts and professionals to assist in the state mandated GMA process as well as providing invaluable expertise, data, and insight into the decision-making process. This team is available to the counties as a resource. Several nearby counties have already entered an interlocal agreement with their respective GCDs to review and/or oversee the GAC study. The counties can leverage this expertise by allowing UTGCD staff to review the Certification Statement and ensure that the study was thoroughly completed.
- **Provide Funding Assistance.** Future water supply solutions will benefit from a regional approach. The counties, with assistance from the state and possible federal funding sources, can help fund some of these solutions. For example, Parker County has earmarked a portion of the American Rescue Plan funding for future water planning needs. Water suppliers also have access to several financial assistance programs sponsored by the TWDB.
- **Develop Strategic Water Planning Task Force.** It is vital that there is communication between all stakeholders to successfully plan for the management of water supplies. Development of a strategic planning task force would encourage open communication and foster a sense of community. The task force would need to represent different interest groups within the community with a variety of experience. The task force could meet on a recurring basis to discuss any issues, ongoing studies, or projects to solidify a cohesive approach to the management of water supplies and provide a support system for both water suppliers and users alike.

- **Conservation Education and Implementation.** A significant portion of a homeowner's water use is generally attributed to outdoor watering. Private well owners have little incentive to reduce outdoor watering since there is not a direct cost associated with excessive water consumption. Education and implementation of responsible water usage is important, however there is little that can be done to enforce or mandate conservation for private well owners. Several of the water suppliers, as well as UTGCD, have created materials for educating the public on the importance of water conservation. County leadership can consolidate and facilitate distribution of available conservation education materials.

C. Water User Actions

There are several strategies that can be implemented by water users and are applicable to all regions. These strategies are listed below and can be implemented as needed by water users to help meet gaps in need as entities are transitioning.

- **Drill Additional Wells.** One option that was considered was to continue relying on groundwater and drill additional wells. **Continuing to rely only on groundwater is not sustainable for many areas in the long term and will hamper area growth due to groundwater availability, water quality and the land area needed for wells**. Existing wells are already experiencing decreases in capacity due to the significant cone of depression and water table fluctuation effect on the source aquifers. As demands increase, available supply will continue to decrease due to the expanding cone of depression. Supplies in the western portion of the study area are more limited than supplies in the east. Drawdown in the aquifer also increases the amount of sands introduced into a well, which presents serious contamination concerns. There are also land and property constraints when water is supplied via a well. Each well must include a control easement of 300 feet in diameter surrounding the well, which translates to a need of approximately 2 acres of property per well. This severely limits potential development. Additionally, some activities are not allowed within a 500-foot radius of a well therefore restricting 18 acres from certain uses and activities. Another potential problem with the continued and increased use of well water is the threat of contamination. The lack of sanitary sewers in the study area and the growing number of septic systems raises concern, especially for older, potentially uncased or abandoned wells. Anything that is placed in a well has direct access to the aquifer. Overall, continuing to drill wells may be necessary to accommodate growth in the near term but is not a reliable source in the long term and cannot support densification of the area.
- **Conservation and Drought Measures**. The simplest way to reduce future needs is not to acquire new supplies, but to reduce current demand. There is currently very little that can be done to enforce water conservation in rural areas. However, there are actions that can be taken. For example, developments can implement subdivision rules to promote sustainable development and water use. These rules can include limited irrigated turf

area and other landscape ordinances. These types of strategies will require a culture shift however it will be an essential component to the future of water supplies within Parker and Wise counties.

- **Rainwater Harvesting**. Rainwater harvesting is something that can be implemented in the short term and will be particularly beneficial in rural areas that are not connected to a public water system. There is a state sales tax exemption on rainwater harvesting equipment and the UTGCD has implemented several examples of how this type of strategy can be feasible. The main issue with this strategy is that a culture shift will be needed to educate rural communities to the benefits. There are some downsides as well, however including a relatively variable quantity of supplies. During drought these harvesters will be less useful. However, they can alleviate the strain on groundwater supplies during moderate and wet years. Financial incentives such as property tax exemptions could be used to promote sustainable development practices like this.
- **Aquifer Storage and Recovery**. Aquifer storage and recovery projects utilize local aquifers as water savings accounts, depositing and transferring water for beneficial use. These projects don't create new supply however they can improve water sustainability and reliability. ASR is still relatively new throughout the region however some entities (including TRWD) have begun pilot studies. There are also municipal scale facilities already implemented in El Paso, Kerrville, and San Antonio. The main issue with ASR is that the project will require a sponsor. To be feasible this endeavor would need to be led by one of the larger entities within the study area. According to studies performed by the TWDB, the study area ASR final suitability score is generally in the moderately to most suitable range.
- **Reuse**. Reuse is the use of treated wastewater for water supply. This could include potable or non-potable supplies. Often reuse is used for non-potable purposes, such as irrigation. Larger quantities of reuse are available from permitted wastewater systems, usually associated with municipalities. Weatherford already incorporates reuse in its water supplies. A large portion of the study area is served by septic systems, which limits the availability of reuse water. **Transitioning these areas to wastewater service could potentially generate a source of water for reuse.** As the counties become more developed, centralized wastewater collection and treatment is expected to become available. This may also provide opportunities for current residents to convert from septic systems to a central sewer system. Several of the larger entities already have sewer systems in place but do not currently implement reuse. It is also a possibility that if a regional entity is formed, one of the entity's directives could be to manage and implement a regional wastewater system. This would provide residents with a valuable service while also generating a potential source of water supply. An example would be the Trinity River Authority who operates several large, regional wastewater systems. It also could help reduce the potential for contamination to groundwater and surface water sources from the many septic systems.

- **Transition of rural areas into public water systems**. As rural areas become developed it will benefit the county for smaller developments to transition into public water systems. Whether it be a water district such as a MUD or SUD, or a new municipality, the formation of public water systems provides the structure to finance improvements necessary to facilitate long-term water supplies. A public water system has dedicated resources whose goal is to provide water supplies for the future and can begin to partner with existing wholesale water providers to develop cohesive infrastructure.

4.02 Parker County Brazos Basin

The first subregion consists of the portion of Parker County that belongs to the Brazos River basin. Of the entities in this region, only five currently use supplies other than groundwater.

- **Mineral Wells.** The City of Mineral Wells owns and operates their own water treatment plant that treats supplies from Palo Pinto Lake. Currently the City supplies wholesale treated water to North Rural WSC, Palo Pinto WSC, Parker County SUD, and Santo SUD. Palo Pinto Lake is in the Brazos River Basin which allows the City to sell supplies to users within the basin without an interbasin transfer permit. However, the City has relayed to its current wholesale customers that they cannot guarantee contract renewals at their current quantities or rates. It currently plans to focus on meeting the growing demands within their own service area first but would like to continue serving their existing wholesale customers if they can implement the necessary infrastructure improvements and acquire additional raw water supplies.
- **Parker County SUD.** Parker County SUD owns and operates a Water Treatment Plant that has a capacity of 1 MGD. The WTP is a desalination plant that treats supplies from the Brazos River from BRA. The contract with BRA is a take or pay contract and supplies are mainly limited by infrastructure. PCSUD does not currently have any wholesale customers, however they are interested in becoming a regional provider within the study area. The SUD supplements supply with groundwater and purchases treated water from the City of Mineral Wells.

Modeled available groundwater supplies indicate that there is approximately 12.92 MGD within Parker County. For planning purposes, it is assumed that only 2.42 MGD of those supplies are within the Brazos basin. Groundwater supplies are being limited to this value for the purposes of this study. According to the projected demands, there are not enough water supplies to meet the demands by as early as 2030.

The following assumptions were made about future water supplies within this region.

- **Surface water supplies will originate from the Brazos River basin**. The transfer of supplies between river basins requires an interbasin transfer. This is a minor obstacle, however the main water providers in the Trinity River basin are focused on serving the growth within that basin.

- **Parker County SUD and the City of Mineral Wells will remain as major wholesale water providers**. Both Parker County SUD and the City of Mineral Wells have water treatment expertise. Developing treatment infrastructure as well as expertise is an obstacle for smaller utilities and rural areas. Supporting the two current major wholesale water providers will support regionalization.
- **Municipal water systems are reluctant to expand their water service areas**. In both Parker and Wise Counties annexation of areas outside of the city must be voluntary. These laws make it difficult for cities to expand their water service areas. This does not preclude the system from providing wholesale water supplies.
- **Turkey Peak Reservoir will be constructed prior to 2030**. Palo Pinto County Municipal Water District No.1 is currently in the process of expanding their raw water supplies with the construction of Turkey Peak Reservoir. This will increase their capacity from 8.8 billion gallons to 15.9 billion gallons. Although some of the supplies will be allocated to Palo Pinto County, this is a partnering opportunity that could provide another raw water supply source.

The short-, mid- and long-term demands are summarized in TABLE 15.

TABLE 15: PARKER COUNTY BRAZOS REGION DEMAND SUMMARY

WATER USER	2030 DEMAND	2050 DEMAND	2080 DEMAND
Mineral Wells	0.32	0.36	0.38
Parker County SUD	0.87	1.61	4.00
Santo SUD	0.02	0.02	0.02
Millsap WSC	0.10	0.14	0.18
North Rural WSC	0.09	0.09	0.10
Rio Brazos WSC	0.06	0.08	0.10
Whitt WSC	0.01	0.01	0.01
Investor-Owned Utilities	0.88	1.21	1.86
P2	0.82	1.11	1.49
P12	0.25	0.33	0.47
P13	0.49	0.98	1.53
P14	0.75	1.99	6.44
TOTAL Demand	**4.66**	**7.91**	**16.59**
MAG	2.42	2.42	2.42
Supplies from Mineral Wells - Existing Customers	0.53	0.61	0.68
Supplies from Parker County SUD – Existing Customers	0.87	1.61	4.00
NEED	**0.84**	**3.28**	**9.49**

NOTE: Supplies from Mineral Wells include the demands of Mineral Wells, Santo SUD, Millsap WSC, and North Rural WSC. Supplies from Parker County SUD only includes the demands of Parker County SUD.

The short-, mid- and long-term needs can potentially be met through the following implementation plan.

Short-Term (Prior to 2030)

- Consider the water management strategies described in **Section 4.01**.
- Continue to explore the potential to develop brackish groundwater in southwest Parker County.
- Consider purchasing additional water from BRA.
- Applicants for groundwater permits should evaluate options and long-term feasibility.
- Increase treatment infrastructure at both Mineral Wells and Parker County SUD
- Enter partnership with Palo Pinto County MWD on the construction of Turkey Peak Reservoir. Consider contracting with Mineral Wells for treated water from Turkey Peak Reservoir.
- Develop transmission infrastructure from the City of Mineral Wells to the Northern portion of the region and transmission infrastructure from Parker County SUD to the Southern portion of the region.
- ***Approximately 0.84 MGD of demand will need to transition to other sources by 2030 to preserve the aquifer.***

Mid-Term (Prior to 2050)

- Depending on results from test wells, consider developing more groundwater resources in the Cross Timbers aquifer.
- Continue to develop transmission infrastructure from the City of Mineral Wells to the Northern portion of the region and transmission infrastructure from Parker County SUD to the Southern portion of the region.
- Conduct studies for ASR on suitability for aquifer storage. If suitable, treated water during normal to wet periods could be stored for high demand periods. This may be more conducive for Parker County SUD that currently diverts and treats Brazos River water.
- ***Approximately 3.28 MGD of demand will need to transition to other sources by 2050 to preserve the aquifer.***

Long-Term (Prior to 2080)

- Continue to develop transmission infrastructure from the City of Mineral Wells to the Northern portion of the region and transmission infrastructure from Parker County SUD to the Southern portion of the region.
- ***Approximately 9.49 MGD of demand will need to transition to other sources by 2080 to preserve the aquifer.***

4.03 Parker County Trinity Basin

The next subregion consists of the portion of Parker County that lies in the Trinity River basin. There are more water users using surface water supplies in this region compared to the Brazos basin region. The larger water providers include:

- **Weatherford.** The City of Weatherford treats supplies from Lake Weatherford and purchases supplies out of Benbrook Lake from TRWD. Other than Lake Weatherford and indirect reuse, all the other water sources currently being used originate from TRWD.
- **Fort Worth.** The City of Fort Worth is TRWD's largest customer and treats supplies out of several reservoirs in the TRWD system. The City of Fort Worth is also a wholesale water supplier and sells treated water supplies to some water users on the eastern edge of the county border including Aledo, Hudson Oaks, and Willow Park. The City purchases raw water supplies from the TRWD reservoir system. The City's service area is currently served by five water treatment plants. These plants are Rolling Hills (200 MGD design capacity), North Holly (80 MGD design capacity), South Holly (100 MGD design capacity), Eagle Mountain (105 MGD design capacity), and Westside (15 MGD design capacity). Fort Worth has indicated that it is not currently able to serve additional western wholesale water customers outside of its ETJ.
- **Walnut Creek SUD.** Walnut Creek SUD's service area and CCN are split between northern Parker and southern Wise counties. Walnut Creek purchases and treats supplies out of Bridgeport Reservoir from TRWD. Walnut Creek SUD is also a wholesale water supplier and sells treated supplies to the City of Reno.
- **Springtown.** The City of Springtown purchases and treats supplies from TRWD (Eagle Mountain Lake) and supplements their supply with groundwater and additional supplies purchased from Walnut Creek SUD (Bridgeport Reservoir). The City has a contract limit with TRWD of 1,121 AFY. The raw water is treated at the Springtown Water Treatment Plant and has the capability of treating 1 MGD. The City does not currently sell wholesale water.
- **Azle.** The City of Azle also purchases and treats supplies out of Eagle Mountain Lake from TRWD. The City has an intake on Eagle Mountain Lake and has a contract limit of 1,680 AFY. The raw water is treated at the Azle WTP which can treat up to 6 MGD. The City does not currently sell wholesale water.

Groundwater supplies are more plentiful in this region of the county. Out of the modeled available groundwater supplies it is assumed that for planning purposes 10.5 MGD is available in the Trinity basin portion (out of 12.92 MGD). Groundwater supplies are being limited to this value for the purposes of this study. If there are not enough groundwater supplies, other supplies will be needed. According to the projected demands, there are not enough groundwater supplies to meet the demands by as early as 2030.

The following assumptions were made about future water supplies within this subregion.

- **Additional surface water supplies will originate from TRWD.** Other than supplies out of Lake Weatherford, all other surface water supplies in this subregion originate from the TRWD system. Due to the lack of other feasible surface water options, it is assumed that additional future surface water supplies will also originate from the TRWD system. The study area within the Trinity River basin falls within the TRWD's service area. However, TRWD sells raw water only and the supplies will need to be treated.
- **Municipal water systems are reluctant to expand their water service areas.** In both Parker and Wise Counties annexation of areas outside of the city must be voluntary. These laws make it difficult for cities to expand their water service areas. This does not preclude the system from providing wholesale water supplies.
- **Municipalities will seek to transition to surface water sources first**. This would include Annetta only for this subregion. However, if Annetta transitions to surface water prior to 2030 this will alleviate the short-term need on the subregion.

The short-, mid- and long-term demands are summarized in TABLE 16.

TABLE 16: PARKER COUNTY TRINITY REGION SUMMARY

WATER USER	2030 DEMAND	2050 DEMAND	2080 DEMAND
Aledo	1.48	1.95	2.46
Annetta	1.07	1.42	1.95
Azle	0.42	0.48	0.84
Fort Worth	10.21	14.04	17.66
Hudson Oaks	0.87	0.94	1.03
Reno	0.24	0.25	0.28
Springtown	1.02	1.24	1.63
Weatherford	9.40	13.99	29.23
Willow Park	1.01	1.43	2.38
Walnut Creek SUD	3.14	4.85	12.04
Water Supply Corporations	0.39	0.52	0.70
Investor-Owned Utilities	0.74	1.00	1.35
Rural Water Users	8.59	20.19	55.29
TOTAL Demand	**38.58**	**62.28**	**126.84**
MAG	10.50	10.50	10.50
Supplies from Weatherford – Existing Customers	9.40	13.99	29.23
Supplies from TRWD - Existing Customers	17.63	24.41	37.57
NEED	**1.05**	**13.38**	**49.54**

NOTE: Supplies from Weatherford include the demand at Weatherford. Supplies from TRWD include the demand on Aledo, Azle, Fort Worth, Hudson Oaks, Reno, Springtown, Willow Park and Walnut Creek SUD.

The short-, mid- and long-term needs can potentially be met through the following implementation plan.

Short-Term (Prior to 2030)

- Consider the water management strategies described in **Section 4.01**.
- Applicants for groundwater permits should evaluate options and long-term feasibility.
- Annetta is the only municipality still on groundwater supplies only. If the City of Annetta connects to a surface water source, the need will be met in 2030. The City of Weatherford is the most feasible alternative; however, an agreement will need to be reached. The City of Fort Worth is another nearby alternative, but the same obstacles apply.
- ***Approximately 1.05 MGD of demand will need to transition to other sources by 2030 to preserve the aquifer.***

Mid-Term (Prior to 2050)

- ***Northeastern Parker*** **-** By 2050 it is projected that TRWD will have acquired an additional source of supply and will connect that supply to Bridgeport Reservoir. This will give the system more flexibility for transferring supplies to wholesale water providers in Parker County. These supplies will need to be treated and distributed by a wholesale water provider. The most feasible alternative would be Walnut Creek SUD. The SUD has both the CCN as well as the treatment infrastructure and expertise. Another alternative would be a new regional entity.
- ***Southeastern Parker*** – It would not be feasible to connect supplies from Bridgeport Reservoir to water users in the southeastern portion of the Trinity basin in Parker County. However, these water users will also need to begin transitioning off groundwater supplies to meet the need by 2050. The most feasible alternative for this area would be to connect to supplies treated either by the City of Weatherford or the City of Fort Worth. Both have treatment infrastructure and expertise as well as reuse programs in place. An incentive could be for the water systems to construct wastewater treatment plants and authorize either City to utilize the reuse.
- ***Approximately 13.38 MGD of demand will need to transition to other sources by 2050 to preserve the aquifer.***

Long-Term (Prior to 2080)

- Continue to develop treatment and transmission infrastructure from Walnut Creek SUD (or other wholesale water provider).
- Continue to develop treatment and transmission infrastructure from the City of Weatherford or Fort Worth (or other wholesale water provider).

- ***Approximately 49.54 MGD of demand will need to be met by other sources by 2080 to preserve the aquifer.***

4.04 Wise County

Wise County is located entirely within the Trinity River basin and is within the service area of the TRWD. There is not a lot of surface water supplies located within the county. Almost every water user that uses surface water supplies within the county purchases supplies out of Bridgeport Reservoir from TRWD (or through another wholesale water provider). The only exception is the small portion of the City of Fort Worth that extends into Wise County. Potential wate rsuppliers in Wise County include:

- **Fort Worth.** The City of Fort Worth is TRWD's largest customer and treats supplies out of several reservoirs in the TRWD system. A small portion of the city is located within Wise County. The city, however, does not sell wholesale water supplies to any other water users within Wise County. The city purchases raw water supplies from the TRWD reservoir system. The city's service area is currently served by five water treatment plants. These plants are Rolling Hills (200 MGD design capacity), North Holly (80 MGD design capacity), South Holly (100 MGD design capacity), Eagle Mountain (105 MGD design capacity), and Westside (15 MGD design capacity). Fort Worth has indicated that it is not currently able to serve additional western wholesale water customers outside of its ETJ.
- **Walnut Creek SUD.** Walnut Creek SUD treats supplies and is a wholesale water provider to Boyd, Paradise, Rhome and West Wise SUD. West Wise SUD in turn sells water to the City of Chico. Walnut Creek SUD purchases raw water from the TRWD through Bridgeport Reservoir. WCSUD currently provides wholesale supplies to Boyd, Reno, Rhome, and West Wise SUD. WCSUD operates a 10 MGD WTP and their contract with TRWD is currently limited to 2,200 AFY. WCSUD is in a strategically advantageous position to become a regional provider since they are located in both Parker and Wise Counties.
- **Bridgeport.** The City of Bridgeport purchases raw water supplies from the TRWD and has an intake on Bridgeport Reservoir. The city has a contract limit of 1,700 AFY. The raw water is treated at the Bridgeport Water Treatment Plant and has the capability of treating 4.2 MGD. The city does not currently sell wholesale water.
- **Runaway Bay.** The City of Runaway Bay purchases raw water supplies from the TRWD and has an intake on Bridgeport Reservoir. The city has a contract limit of 1,344 AFY. The raw water is treated at the Runaway Bay Water Treatment Plant, which has the capability of treating 1 MGD and is currently undergoing expansion. The City of Runaway Bay also sells treated supplies to Grand Harbor WSC and Hideaway Bay Lake Shores WSC.
- **Decatur.** Decatur purchases supplies out of Bridgeport Reservoir from TRWD. The entity that treats the water is Wise County WSD, whose only customer is the City of Decatur.

- **Bolivar WSC.** Bolivar WSC does not currently use surface water supplies however they are included because UTRWD has plans to serve them in the future. UTRWD currently delivers treated water to 29 towns, cities, and utilities in the larger region but outside Wise County. UTRWD's service area primarily covers Denton and Collin counties, Krum and Sanger are both member cities but UTRWD's transmission system does not currently extend that far. UTRWD purchases supplies from Denton to provide treated water to these customers in the interim. UTRWD is interested in extending their services to the northwestern portion of their service area and plans to serve Bolivar WSC in the future. A joint venture to acquire additional raw water supplies and treat them with a new WTP in the northwestern portion of the UTRWD service area could be mutually beneficial.

Modeled available groundwater supplies indicates that there is approximately 10.3 MGD within Wise County. Groundwater supplies are limited to this value for the purposes of this study. According to the projected demands, there are not enough groundwater supplies to meet the demands by as early as 2030.

The following assumptions were made about future water supplies within this region.

- **Municipal water systems are reluctant to expand their water service areas**. In both Parker and Wise Counties annexation of areas outside of the city must be voluntary. These laws make it difficult for cities to expand their water service areas. This does not preclude the system from providing wholesale water supplies.
- **Municipalities will seek to transition to surface water sources first**. This would include Alvord and Newark for this subregion.

The short-, mid- and long-term demands are summarized in TABLE 17.

TABLE 17: WISE COUNTY REGION SUMMARY

WATER USER	2030 DEMAND	2050 DEMAND	2080 DEMAND
Alvord	0.40	0.54	0.78
Boyd	0.26	0.52	0.78
Bridgeport	1.53	2.88	4.74
Chico	0.49	0.90	1.70
Decatur	2.86	4.84	7.65
Fort Worth	4.59	6.32	7.95
Newark	0.26	0.51	1.20
Paradise	0.07	0.09	0.12
Rhome	0.62	1.23	2.99
Runaway Bay	0.52	0.72	1.14
West Wise SUD	0.62	0.75	1.00
Walnut Creek SUD	0.55	0.86	2.12
Water Supply Corporations	0.17	0.23	0.35
Investor-Owned Utilities	1.06	1.43	1.93
Rural Users	9.62	23.12	49.45
TOTAL Demand	**23.63**	**44.94**	**83.91**
MAG	10.30	10.30	10.30
Supplies from TRWD - Existing Customers	11.70	18.70	29.80
NEED	**1.64**	**15.94**	**43.81**

NOTE: Supplies from TRWD includes the demands of Boyd, Bridgeport, Chico, Decatur, Fort Worth, Paradise, Rhome, Runaway Bay, West Wise SUD, Walnut Creek SUD, Grand Harbor WSC, and Hideaway Bay Lake Shores WSC.

The short-, mid- and long-term needs can potentially be met through the following implementation plan.

Short-Term (Prior to 2030)

- Consider the water management strategies described in **Section 4.01**.
- Limit new groundwater permits as feasible. Applicants for groundwater permits should evaluate options and long-term feasibility.
- Alvord and Newark are the only two municipalities still on groundwater supplies only. If these entities connect to an alternative water supply source, then that will account for 0.66 MGD of the 1.69 MGD need in 2030. The most feasible alternative for Alvord would be to connect to a wholesale water provider that treats supplies from Bridgeport Reservoir and the most feasible alternative for Newark would be to connect to the City of Fort Worth.
- Other water users will need to transition to meet the 2030 need. A large portion of the growth is due to rural users and new developments concentrated in the southeastern

portion of Wise County. The most feasible alternative for these developments would be to connect to the City of Fort Worth or Walnut Creek SUD.

- ***Approximately 1.64 MGD of demand will need to transition to other sources by 2030 to preserve the aquifer.***

Mid-Term (Prior to 2050)

- Continue to develop transmission infrastructure from wholesale water providers - whether Walnut Creek SUD, the City of Fort Worth or West Wise SUD.
- By 2050 it is projected that TRWD will have acquired an additional supply, which would allow more supply to be used for local use. These supplies will need to be treated and distributed by a wholesale water provider. The most feasible alternative would be Walnut Creek SUD. The SUD has both the CCN as well as the treatment infrastructure and expertise. Another alternative would be a new regional entity that could be used to serve only the growing demand or could consolidate existing providers in both Wise and Parker counties. Whether a new regional provider is pursued or an existing provider expands its service area, it is recommended to utilize the existing infrastructure as much as feasible.
- ***Approximately 15.94 MGD of demand will need to transition to other sources by 2050 to preserve the aquifer.***

Long-Term (Prior to 2080)

- Continue to develop transmission infrastructure from wholesale water providers - whether Walnut Creek SUD, the City of Fort Worth or West Wise SUD.
- Connect Bolivar WSC to the UTRWD system. At this point in time there might be other northern Wise County entities that could partner to develop the necessary infrastructure.
- Consider the development of the new reservoir discussed in Appendix B. There are significant obstacles that will need to be overcome to implement.
- ***Approximately 43.81 MGD of demand will need to transition to other sources by 2080 to preserve the aquifer.***

4.05 Conclusions

Water providers and community leaders in both Parker and Wise counties are charged with the task of supporting a rapidly growing region in need of a safe, reliable water supply. The challenges facing the counties are like those that other counties have had to overcome in the past. Local water supplies are limited, and communities need additional supplies to support their rapidly growing populations and provide for the prosperity of the region. It is the responsibility of the community to be good stewards of the region's natural and financial resources. While it is still unknown the exact amount of water that will be needed in the future, it is known that current supplies are not sufficient. A cultural shift towards water efficiency is vital since new water supply sources can take many years to plan, permit and develop. The counties will also

need to plan for and construct the necessary transmission and treatment infrastructure to continue to support the growing community. While there are many obstacles to overcome, the UTGCD is committed to their mission to provide protection to existing wells, prevent waste, promote conservation, provide a framework that will allow availability and accessibility of groundwater for future generations, protect the quality of the groundwater in the recharge zone of the aquifer, ensure that the residents of Parker and Wise Counties maintain local control over their groundwater, respect and protect the property rights of landowners in groundwater, and operate the District in a fair and equitable manner for all residents of the District.

5 APPENDICES

Shore of Bridgeport Reservoir

APPENDIX A

STUDY AREA STAKEHOLDER SURVEY

Regional Water Supply and Facilities Planning for Parker and Wise County

UTGCD Stakeholder Survey Introduction

Thank you for taking the time to fill out this survey for the Upper Trinity Groundwater Conservation District. Your feedback is an important part of District efforts to develop a sustainable and implementable water supply solution. If you have any questions and/or additional feedback regarding this survey, please contact Abbie Gardner at abagail.gardner@freese.com.

Please take a moment to review the following guidance before starting the survey:

- If you wish to return to an earlier portion of the survey, use the "Prev" button at the bottom of the page. Please do **NOT** use the "Back" button on your browser. You can navigate back to previous sections at any time as long as you have not yet submitted the completed survey.
- You can close your browser and return to your stopping point later, but to do so without losing your data you **MUST** be on the same computer **AND** allow your browser to store cookies. Each page is only saved after you click "**Next**" at the bottom.

Regional Water Supply and Facilities Planning for Parker and Wise County

UTGCD Stakeholder Survey
Section 1: Background Information

*** Please enter contact information for your organization below.**

Name of your organization:	
Person to contact::	
Contact e-mail:	
Contact phone number:	

Regional Water Supply and Facilities Planning for Parker and Wise County

UTGCD Stakeholder Survey
Section 2: Water Service Area

Please use the unique OneDrive link provided in your email to view Figure 1. The figure depicts your water service area, city limits, and CCN. Projections are based on the TWDB Water Service Area shown in red.

Do these boundaries look correct?

- ◯ Yes
- ◯ No

If there are any changes that should be made, please describe below.

UTGCD Stakeholder Survey
Section 3: Relevant Studies

Are there any relevant studies you can share (e.g., population projections, impact fee studies, master plans, system mapping, schematics, or other helpful information)?

- ◯ Yes
- ◯ No

If so, please upload documents by clicking on the unique OneDrive link provided in your email, and selecting “Upload”.

Regional Water Supply and Facilities Planning for Parker and Wise County

UTGCD Stakeholder Survey
Section 4: Population

Please use the unique OneDrive link provided in your email to view Figure 2. The figure shows historical population as reported in the TWDB Water Use Surveys as well as from the 2020 Census. If available, population projections from published studies are included as well. Population Projections proposed to be used in this study are shown as 'Projected - Expected Projections.'

If you have any comments or suggested revisions to the draft projections included here, please describe below.

What is your projected build out population? What year is it projected?

Build out population

Build out year

Regional Water Supply and Facilities Planning for Parker and Wise County

UTGCD Stakeholder Survey
Section 5: Demand

Please use the unique OneDrive link provided in your email to view Figure 3. The figure shows historical water demands as well as expected demand projections. These projections are for dry year (average day) water demands.

Please note: Expected water demands in Figure 3 are based in part on prior TWDB population projections. Demand estimates for the study may be updated with any information you provided in Section 4 regarding population.

Do these demand projections look reasonable?

- ◯ Yes
- ◯ No

If you have any suggested changes, please describe below.

Do you have any current wholesale customers?

- ◯ Yes
- ◯ No

If you selected yes, please list current wholesale customers in the space below.

Do you anticipate any new wholesale customers?

- ◯ Yes
- ◯ No

If you answered yes, please provide a timeline and any available projection, connections, and/or flow rate data you have in the space below. If your information is extensive, you may also upload the data by clicking on the unique OneDrive link provided in your email, and selecting “Upload”.

Are there any customers you plan to cease supplying in the future?

- ◯ Yes
- ◯ No

If you selected yes, please list these customers in the space below.

Regional Water Supply and Facilities Planning for Parker and Wise County

UTGCD Stakeholder Survey
Section 6: Infrastructure

Please provide a high-level summary of existing infrastructure capacities and constraints (e.g., storage tanks, wells, delivery points, pump stations, etc.).

Would you be willing to share any GIS data regarding infrastructure?

- ○ Yes
- ○ No

If so, please upload data by clicking on the unique OneDrive link provided in your email, and selecting “Upload”.

APPENDIX B

NEW RESERVOIR EVALUATION

FNI conducted a high-level feasibility analysis for a potential reservoir to assess if it could provide a reliable source of water to the region. Since no information was provided for the potential reservoir other than the tributary and general area, the chosen size and location of the reservoir were based on engineering judgement. The proposed reservoir on Denton Creek would be formed by a dam approximately 0.5 miles in length located just north of Highway 380. The dam would inundate 2,658 acres and store up to 28,897 acre-feet (ac-ft) of water at a conservation pool elevation of 759 feet. The contributing drainage area for the reservoir would be approximately 283 square miles. The reservoir would be located upstream of Grapevine Lake, a major water supply reservoir for the Dallas-Fort Worth Metroplex. FIGURE B-1 shows the reservoir with the drainage area and location relative to Grapevine Lake.

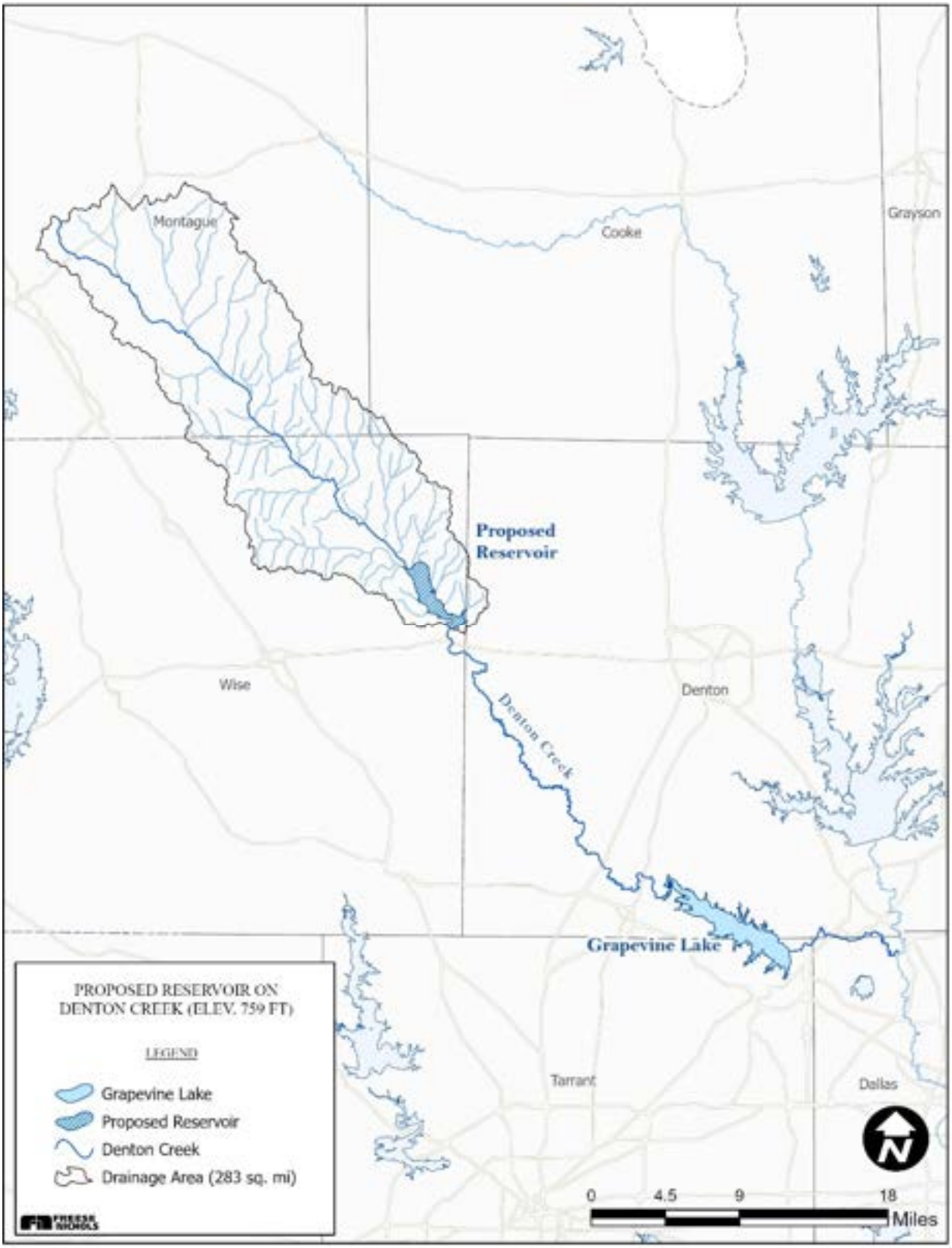
To determine an appropriate location for the dam site, the terrain along the reach of Denton Creek between Highway 380 and FM 51 was analyzed using a digital elevation model (DEM). A suitable location was chosen at a narrow point in the creek channel to maximize water surface elevation and minimize dam length. One-foot elevation contours were then generated from the DEM, and surface area and volume were calculated at each contour elevation to create an area-capacity-elevation relationship (TABLE B-1). A conservation pool elevation of 759 feet was chosen because the capacity at that elevation (28,897 ac-ft) would be similar to Lake Amon Carter, a nearby reservoir in the Trinity Basin. While this elevation was chosen for the conservation pool, other elevations could be chosen as alternatives.

TABLE B-1: AREA ELEVATION CAPACITY RELATIONSHIP FOR PROPOSED DENTON CREEK RESERVOIR

ELEVATION (FT)	AREA (AC)	CAPACITY (AF)
717	0	0
721	3.1	6.0
725	7.7	26
729	25	88
733	87	305
737	138	757
741	310	1,495
745	869	3,756
749	1,253	8,107
753	1,951	14,589
757	2,517	23,720
759*	2,658	28,897

*Conservation Pool Elevation

FIGURE B-1: LOCATION OF PROPOSED RESERVOIR ON DENTON CREEK



Water supplies for the proposed Denton Creek reservoir were determined using a modified version of the Texas Commission on Environmental Quality (TCEQ) Trinity River Basin Water Availability Model (WAM). The WAM is a computer-based simulation that predicts the amount of water available at a specific point in a river basin under a certain set of conditions. The WAM is used by TCEQ to evaluate new water right applications. The current version of the Trinity River Basin WAM includes hydrologic data from 1940 to 1996. This data is used by the model to estimate how much and how often water would be available at a given point in the basin. Water rights are represented in the WAM as control points. Available water is allocated to the most senior water rights first based on the year the water right permit was issued.

To determine available water supplies for the proposed reservoir on Denton Creek, a control point was added at the reservoir site to represent a municipal water right. The model was run under two different priority scenarios. First, the water right was given the most junior priority date in the Trinity basin, meaning water in Denton Creek would only be available for the proposed water right if there is enough water to satisfy all other senior water rights. In the second scenario, the reservoir was given a the most senior water right in the basin. Although a water right for a new reservoir would not have a senior priority date, this scenario was run to estimate the maximum amount of water the reservoir could theoretically supply if no water in Denton Creek was allocated to other water rights. The results of each scenario are shown in TABLE B-2.

TABLE B-2: WATER SUPPLY AVAILABILITY FOR PROPOSED DENTON CREEK RESERVOIR UNDER DIFFERENT WATER RIGHT PRIORITY SCENARIOS

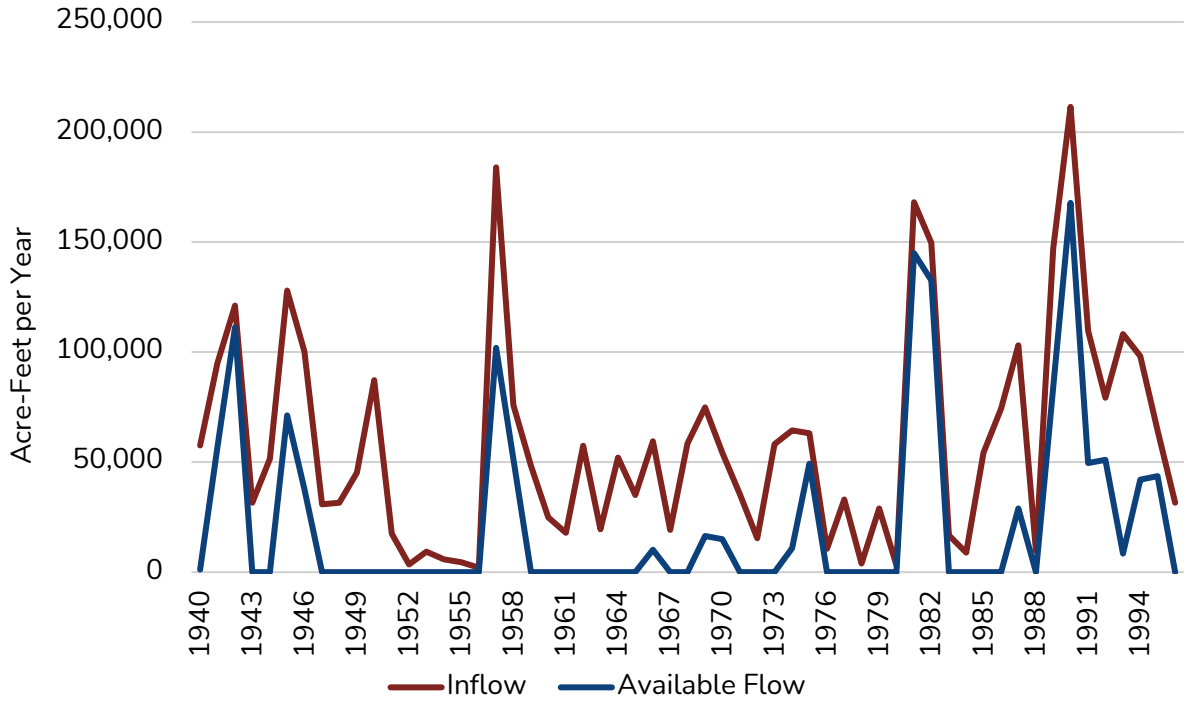
WATER RIGHT PRIORITY	FIRM YIELD (AFY)	PERCENT OF MONTHS WITH AVAILABLE WATER[1]
Junior	22	7%
Senior	4,524	88%

[1]This represents the months when new state water can be diverted or stored. Water can be diverted from storage during other times.

The reservoir firm yield is the metric used by TCEQ to measure a reservoir's water supply reliability. The firm yield is the maximum annual diversion from a reservoir under the worst drought of record. Under the junior priority scenario, the firm yield of the proposed reservoir is 22 ac-ft per year, while under the seniority priority scenario the firm yield is 4,524 ac-ft per year. The reason the yield is much less in the junior priority scenario is because most of the available water in Denton Creek is reserved for downstream senior water rights from Grapevine Lake. The WAM estimated there would be available water to divert and/or store during only 7% of months from the historical period analyzed (1940-1996). FIGURE B-2 shows the amount of inflow into the reservoir compared to the available flow for diversion from the proposed new reservoir on

an annual basis. While there is available flow during wet years, during dry years there is little to no available flow.

FIGURE B-2: INFLOW COMPARED TO AVAILABLE FLOW FOR PROPOSED DENTON CREEK RESERVOIR – JUNIOR WATER RIGHT SCENARIO



Given the results of the WAM scenario with a junior water right priority, the proposed reservoir would not be a reliable water supply source. The model did not take into account environmental flow requirements, which is the amount of water that must be released downstream from a reservoir for environmental benefits. This would reduce the already very limited supply even further.

The most feasible scenario to obtain a water right permit and some reliable supply for the reservoir would be through an agreement with downstream senior water right holders at Grapevine Lake. These include City of Grapevine, City of Dallas, and Dallas County Park Cities Municipal Utility District. These stakeholders would have to agree to divert less water to increase the available yield from the proposed Denton Creek reservoir. The proposed reservoir project sponsor(s) would have to compensate the other water right holders for the reduced yield in Grapevine Lake. Another challenge presented by this approach would be the regulatory and permitting process which is complex and can be lengthy.

APPENDIX C
Projection Tables

PARKER COUNTY

MAP KEY		ANNUAL GROWTH RATE						POPULATION								PEOPLE PER ACRE						DEMAND (MGD)						
		2020 - 2030	2030 - 2040	2040 - 2050	2050 - 2060	2060 - 2070	2070 - 2080	2020 CENSUS	2020 REPORTED POPULATION	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	Selected GPCD	2030	2040	2050	2060	2070	2080
MUNICIPALITIES																												
3	ALEDO	8.95%	1.40%	1.41%	0.84%	0.77%	0.72%	*4,448*	*3,691*	8,700	10,000	11,500	12,500	13,500	14,500	5.34	6.14	7.06	7.67	8.29	8.90	170	1.48	1.70	1.95	2.12	2.29	2.46
5	ANNETTA	7.02%	1.50%	1.30%	1.15%	1.03%	1.01%	*5,131*	*3,804*	7,500	8,700	9,900	11,100	12,300	13,600	1.06	1.23	1.40	1.57	1.74	1.93	143	1.07	1.25	1.42	1.59	1.76	1.95
7	AZLE	0.73%	0.65%	0.61%	1.12%	2.36%	2.26%	*2,490*	*2,790*	3,000	3,200	3,400	3,800	4,800	6,000	1.82	1.94	2.06	2.30	2.91	3.64	141	0.42	0.45	0.48	0.53	0.68	0.84
18	FORT WORTH	3.36%	2.12%	1.09%	0.85%	0.78%	0.67%	*40,753*	*41,515*	57,798	71,284	79,481	86,511	93,540	100,000	5.89	7.27	8.10	8.82	9.53	10.19	177	10.21	12.59	14.04	15.28	16.52	17.66
28	HUDSON OAKS	1.03%	0.36%	0.35%	0.33%	0.32%	0.31%	*4,106*	*4,962*	5,500	5,700	5,900	6,100	6,300	6,500	1.30	1.35	1.39	1.44	1.49	1.54	159	0.87	0.90	0.94	0.97	1.00	1.03
39	MINERAL WELLS	2.10%	0.54%	0.51%	0.49%	0.00%	0.00%	*160*	*1,463*	1,800	1,900	2,000	2,100	2,100	2,100	0.25	0.26	0.28	0.29	0.29	0.29	180	0.32	0.34	0.36	0.38	0.38	0.38
44	RENO	0.16%	0.29%	0.28%	0.27%	0.27%	0.26%	*6,135*	*3,346*	3,400	3,500	3,600	3,700	3,800	3,900	0.25	0.26	0.27	0.28	0.28	0.29	71	0.24	0.25	0.25	0.26	0.27	0.28
56	SPRINGTOWN	5.10%	0.94%	1.02%	0.93%	0.98%	0.90%	*3,101*	*3,100*	5,100	5,600	6,200	6,800	7,500	8,200	2.39	2.62	2.90	3.18	3.51	3.83	199	1.02	1.12	1.24	1.36	1.49	1.63
63	WEATHERFORD	1.90%	2.03%	1.99%	2.53%	2.49%	2.44%	*35,263*	*37,262*	45,000	55,000	67,000	86,000	110,000	140,000	1.54	1.88	2.29	2.94	3.76	4.78	209	9.40	11.48	13.99	17.96	22.97	29.23
68	WILLOW PARK	0.93%	1.31%	2.21%	2.53%	1.36%	1.26%	*6,563*	*6,562*	7,200	8,200	10,200	13,100	15,000	17,000	1.39	1.58	1.97	2.53	2.89	3.28	140	1.01	1.15	1.43	1.83	2.10	2.38
	SUBTOTAL							***108,150***	***108,494***	***144,998***	***173,084***	***199,181***	***231,711***	***268,840***	***311,800***								***26.04***	***31.22***	***36.09***	***42.28***	***49.45***	***57.84***
WATER DISTRICTS																												
41	PARKER COUNTY SUD	2.59%	3.14%	3.08%	3.10%	3.09%	3.07%	*676*	*7,044*	9,100	12,400	16,800	22,800	30,900	41,800	0.21	0.29	0.40	0.54	0.73	0.98	96	0.87	1.19	1.61	2.18	2.95	4.00
50	SANTO SUD	0.85%	0.54%	0.58%	0.57%	0.58%	0.50%	*126*	*124*	135	142	151	160	169	178	0.02	0.02	0.02	0.02	0.02	0.02	125	0.02	0.02	0.02	0.02	0.02	0.02
62	WALNUT CREEK SUD	4.97%	0.99%	3.41%	4.02%	2.72%	2.50%	*16,164*	*13,594*	22,071	24,362	34,075	50,558	66,114	84,631	0.44	0.49	0.68	1.01	1.32	1.69	142	3.14	3.47	4.85	7.19	9.41	12.04
	SUBTOTAL							***16,966***	***20,762***	***31,306***	***36,904***	***51,026***	***73,518***	***97,183***	***126,609***								***4.03***	***4.67***	***6.47***	***9.39***	***12.38***	***16.06***
WATER SUPPLY CORPORATIONS																												
9	BLUEBONNET HILLS WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*238*	*561*	651	756	877	969	1,070	1,182	1.66	1.92	2.23	2.46	2.72	3.01	145	0.09	0.11	0.13	0.14	0.15	0.17
11	BOURLAND ESTATES WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*120*	*130*	151	175	203	224	248	274	0.93	1.08	1.25	1.38	1.52	1.68	200	0.03	0.03	0.04	0.04	0.05	0.05
15	ECHO VALLEY WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*39*	*69*	80	93	108	119	132	145	0.40	0.46	0.53	0.59	0.65	0.72	107	0.01	0.01	0.01	0.01	0.01	0.02
26	HIGHLAND WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*449*	*432*	501	582	675	746	824	910	1.66	1.93	2.24	2.47	2.73	3.02	124	0.06	0.07	0.08	0.09	0.10	0.11
35	M&L WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*300*	*504*	585	679	788	870	961	1,062	1.57	1.83	2.12	2.34	2.59	2.86	130	0.08	0.09	0.10	0.11	0.13	0.14
38	MILLSAP WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*1,711*	*1,095*	1,271	1,475	1,712	1,891	2,088	2,307	0.06	0.07	0.08	0.08	0.09	0.10	80	0.10	0.12	0.14	0.15	0.17	0.18
40	NORTH RURAL WSC	0.15%	0.15%	0.20%	0.25%	0.30%	0.30%	*1,119*	*868*	882	895	913	936	965	994	0.08	0.08	0.08	0.08	0.08	0.09	100	0.09	0.09	0.09	0.09	0.10	0.10
45	RIO BRAZOS WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*218*	*487*	565	656	761	841	929	1,026	5.08	5.90	6.85	7.56	8.36	9.23	100	0.06	0.07	0.08	0.08	0.09	0.10
47	ROLLINS HILLS ESTATES WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*102*	*129*	150	174	202	223	246	272	0.58	0.68	0.78	0.87	0.96	1.06	385	0.06	0.07	0.08	0.09	0.09	0.10
51	S-ESTATES WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*130*	*465*	540	626	727	803	887	980	2.18	2.53	2.94	3.25	3.59	3.96	106	0.06	0.07	0.08	0.09	0.09	0.10
67	WHITT WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*79*	*138*	160	186	216	238	263	291	0.41	0.47	0.55	0.61	0.67	0.74	47	0.01	0.01	0.01	0.01	0.01	0.01
	SUBTOTAL							***4,505***	***4,878***	***5,535***	***6,296***	***7,181***	***7,860***	***8,613***	***9,442***								***0.64***	***0.73***	***0.83***	***0.91***	***1.00***	***1.10***
INVESTOR OWNED UTILITIES																												
1	ABRAXAS UTILITIES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*686*	*552*	641	743	863	953	1,053	1,163	0.91	1.05	1.22	1.35	1.49	1.65	124	0.08	0.09	0.11	0.12	0.13	0.14
2	AGNES SUBDIVISION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*10*	*69*	80	93	108	119	132	145	0.71	0.83	0.96	1.06	1.17	1.29	62	0.01	0.01	0.01	0.01	0.01	0.01
4	ALEDO MOBILE HOME PARK	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*279*	*450*	450	522	606	669	740	817	12.91	14.99	17.39	19.21	21.22	23.44	43	0.02	0.02	0.03	0.03	0.03	0.04
6	ASHCREEK ADDITION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*59*	*354*	411	477	553	611	675	746	4.23	4.91	5.70	6.30	6.96	7.69	88	0.04	0.04	0.05	0.05	0.06	0.07
8	BLUE RIDGE WATER SYSTEM	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*52*	*306*	355	412	478	528	584	645	2.69	3.12	3.62	4.00	4.41	4.88	61	0.02	0.03	0.03	0.03	0.04	0.04
10	BOLING RANCH ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*899*	-	1,043	1,211	1,405	1,552	1,715	1,894	0.62	0.72	0.84	0.93	1.03	1.13	116	0.12	0.14	0.16	0.18	0.20	0.22
12	CRAZY HORSE RANCH WATER COMPANY	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*147*	*185*	215	249	289	319	353	390	0.85	0.98	1.14	1.26	1.39	1.54	137	0.03	0.03	0.04	0.04	0.05	0.05
13	DEER BUTTE SUBDIVISION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*142*	*189*	219	255	295	326	360	398	1.97	2.29	2.65	2.93	3.24	3.57	78	0.02	0.02	0.02	0.03	0.03	0.03
14	DU CHANE CHATEAUX	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*269*	*299*	347	403	467	516	570	630	1.05	1.22	1.41	1.56	1.72	1.90	63	0.02	0.03	0.03	0.03	0.04	0.04
16	ENCHANTED OAKS SUBDIVISION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*82*	*228*	265	307	356	394	435	480	6.35	7.36	8.55	9.44	10.43	11.52	112	0.03	0.03	0.04	0.04	0.05	0.05
17	FLAT ROCK ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*295*	*105*	122	141	164	181	200	221	0.41	0.47	0.55	0.60	0.67	0.74	92	0.01	0.01	0.02	0.02	0.02	0.02
19	GREEN ACRES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*52*	*279*	324	376	436	482	532	588	6.43	7.46	8.66	9.56	10.56	11.67	52	0.02	0.02	0.02	0.03	0.03	0.03
20	HARMONY WATER SYSTEM	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*175*	*282*	327	380	441	487	538	594	2.54	2.95	3.42	3.78	4.18	4.61	75	0.02	0.03	0.03	0.04	0.04	0.04
21	HERITAGE RV PARK	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*33*	-	38	44	52	57	63	70	1.65	1.92	2.23	2.46	2.72	3.00	70	0.00	0.00	0.00	0.00	0.00	0.00
22	HIGHLAND COURT	18.71%	1.50%	1.50%	1.00%	1.00%	1.00%	*9*	-	50	58	67	74	82	91	3.39	3.94	4.57	5.05	5.57	6.16	49	0.0025	0.0029	0.0033	0.0037	0.0040	0.0045
23	HIGHLAND LAKES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*35*	*147*	171	198	230	254	280	310	0.34	0.40	0.46	0.51	0.57	0.63	110	0.02	0.02	0.03	0.03	0.03	0.03
24	HIGHLAND MEADOWS	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*60*	-	70	81	94	104	114	126	4.24	4.92	5.71	6.30	6.96	7.69	30	0.0021	0.0024	0.0028	0.0031	0.0034	0.0038
25	HIGHLAND TERRACE APARTMENTS	34.93%	1.50%	1.50%	1.00%	1.00%	1.00%	*1*	-	20	23	27	30	33	36	16.15	18.74	21.75	24.03	26.54	29.32	50	0.0010	0.0012	0.0013	0.0015	0.0016	0.0018
27	HORSESHOE BEND WATER SYSTEM	4.01%	1.32%	2.34%	2.74%	2.73%	2.73%	*945*	*912*	1,352	1,542	1,942	2,546	3,334	4,367	1.09	1.25	1.57	2.06	2.70	3.54	135	0.18	0.21	0.26	0.34	0.45	0.59
29	KINBROOK ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*66*	*282*	327	380	441	487	538	594	2.05	2.37	2.75	3.04	3.36	3.71	66	0.02	0.03	0.03	0.03	0.04	0.04
30	LA JUNTA SUBDIVISION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*158*	*102*	118	137	159	176	195	215	0.74	0.86	1.00	1.11	1.22	1.35	101	0.01	0.01	0.02	0.02	0.02	0.02
31	LAGO LINDO ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*244*	*162*	188	218	253	280	309	341	0.21	0.25	0.29	0.32	0.35	0.39	72	0.01	0.02	0.02	0.02	0.02	0.02
32	LAKE COUNTRY ACRES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*254*	*693*	804	933	1,083	1,197	1,322	1,460	2.31	2.68	3.11	3.43	3.79	4.19	83	0.07	0.08	0.09	0.10	0.11	0.12
33	LAZY BEND ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*30*	*129*	150	174	202	223	246	272	0.44	0.51	0.59	0.65	0.72	0.79	48	0.01	0.01	0.01	0.01	0.01	0.01
34	LIVE OAK HILLS ADDITION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*190*	*237*	275	319	370	409	452	499	0.41	0.47	0.55	0.60	0.67	0.74	101	0.03	0.03	0.04	0.04	0.05	0.05
36	MAR LYNN SUBDIVISION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*157*	*48*	56	65	75	83	92	101	0.50	0.58	0.67	0.74	0.82	0.91	132	0.01	0.01	0.01	0.01	0.01	0.01
37	MIDWAY HOMES	3.93%	1.50%	1.50%	1.00%	1.00%	1.00%	*34*	-	50	58	67	74	82	91	2.65	3.08	3.57	3.95	4.36	4.82	66	0.0033	0.0038	0.0045	0.0049	0.0054	0.0060
42	PONDEROSA HILLS SUBDIVISION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*108*	*234*	272	315	366	404	446	493	0.54	0.62	0.72	0.80	0.88	0.98	221	0.06	0.07	0.08	0.09	0.10	0.11
43	REMUDA RANCH ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*234*	*186*	216	251	291	321	355	392	0.50	0.58	0.67	0.74	0.82	0.91	88	0.02	0.02	0.03	0.03	0.03	0.03
46	RJR WATER COMPANY INC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*11*	*318*	369	428	497	549	607	670	1.56	1.81	2.10	2.33	2.57	2.84	261	0.10	0.11	0.13	0.14	0.16	0.17
48	SADDLE CLUB	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*206*	-	239	277	322	356	393	434	0.78	0.91	1.05	1.16	1.28	1.42	116	0.03	0.03	0.04	0.04	0.05	0.05
49	SANDY ACRES ADDITION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*139*	*168*	195	226	263	290	320	354	2.01	2.33	2.71	2.99	3.30	3.65	49	0.01	0.01	0.01	0.01	0.02	0.02
52	SHANGRI LA SUBDIVISION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*118*	*327*	379	440	511	565	624	689	0.94	1.09	1.26	1.39	1.54	1.70	91	0.03	0.04	0.05	0.05	0.06	0.06
53	SILVER CREEK ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*5*	*147*	171	198	230	254	280	310	20.36	23.63	27.42	30.29	33.46	36.96	136	0.02	0.03	0.03	0.03	0.04	0.04
54	SPANISH PARK ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*57*	*96*	111	129	150	166	183	202	2.26	2.63	3.05	3.37	3.72	4.11	60	0.01	0.01	0.01	0.01	0.01	0.01
55	SPRING VALLEY ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*886*	*273*	317	368	427	471	521	575	0.16	0.19	0.22	0.24	0.26	0.29	124	0.04	0.05	0.05	0.06	0.06	0.07
57	SPRINGTOWN SUBDIVISION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*70*	*69*	80	93	108	119	132	145	0.70	0.81	0.94	1.04	1.15	1.27	88	0.01	0.01	0.01	0.01	0.01	0.01

PARKER COUNTY

MAP KEY		ANNUAL GROWTH RATE						POPULATION								PEOPLE PER ACRE						DEMAND (MGD)						
		2020 - 2030	2030 - 2040	2040 - 2050	2050 - 2060	2060 - 2070	2070 - 2080	2020 CENSUS	2020 REPORTED POPULATION	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	Selected GPCD	2030	2040	2050	2060	2070	2080
58	TANGLEWOOD ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*440*	*573*	665	772	896	989	1,093	1,207	5.33	6.19	7.18	7.93	8.76	9.68	**67**	0.04	0.05	0.06	0.07	0.07	0.08
59	TIMBERCREEK VALLEY UTILITY	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*31*	*144*	340	394	458	506	559	617	5.01	5.81	6.75	7.45	8.23	9.10	**89**	0.03	0.04	0.04	0.05	0.05	0.06
60	TREETOP ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*55*	*102*	118	137	159	176	195	215	1.09	1.27	1.47	1.63	1.80	1.98	**164**	0.02	0.02	0.03	0.03	0.03	0.04
61	TRINITY RIVER ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*37*	-	43	50	58	64	71	78	0.69	0.80	0.92	1.02	1.13	1.25	**41**	0.00	0.00	0.00	0.00	0.00	0.00
64	WEST PARK ADDITION	25.89%	1.50%	1.50%	1.00%	1.00%	1.00%	*6*	-	60	70	81	89	99	109	3.61	4.19	4.86	5.37	5.93	6.55	**160**	0.0096	0.0111	0.0129	0.0143	0.0158	0.0174
65	WESTERN LAKE ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*1,555*	*2,159*	2,506	2,908	3,375	3,728	4,118	4,549	2.14	2.49	2.89	3.19	3.52	3.89	**140**	0.35	0.41	0.47	0.52	0.58	0.64
66	WESTVIEW ENTERPRISES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*132*	*168*	195	226	263	290	320	354	2.71	3.15	3.65	4.03	4.46	4.92	**82**	0.02	0.02	0.02	0.02	0.03	0.03
69	WINDSOR ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*23*	*93*	108	125	145	161	177	196	1.39	1.62	1.88	2.07	2.29	2.53	**78**	0.01	0.01	0.01	0.01	0.01	0.02
70	WOODLANDS OF PARKER COUNTY & OLD BANK	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*139*	-	161	187	217	240	265	293	0.32	0.37	0.43	0.48	0.53	0.59	**116**	0.02	0.02	0.03	0.03	0.03	0.03
	SUBTOTAL							***9,615***	***11,067***	***15,012***	***17,395***	***20,341***	***22,869***	***25,784***	***29,166***								***1.62***	***1.88***	***2.20***	***2.49***	***2.82***	***3.21***
RURAL WATER USERS																												
-	P1	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*401*	-	653	1,064	1,733	2,823	3,982	5,617	0.71	1.16	1.89	3.08	4.35	6.13	**164**	0.11	0.17	0.28	0.46	0.65	0.92
-	P2	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*4,317*	-	5,010	5,814	6,748	7,454	8,234	9,095	0.07	0.08	0.09	0.10	0.11	0.13	**164**	0.82	0.95	1.11	1.22	1.35	1.49
-	P3	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*1,177*	-	1,917	3,123	5,087	8,286	11,688	16,488	0.84	1.36	2.22	3.62	5.10	7.20	**164**	0.31	0.51	0.83	1.36	1.92	2.70
-	P4	3.50%	3.50%	3.50%	1.50%	1.50%	1.50%	*2,324*	-	3,278	4,624	6,523	7,570	8,786	10,196	0.58	0.81	1.15	1.33	1.55	1.80	**164**	0.54	0.76	1.07	1.24	1.44	1.67
-	P5	3.50%	3.50%	3.50%	1.50%	1.50%	1.50%	*1,881*	-	2,653	3,743	5,280	6,127	7,111	8,252	0.28	0.39	0.56	0.65	0.75	0.87	**164**	0.44	0.61	0.87	1.00	1.17	1.35
-	P6	3.50%	3.50%	3.50%	1.50%	1.50%	1.50%	*2,339*	-	3,299	4,654	6,565	7,619	8,842	10,262	0.29	0.41	0.58	0.67	0.78	0.91	**164**	0.54	0.76	1.08	1.25	1.45	1.68
-	P7	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*2,373*	-	3,865	6,296	10,256	16,706	23,565	33,241	0.83	1.36	2.22	3.61	5.09	7.18	**164**	0.63	1.03	1.68	2.74	3.86	5.45
-	P8	6.37%	3.50%	3.50%	1.50%	1.50%	1.50%	*2,157*	-	4,000	5,642	7,959	9,237	10,720	12,441	0.26	0.36	0.51	0.59	0.69	0.80	**164**	0.66	0.93	1.30	1.51	1.76	2.04
-	P9	9.93%	5.00%	5.00%	5.00%	3.50%	3.50%	*3,105*	-	8,000	13,031	21,226	34,576	48,772	68,798	0.57	0.93	1.52	2.48	3.49	4.92	**164**	1.31	2.14	3.48	5.67	8.00	11.28
-	P10	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*4,163*	-	6,781	11,046	17,992	29,307	41,341	58,316	0.27	0.44	0.72	1.18	1.66	2.35	**164**	1.11	1.81	2.95	4.81	6.78	9.56
-	P11	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*3,932*	-	4,563	5,296	6,146	6,789	7,499	8,284	0.11	0.13	0.15	0.16	0.18	0.20	**164**	0.75	0.87	1.01	1.11	1.23	1.36
-	P12	3.50%	1.50%	1.50%	1.50%	1.00%	1.00%	*1,065*	-	1,502	1,743	2,023	2,348	2,594	2,865	0.15	0.17	0.20	0.23	0.25	0.28	**164**	0.25	0.29	0.33	0.38	0.43	0.47
-	P13	1.00%	3.50%	3.50%	1.50%	1.50%	1.50%	*2,715*	-	2,999	4,230	5,967	6,925	8,037	9,328	0.06	0.09	0.12	0.14	0.16	0.19	**164**	0.49	0.69	0.98	1.14	1.32	1.53
-	P14	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*2,804*	-	4,567	7,440	12,119	19,740	27,845	39,279	0.14	0.22	0.37	0.60	0.84	1.19	**164**	0.75	1.22	1.99	3.24	4.57	6.44
-	P15	3.50%	3.50%	3.50%	1.50%	1.50%	1.50%	*1,292*	-	1,822	2,571	3,626	4,209	4,884	5,668	0.40	0.56	0.80	0.92	1.07	1.24	**164**	0.30	0.42	0.59	0.69	0.80	0.93
-	P16	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*699*	-	1,139	1,855	3,021	4,921	6,941	9,792	0.66	1.07	1.75	2.85	4.02	5.66	**164**	0.19	0.30	0.50	0.81	1.14	1.61
-	P17	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*2,961*	-	4,823	7,856	12,797	20,845	29,405	41,478	0.11	0.19	0.30	0.49	0.70	0.98	**164**	0.79	1.29	2.10	3.42	4.82	6.80
-	P18	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*2,823*	-	4,598	7,490	12,201	19,874	28,034	39,545	0.27	0.44	0.72	1.18	1.66	2.35	**164**	0.75	1.23	2.00	3.26	4.60	6.48
-	P19	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*632*	-	1,029	1,677	2,731	4,449	6,276	8,853	0.17	0.28	0.45	0.74	1.04	1.47	**164**	0.17	0.27	0.45	0.73	1.03	1.45
	SUBTOTAL							***43,160***	-	***66,502***	***99,197***	***150,002***	***219,806***	***294,557***	***397,797***								***10.90***	***16.26***	***24.59***	***36.04***	***48.29***	***65.22***
	PARKER COUNTY TOTAL							***182,396***		***263,354***	***332,876***	***427,730***	***555,763***	***694,977***	***874,814***								***43.2***	***54.8***	***70.2***	***91.1***	***114.0***	***143.4***

WISE COUNTY

MAP KEY		ANNUAL GROWTH RATE						POPULATION								PEOPLE PER ACRE						DEMAND (MGD)						
		2020 - 2030	2030 - 2040	2040 - 2050	2050 - 2060	2060 - 2070	2070 - 2080	2020 CENSUS	2020 REPORTED POPULATION	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	Selected GPCD	2030	2040	2050	2060	2070	2080
MUNICIPALITIES																												
1	ALVORD	2.38%	1.66%	1.42%	1.48%	1.29%	0.96%	*2,187*	*2,213*	*2,800*	*3,300*	*3,800*	*4,400*	*5,000*	*5,500*	0.22	0.26	0.30	0.35	0.39	0.43	**142**	0.40	0.47	0.54	0.62	0.71	0.78
4	BOYD	0.77%	3.63%	3.42%	1.96%	1.12%	1.01%	*1,450*	*1,296*	*1,400*	*2,000*	*2,800*	*3,400*	*3,800*	*4,200*	0.50	0.71	1.00	1.21	1.35	1.49	**186**	0.26	0.37	0.52	0.63	0.71	0.78
5	BRIDGEPORT	4.72%	3.50%	2.96%	2.52%	1.38%	1.14%	*5,675*	*5,674*	*9,000*	*12,700*	*17,000*	*21,800*	*25,000*	*28,000*	1.88	2.65	3.55	4.55	5.22	5.84	**169**	1.53	2.15	2.88	3.69	4.24	4.74
6	CHICO	3.15%	3.10%	2.99%	2.30%	2.26%	1.84%	*2,039*	*2,054*	*2,800*	*3,800*	*5,100*	*6,400*	*8,000*	*9,600*	0.13	0.18	0.25	0.31	0.38	0.46	**177**	0.49	0.67	0.90	1.13	1.41	1.70
11	DECATUR	5.99%	2.72%	2.61%	1.60%	1.53%	1.49%	*6,539*	*6,539*	*11,700*	*15,300*	*19,800*	*23,200*	*27,000*	*31,300*	2.08	2.72	3.52	4.12	4.79	5.56	**244**	2.86	3.74	4.84	5.67	6.60	7.65
18	FORT WORTH	3.36%	2.12%	1.09%	0.85%	0.78%	0.67%	*18,339*	*18,682*	*26,009*	*32,078*	*35,766*	*38,930*	*42,093*	*45,000*	2.65	3.27	3.65	3.97	4.29	4.59	**177**	4.59	5.67	6.32	6.88	7.44	7.95
25	NEWARK	7.68%	3.68%	3.15%	3.26%	2.96%	2.48%	*1,097*	*1,097*	*2,300*	*3,300*	*4,500*	*6,200*	*8,300*	*10,600*	4.18	5.99	8.17	11.25	15.07	19.24	**113**	0.26	0.37	0.51	0.70	0.94	1.20
27	PARADISE	2.06%	1.44%	1.26%	1.12%	1.01%	0.47%	*475*	*530*	*650*	*750*	*850*	*950*	*1,050*	*1,100*	0.51	0.58	0.66	0.74	0.82	0.86	**111**	0.07	0.08	0.09	0.11	0.12	0.12
29	RHOME	9.55%	3.82%	3.24%	3.15%	2.92%	2.92%	*1,293*	*1,326*	*3,300*	*4,800*	*6,600*	*9,000*	*12,000*	*16,000*	1.40	2.03	2.80	3.82	5.09	6.78	**187**	0.62	0.90	1.23	1.68	2.24	2.99
30	RUNAWAY BAY	0.44%	1.18%	2.03%	1.29%	1.84%	1.55%	*1,622*	*1,531*	*1,600*	*1,800*	*2,200*	*2,500*	*3,000*	*3,500*	0.76	0.86	1.05	1.19	1.43	1.67	**326**	0.52	0.59	0.72	0.82	0.98	1.14
	SUBTOTAL							***40,716***	***40,942***	***61,559***	***79,828***	***98,416***	***116,780***	***135,243***	***154,800***								***11.60***	***15.01***	***18.55***	***21.93***	***25.38***	***29.05***
WATER DISTRICTS																												
41	PARKER COUNTY SUD	3.89%	0.91%	0.99%	0.90%	0.96%	0.99%	*3,618*	*3,617*	*5,300*	*5,800*	*6,400*	*7,000*	*7,700*	*8,500*	0.13	0.14	0.16	0.17	0.19	0.21	**118**	0.62	0.68	0.75	0.82	0.91	1.00
62	SANTO SUD	4.97%	0.99%	3.41%	4.02%	2.72%	2.50%	*2,425*	*2,399*	*3,895*	*4,299*	*6,013*	*8,922*	*11,667*	*14,935*	0.08	0.09	0.12	0.18	0.23	0.30	**142**	0.55	0.61	0.86	1.27	1.66	2.12
	SUBTOTAL							***6,043***	***6,016***	***9,195***	***10,099***	***12,413***	***15,922***	***19,367***	***23,435***								***1.18***	***1.29***	***1.61***	***2.09***	***2.57***	***3.12***
WATER SUPPLY CORPORATIONS																												
3	BOLIVAR WSC	3.31%	1.78%	1.66%	1.66%	1.59%	1.50%	*83*	*686*	*950*	*1,134*	*1,337*	*1,576*	*1,844*	*2,140*	0.02	0.03	0.03	0.04	0.05	0.05	**127**	0.12	0.14	0.17	0.20	0.23	0.27
15	GRAND HARBOR WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*35*	*120*	*139*	*162*	*188*	*207*	*229*	*253*	0.14	0.17	0.20	0.22	0.24	0.26	**210**	0.03	0.03	0.04	0.04	0.05	0.05
17	HIDEAWAY BAY LAKE SHORES WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*13*	*147*	*171*	*198*	*230*	*254*	*280*	*310*	1.01	1.17	1.36	1.50	1.66	1.83	**30**	0.01	0.01	0.01	0.01	0.01	0.01
35	SLIDELL WSC	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*36*	*100*	*116*	*135*	*156*	*173*	*191*	*211*	2.03	2.36	2.74	3.02	3.34	3.69	**93**	0.01	0.01	0.01	0.02	0.02	0.02
	SUBTOTAL							***167***	***1,053***	***1,376***	***1,628***	***1,911***	***2,209***	***2,544***	***2,913***								***0.17***	***0.20***	***0.23***	***0.27***	***0.31***	***0.35***
INVESTOR OWNED UTILITIES																												
2	AURORA VISTA	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*321*	*438*	*508*	*590*	*685*	*756*	*835*	*923*	1.96	2.27	2.64	2.91	3.22	3.55	**148**	0.08	0.09	0.10	0.11	0.12	0.14
7	CHISOLM HILLS ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*393*	*846*	*982*	*1,139*	*1,322*	*1,461*	*1,614*	*1,782*	1.35	1.57	1.82	2.01	2.22	2.45	**138**	0.14	0.16	0.18	0.20	0.22	0.25
8	CHISHOLM SPRINGS	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*212*	-	*246*	*286*	*331*	*366*	*404*	*447*	1.25	1.45	1.68	1.86	2.05	2.27	**160**	0.04	0.05	0.05	0.06	0.06	0.07
9	COOLEY POINT WATER SYSTEM	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*249*	*135*	*157*	*182*	*211*	*233*	*257*	*284*	0.17	0.19	0.22	0.25	0.27	0.30	**52**	0.01	0.01	0.01	0.01	0.01	0.01
10	COYOTE RIDGE ADDITION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*268*	*378*	*439*	*509*	*591*	*653*	*721*	*796*	0.97	1.13	1.31	1.45	1.60	1.76	**108**	0.05	0.06	0.06	0.07	0.08	0.09
12	DECATUR ACRES WATER SYSTEM	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*100*	*210*	*244*	*283*	*328*	*363*	*401*	*442*	1.93	2.24	2.60	2.87	3.17	3.50	**77**	0.02	0.02	0.03	0.03	0.03	0.03
14	GLIDER BASE ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*607*	*256*	*704*	*818*	*949*	*1,048*	*1,158*	*1,279*	0.94	1.09	1.26	1.39	1.54	1.70	**44**	0.03	0.04	0.04	0.05	0.05	0.06
16	HAWK RIDGE	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*88*	-	*102*	*119*	*138*	*152*	*168*	*185*	0.40	0.47	0.54	0.60	0.66	0.73	**160**	0.02	0.02	0.02	0.02	0.03	0.03
18	HIGHLAND HILLS	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*277*	-	*321*	*373*	*433*	*478*	*528*	*584*	1.51	1.76	2.04	2.25	2.49	2.75	**160**	0.05	0.06	0.07	0.08	0.08	0.09
19	HIGHLAND MEADOWS WATER SYSTEM	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*211*	*222*	*258*	*299*	*347*	*383*	*423*	*468*	0.58	0.67	0.78	0.86	0.95	1.05	**88**	0.02	0.03	0.03	0.03	0.04	0.04
20	HILLS OF BRIAR OAKS	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*293*	*437*	*507*	*589*	*683*	*755*	*833*	*921*	2.36	2.74	3.18	3.52	3.88	4.29	**80**	0.04	0.05	0.05	0.06	0.07	0.07
21	THE HILLS OF OLIVER CREEK	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*665*	*735*	*853*	*990*	*1,149*	*1,269*	*1,402*	*1,548*	0.73	0.85	0.99	1.09	1.21	1.33	**105**	0.09	0.10	0.12	0.13	0.15	0.16
22	KILLOUGH ADDITION	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*25*	*102*	*118*	*137*	*159*	*176*	*195*	*215*	6.31	7.32	8.50	9.39	10.37	11.46	**51**	0.01	0.01	0.01	0.01	0.01	0.01
23	KINGS REST ESTATES WATER SYSTEM	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*41*	*75*	*87*	*101*	*117*	*129*	*143*	*158*	1.43	1.66	1.92	2.12	2.34	2.59	**109**	0.01	0.01	0.01	0.01	0.02	0.02
24	MESA RIDGE	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*549*	-	*637*	*739*	*858*	*948*	*1,047*	*1,157*	0.34	0.40	0.46	0.51	0.57	0.62	**160**	0.10	0.12	0.14	0.15	0.17	0.19
26	OLD CHISHOLM ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*263*	*372*	*432*	*501*	*581*	*642*	*709*	*784*	0.70	0.82	0.95	1.05	1.15	1.28	**26**	0.01	0.01	0.02	0.02	0.02	0.02
28	REATTA	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*167*	-	*194*	*225*	*261*	*288*	*319*	*352*	1.37	1.59	1.85	2.04	2.26	2.49	**160**	0.03	0.04	0.04	0.05	0.05	0.06
31	SAGE BRUSH ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*580*	*441*	*512*	*594*	*689*	*761*	*841*	*929*	0.31	0.36	0.42	0.46	0.51	0.56	**88**	0.05	0.05	0.06	0.07	0.07	0.08
32	SHALE CREEK	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*654*	-	*759*	*881*	*1,022*	*1,129*	*1,247*	*1,378*	9.91	11.50	13.34	14.74	16.28	17.99	**160**	0.12	0.14	0.16	0.18	0.20	0.22
33	SINGING MEADOWS ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*11*	*138*	*160*	*186*	*216*	*238*	*263*	*291*	1.26	1.47	1.70	1.88	2.08	2.29	**57**	0.01	0.01	0.01	0.01	0.01	0.02
34	SKY VIEW RANCH ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*75*	*225*	*261*	*303*	*352*	*388*	*429*	*474*	0.81	0.94	1.09	1.20	1.33	1.47	**138**	0.04	0.04	0.05	0.05	0.06	0.07
36	STONEGATE WATER	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*85*	*195*	*226*	*263*	*305*	*337*	*372*	*411*	0.70	0.81	0.94	1.04	1.15	1.27	**76**	0.02	0.02	0.02	0.03	0.03	0.03
37	STRAWBERRY ESTATES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*122*	*132*	*153*	*178*	*206*	*228*	*252*	*278*	0.66	0.77	0.90	0.99	1.09	1.21	**24**	0.00	0.00	0.00	0.01	0.01	0.01
38	SUNSHINE MEADOWS WATER SYSTEM	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*418*	*732*	*850*	*986*	*1,144*	*1,264*	*1,396*	*1,542*	2.38	2.76	3.21	3.54	3.91	4.32	**60**	0.05	0.06	0.07	0.08	0.08	0.09
39	T L WATER JONES ACRES	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*24*	-	*28*	*32*	*38*	*41*	*46*	*51*	0.24	0.28	0.33	0.36	0.40	0.44	**160**	0.00	0.01	0.01	0.01	0.01	0.01
42	WILDWOOD NATURISTS RESORT WATER SYSTEM	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*7*	*26*	*8*	*9*	*11*	*12*	*13*	*15*	0.07	0.08	0.09	0.10	0.11	0.12	**180**	0.00	0.00	0.00	0.00	0.00	0.00
43	WINDMILL TRAIL	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*109*	*231*	*268*	*311*	*361*	*399*	*441*	*487*	0.50	0.58	0.68	0.75	0.83	0.91	**141**	0.04	0.04	0.05	0.06	0.06	0.07
	SUBTOTAL							***6,814***	***6,326***	***10,014***	***11,622***	***13,488***	***14,899***	***16,458***	***18,180***								***1.06***	***1.23***	***1.43***	***1.58***	***1.75***	***1.93***
RURAL WATER USERS																												
-	W1	3.50%	3.50%	3.50%	1.50%	1.50%	1.50%	*2,840*	-	*4,006*	*5,651*	*7,971*	*9,251*	*10,736*	*12,460*	0.06	0.09	0.12	0.14	0.16	0.19	**173**	0.69	0.98	1.38	1.60	1.86	2.15
-	W2	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*3,604*	-	*5,871*	*9,562*	*15,576*	*25,372*	*35,790*	*50,485*	0.14	0.22	0.36	0.59	0.84	1.18	**173**	1.01	1.65	2.69	4.39	6.19	8.73
-	W3	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*2,577*	-	*4,198*	*6,838*	*11,138*	*18,142*	*25,591*	*36,099*	0.17	0.28	0.45	0.73	1.03	1.45	**173**	0.73	1.18	1.93	3.14	4.42	6.24
-	W4	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*844*	-	*1,375*	*2,239*	*3,648*	*5,942*	*8,381*	*11,823*	0.15	0.25	0.41	0.67	0.94	1.32	**173**	0.24	0.39	0.63	1.03	1.45	2.04
-	W5	3.50%	3.50%	3.50%	1.50%	1.50%	1.50%	*1,017*	-	*1,435*	*2,024*	*2,855*	*3,313*	*3,845*	*4,462*	0.04	0.05	0.07	0.08	0.10	0.11	**173**	0.25	0.35	0.49	0.57	0.66	0.77
-	W6	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*4,128*	-	*4,791*	*5,560*	*6,452*	*7,127*	*7,873*	*8,697*	0.07	0.08	0.09	0.10	0.11	0.12	**173**	0.83	0.96	1.12	1.23	1.36	1.50
-	W7	3.50%	3.50%	3.50%	1.50%	1.50%	1.50%	*3,491*	-	*4,924*	*6,946*	*9,799*	*11,372*	*13,197*	*15,316*	0.18	0.25	0.35	0.41	0.47	0.55	**173**	0.85	1.20	1.69	1.97	2.28	2.65
-	W8	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*1,275*	-	*1,480*	*1,717*	*1,993*	*2,201*	*2,432*	*2,686*	0.04	0.04	0.05	0.06	0.06	0.07	**173**	0.26	0.30	0.34	0.38	0.42	0.46
-	W9	1.50%	1.50%	1.50%	1.00%	1.00%	1.00%	*522*	-	*606*	*703*	*816*	*901*	*996*	*1,100*	0.02	0.03	0.03	0.04	0.04	0.04	**173**	0.10	0.12	0.14	0.16	0.17	0.19
-	W10	3.50%	3.50%	3.50%	1.50%	1.50%	1.50%	*32*	-	*45*	*64*	*90*	*104*	*121*	*140*	0.04	0.06	0.08	0.10	0.11	0.13	**173**	0.01	0.01	0.02	0.02	0.02	0.02
-	W11	15.44%	8.40%	3.63%	2.26%	0.96%	0.87%	*2,974*	-	*12,500*	*28,000*	*40,000*	*50,000*	*55,000*	*60,000*	1.25	2.80	4.00	4.99	5.49	5.99	**173**	2.16	4.84	6.92	8.64	9.51	10.37
-	W12	3.50%	3.50%	3.50%	1.50%	1.50%	1.50%	*2,490*	-	*3,512*	*4,955*	*6,989*	*8,111*	*9,413*	*10,924*	0.25	0.35	0.49	0.57	0.66	0.76	**173**	0.61	0.86	1.21	1.40	1.63	1.89
-	W13	3.50%	3.50%	3.50%	1.50%	1.50%	1.50%	*2,771*	-	*3,909*	*5,514*	*7,778*	*9,026*	*10,475*	*12,157*	0.20	0.29	0.41	0.47	0.55	0.64	**173**	0.68	0.95	1.34	1.56	1.81	2.10
-	W14	13.38%	5.00%	5.02%	4.90%	3.42%	3.46%	*997*	-	*3,500*	*5,700*	*9,300*	*15,000*	*21,000*	*29,500*	0.34	0.56	0.91	1.46	2.05	2.88	**173**	0.61	0.99	1.61	2.59	3.63	5.10
-	W15	5.00%	5.00%	5.00%	5.00%	3.50%	3.50%	*2,155*	-	*3,510*	*5,718*	*9,314*	*15,171*	*21,400*	*30,187*	0.15	0.25	0.40	0.65	0.92	1.30	**173**	0.61	0.99	1.61	2.62	3.70	5.22
	SUBTOTAL							***31,717***	***-***	***55,661***	***91,190***	***133,717***	***181,034***	***226,251***	***286,036***								***9.62***	***15.77***	***23.12***	***31.30***	***39.12***	***49.45***
	WISE COUNTY TOTAL							***85,456***	***-***	***137,806***	***194,368***	***259,945***	***330,844***	***399,863***	***485,364***								***23.6***	***33.5***	***44.9***	***57.2***	***69.1***	***83.9***