2026 INITIALLY PREPARED REGION C WATER PLAN

Volume I. Main Report

March 2025

Prepared for the Region C Water Planning Group

Freese and Nichols, Inc.

Plummer Associates, Inc.

Cooksey Communications

2026 INITIALLY PREPARED REGION C WATER PLAN

March 2025

Prepared for the Region C Water Planning Group

DRAFT
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF SIMONE KIEL, P.E., TEXAS NO. 93615 ON FEBRUARY 21, 2025. IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES. FREESE AND NICHOLS, INC. TEXAS REGISTERED ENGINEERING FIRM F- 2144

DRAFT
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF CHRISTINA GILDEA, P.E., TEXAS NO. 154468 ON FEBRUARY 21, 2025. IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES. FREESE AND NICHOLS, INC. TEXAS REGISTERED ENGINEERING FIRM F- 2144

DRAFT
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF QIWEN ZHANG, P.E., TEXAS NO. 149966 ON FEBRUARY 21, 2025. IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES. PLUMMER ASSOCIATES, INC. TEXAS REGISTERED ENGINEERING FIRM F-13

DRAFT
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRIGIT AFSHAR BUFF, P.E., TEXAS NO. 112715 ON FEBRUARY 21, 2025. IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES. PLUMMER ASSOCIATES, INC. TEXAS REGISTERED ENGINEERING FIRM F-13

2026 INITIALLY PREPARED REGION C WATER PLAN

March 2025

Prepared for the Region C Water Planning Group

Group Members at the time of publication:

Dan Buhman, Chair

Russel Laughlin, Vice Chair

Jenna Covington, Secretary

David Bailey

Jay Barksdale

Ryan Bayle

Chris Boyd

Glenn Clingenpeel

Grace Darling

John Paul Dineen III

Gary Douglas

Stephen Gay

Chris Harder

Harold Latham

John Lingenfelder

Steve Mundt

Denis Qualls

Rick Shaffer

Doug Shaw

Paul Sigle

Connie Standridge

Steve Starnes

John Stevenson

TABLE OF CONTENTS

TABLE OF TABLES

Table 2.1 Adopted Population Projections for Region C by County 2-6
Table 2.2: Projected Demands for Municipal WUGs by County (acre-feet per year) 2-9
Table 2.3 Projected Demand for Irrigation WUGs (acre-feet per year) 2-10
Table 2.4 Projected Demand for Livestock WUGs (acre-feet per year) 2-11
Table 2.5 Projected Demand for Manufacturing WUGs (acre-feet per year) 2-12
Table 2.6 Projected Demand for Mining WUGs (acre-feet per year) 2-13
Table 2.8 Projected Demand for Steam Electric Power WUGs (acre-feet per year) 2-14
Table 2.9 Adopted Total Dry-Year Water Demand Projections for Region C by County 2-17
Table 2.10 Adopted Dry-Year Water Demand Projections for Region C by Type of Use 2-17
Table 2.11 Adopted Dry-Year Water Demand Projections by County and Type of Use 2-18
Table 2.12 Projected Dry-Year Water Demand (acre-feet per year) by Wholesale Water Provider 2-21

TABLE OF FIGURES

Appendices (Volume II)

List of Acronyms

ACRONYM	DESCRIPTION
AMI	Advanced Metering Infrastructure
ASR	Aquifer Storage and Recovery
AWWA	American Water Works Association
BEG	Bureau of Economic Geology
BMP	Best Management Practices
CFS	Cubic Feet per Second
CGMA	Collin-Grayson Municipal Alliance
CRU	Collective Reporting Units
DB22	TWDB's Regional Water Planning Database
DBP	Disinfection Byproduct
DCP	Drought Contingency Plan
DFC	Desired Future Conditions
DOR	Drought of Record
DPR	Direct Potable Reuse
EA	Executive Administrator of the TWDB
EPA	Environmental Protection Agency
GAM	Groundwater Availability Model
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
GPCD	Gallons per Capita per Day
GPF	Gallons per Flush
GPM	Gallons per minute
HOA	Homeowners Association
IBT	Interbasin Transfer
ICI	Industrial, Commercial, Institutional
IPP	Initially Prepared Plan
IWA	International Water Association
LLC	Limited Liability Company
MAG	Modeled Available Groundwater
MGD	Million Gallons per Day
MSL	Mean Sea Level
MWP	Major Water Provider
NRCS	Natural Resources Conservation Service (formerly the Soil Conservation Service)
NRNWR	Neches River National Wildlife Refuge
OCR	Off Channel Reservoir
PDSI	Palmer Drought Severity Index
RO	Reverse Osmosis
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SB1	Senate Bill One

ACRONYM	DESCRIPTION
SB2	Senate Bill Two
SB3	Senate Bill Three
SDWA	Safe Drinking Water Act
SEP	Steam Electric Power
SUD	Special Utility District
SWCQP	Statewide Water Conservation Quantification Project
SWIFT	State Water Implementation Fund
SWIRFT	State Water Implementation Revenue Fund
SWP	State Water Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TNRIS	Texas Natural Resources Information System
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
UCM	Uniform Costing Model
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
WAM	Water Availability Model
WCAC	Water Conservation Advisory Council
WCCAP	Water Conservation and Condition Assessment Program
WCP	Water Conservation Plan
WIF	Water Infrastructure Fund
WMS	Water Management Strategy
WMSP	Water Management Strategy Project
WSC	Water Supply Corporation
WSD	Water Supply District
WTP	Water Treatment Plant
WUG	Water User Group
WWP	Wholesale Water Provider
WWTP	Wastewater Treatment Plant
Water Providers	
ANRA	Angelina and Neches River Authority
BRA	Brazos River Authority
DWU	Dallas Water Utilities
GTUA	Greater Texoma Utility Authority
NTMWD	North Texas Municipal Water District
RRA	Red River Authority
SRA	Sabine River Authority
SRBA	Sulphur River Basin Authority
SRMWD	Sulphur River Municipal Water District
TRWD	Tarrant Regional Water District
TRA	Trinity River Authority
UNRMWA	Upper Neches River Municipal Water Authority

ACRONYM	DESCRIPTION
UTRWD	Upper Trinity Regional Water District

Glossary of Terms

TERM	MEANING
Aquifer Storage and Recovery	Aquifer storage and recovery (ASR) is the storage of water in a suitable aquifer through a well during times when water is available, and the recovery of water from the same aquifer during times when it is needed.
Best Management Practice	Best Management Practices (BMPs) are a menu of options for which entities within a water use sector can choose to implement in order to achieve benchmarks and goals through water conservation. Best management practices are voluntary efficiency measures that are intended to save a quantifiable amount of water, either directly or indirectly, and can be implemented within a specified timeframe.
Desired Future Condition	Criteria which is used to define the amount of available groundwater from an aquifer.
Drought of Record	A drought of record is the worst recorded drought since the compliation of meterologic and hydraulic began.
Groundwater Availability Model	Numerical groundwater flow model. GAMs are used to determine the aquifer response to pumping scenarios. These are the preferred models to assess groundwater availability.
Groundwater Conservation District	Generic term for all or individual state recognized Districts that oversee the groundwater resources within a specified political boundary.
Groundwater Management Area	Sixteen GMAs in Texas. Tasked by the Legislature to define the desired future conditions for major and minor aquifers within the GMA.
Gallons per capita per day	Unit of measure that accounts for water use in the number of gallons a person uses each day.
Interbasin Transfer	In an interbasin water transfer, surface water is taken from one river basin and conveyed into another river basin for use there.
Modeled Available Groundwater	The MAG is the amount of groundwater that can be permitted by a GCD on an annual basis. It is determined by the TWDB based on the DFC approved by the GMA. Once the MAG is established, this value must be used as the available groundwater in regional water planning.
Major Water Provider	A water user group or a wholesale water provider of particular significance to the region's water supply as determined by the regional water planning group.
Palmer Drought Severity Index	A measure of dryness based on precipitation, temperature, soil moisture and other factors.
Regional Water Planning Group	The generic term for the planning groups that oversee the regional water plan development in each respective region in the State of Texas
Senate Bill One	Legislation passed by the 75th Texas Legislature that is the basis for the current regional water planning process.

TERM	MEANING
Texas Commission on Environmental Quality	Agency charged with oversight of Texas surface water rights and WAM program.
Total Dissolved Solids	A measure of the combined total organic and inorganic substances contained in the water.
Total Maximum Daily Load	A Total Maximum Daily Load (TMDL) is a regulatory term in the U.S. Clean Water Act, describing a plan for restoring impaired waters that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.
Texas Water Development Board	Texas Agency charged with oversight of regional water plan development and oversight of GCDs
Water Availability Model	Computer model of a river watershed that evaluates surface water availability based on Texas water rights.
Water Management Strategy	Strategies available to RWPG to meet water needs identified in the regional water plan.
Water User Group	A group that uses water. Six major types of WUGs: municipal, manufacturing, mining, steam electric power, irrigation and livestock.
Wholesale Water Provider	Entity that has or is expected to have contracts to sell 1,000 ac-ft./yr. or more of wholesale water.

EXECUTIVE SUMMARY

CHAPTER OUTLINE	
Section ES.1	Current Water Use and Supplies in Region C
Section ES.2	Projected Need for Water
Section ES.3	Identification and Selection of Water Management Strategies
RELATED APPENDICES	
Appendix A	Consistency with TWDB Rules
Appendix D	DB27 Reports
Appendix I	Water Conservation Savings
Appendix L	Socioeconomics Impacts

This report presents the *2026 Region C Water Plan* developed in the sixth round of the Senate Bill One regional water planning process. Region C covers all or part of 16 North Central Texas counties, as shown in **Figure ES.1**. The Region C water plan was developed under the direction of the Region C Water Planning Group (RCWPG). The initially prepared regional water plan was adopted by the RCWPG on February 24, 2025, and made publicly available at that time.

This Executive Summary focuses on current water needs and supplies in Region C, the projected need for water, the identification and selection of recommended water management strategies, the costs and impacts of the selected strategies, and county summaries for each county in the region over the 50-year planning period. Other elements of the plan are covered in the main text and the appendices.

This includes all associated data necessary in developing the plan from the Texas Water Development Board (TWDB). All the TWDB rules, guidance, and regulations were followed and compliance with them is documented in **Appendix A**.

Key Takeaways:

- Region C is experiencing rapid growth that is outpacing current water supplies.
  - Some providers are experiencing shortages today.
- Conservation and reuse alone will not be able to meet the needs.
- The water supply shortage can be solved but Region C will need to use water from other parts of the state.
- 2026 Region C Water Plan has unmet municipal water needs.
  - Delays in project implementation can increase unmet needs.
- The ability to develop new water supplies and meet future growth is critical to the State's economy.

The plan's required database (DB27) reports can be accessed through the TWDB Database Reports application at https://www3.twdb.texas.gov/apps/SARA/reports/list and following the steps below. The reports available for access in DB27 are listed in **Table ES.1**.

1. Enter '2026 Regional Water Plan' into the "Report Name" field to filter to all DB27 reports associated with the 2026 Regional Water Plans
2. Click on the report name hyperlink to load the desired report
3. Enter the planning region letter parameter, click view report

TABLE ES.1 TEXAS WATER DEVELOPMENT BOARD DATABASE REPORTS

REPORT
Report 1 – WUG Population
Report 2 – WUG Water Demand
Report 3 – Source Total Availability
Report 4 – WUG Existing Water Supply
Report 5 – WUG Needs/Surplus
Report 6 – WUG Second-Tier Identified Water Need
Report 7 – WUG Data Comparison to 2021 RWP
Report 8 – Source Data Comparison to 2021 RWP
Report 9 – WUG Unmet Needs
Report 10 – Recommended WUG Water Management Strategies
Report 11 – Recommended Projects Associated with Water Management Strategies
Report 12 – Alternative WUG Water Management Strategies
Report 13 – Alternative Projects Associated with Water Management Strategies
Report 14 – WUG Management Supply Factor
Report 15 – Recommended water Management Strategy Supply Associated with a new or amended IBT Permit
Report 16 – WUG Recommended WMS Supply Associated with a new or amended IBT Permit and Total Recommended conservation WMS Supply
Report 17 – Sponsored Recommended WMS Supplies Unallocated to WUGs
Report 18 – MWP Existing sales and Transfers
Report 19 – MWP WMS Summary

ES.1 Current Water Use and Supplies in Region C

As of the 2020 census, the population of Region C was 7,732,976, which represented about 26 percent of Texas' total population. The estimated population in July 2016 was 7,233,415, showing an increase of over 499,000 (6.4 percent) in four years. The two most populous counties in Region C, Dallas and Tarrant, have 61 percent of the region's population. Region C is heavily urbanized, with 84 percent of the population located in cities of more than 20,000 people.

ES.1.1 Physical Setting

Most of Region C is in the upper portion of the Trinity River Basin, with smaller parts in the Red, Brazos, Sulphur, and Sabine River Basins. Precipitation increases from west to east in the region. The average runoff in the region also increases from the west to the east, while evaporation is higher to the west. These patterns of rainfall, runoff, and evaporation result in more abundant water supplies in the eastern part of Region C than in the west.

There are thirty-four major reservoirs in Region C with conservation storages in excess of 5,000 acre-feet. Of these, twenty-six reservoirs are actively providing water supplies to the region. These reservoirs and others outside of Region C provide most of the region's water supply. Aquifers in the region include the Trinity, Woodbine, Carrizo-Wilcox, Nacatoch, and Queen City.

ES.1.2 Water Use

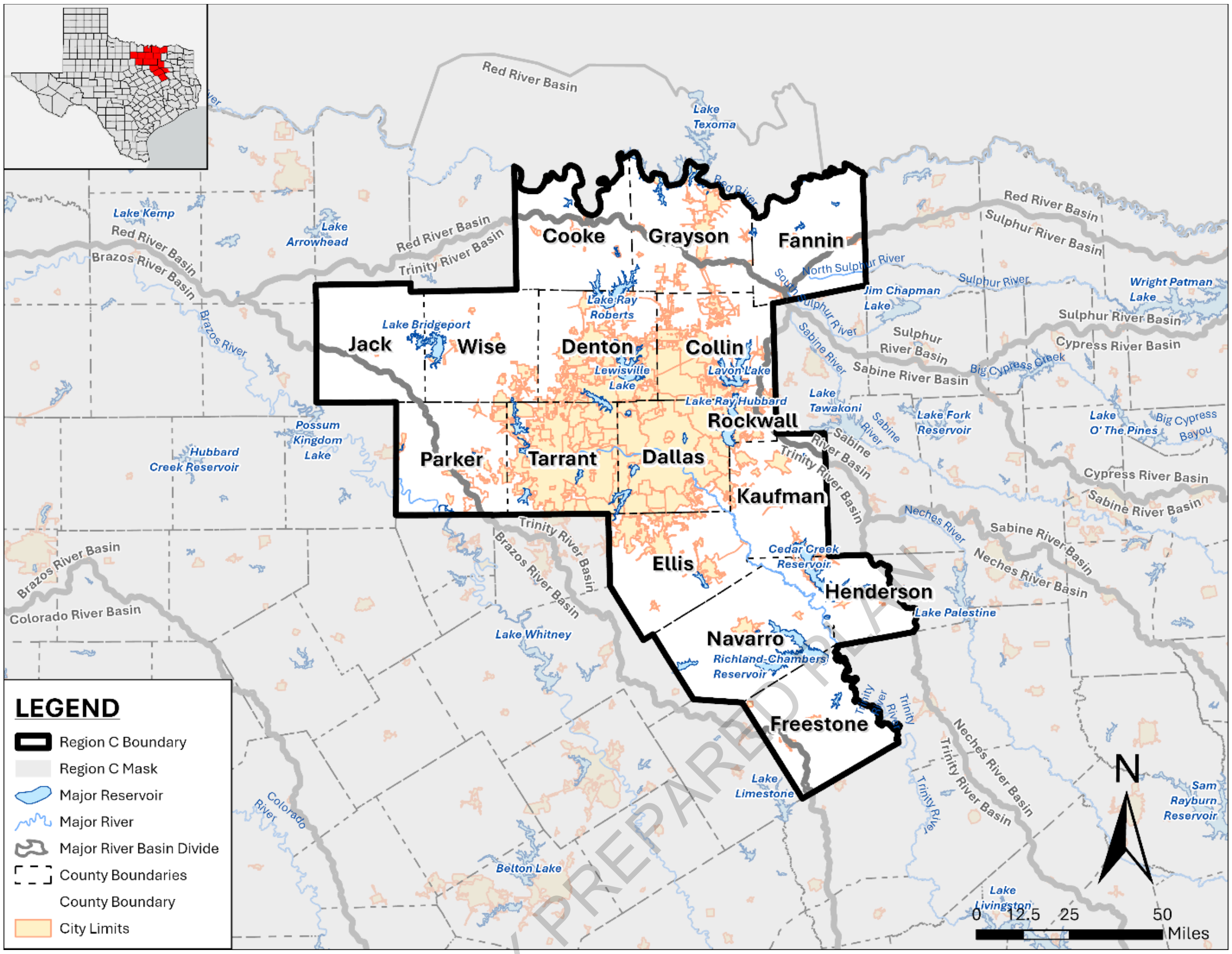
Water use in Region C has increased significantly in recent years, primarily in response to the increasing population. The regional water use in the year 2021 was approximately 1,390,000 acre-feet. It is interesting to note that Region C, with 26 percent of Texas' population, had only 9.7 percent of the state's water use in 2021. About 90 percent of the current water use in Region C is for municipal supply.

ES.1.3 Current Sources of Water Supply

About 89 percent of the water use in Region C is supplied by surface water, but groundwater can also be important, especially in rural areas. Most of the surface water supply in Region C comes from major reservoirs in and outside of the region. The Trinity aquifer is the largest source of groundwater in Region C, with some use from the Woodbine, Carrizo-Wilcox and other minor aquifers. The current use of groundwater is close to or greater than the long-term reliable supply available in some parts of Region C.

About half of the water used for municipal supply in Region C is discharged as treated effluent from wastewater treatment plants, making wastewater reclamation and reuse a significant source of water supply for the region. Reuse supplies are increasing rapidly in the region, with several major projects recently completed or under development. It is clear that the reuse of treated wastewater will be a significant source of future water supplies for the region.

FIGURE ES.1 REGION C LOCATION MAP WITH MAJOR WATER SOURCES



ES.1.4 Water Providers in Region C

Water providers in Region C include over 30 wholesale water providers (with six of them being designated as major water providers) and over 360 water user groups. In 2021, the three largest wholesale water providers in Region C (Dallas Water Utilities, Tarrant Regional Water District, and North Texas Municipal Water District) provided the majority of the water used in the region. Cities and towns provide most of the retail water service in Region C.

ES.2 Projected Need for Water

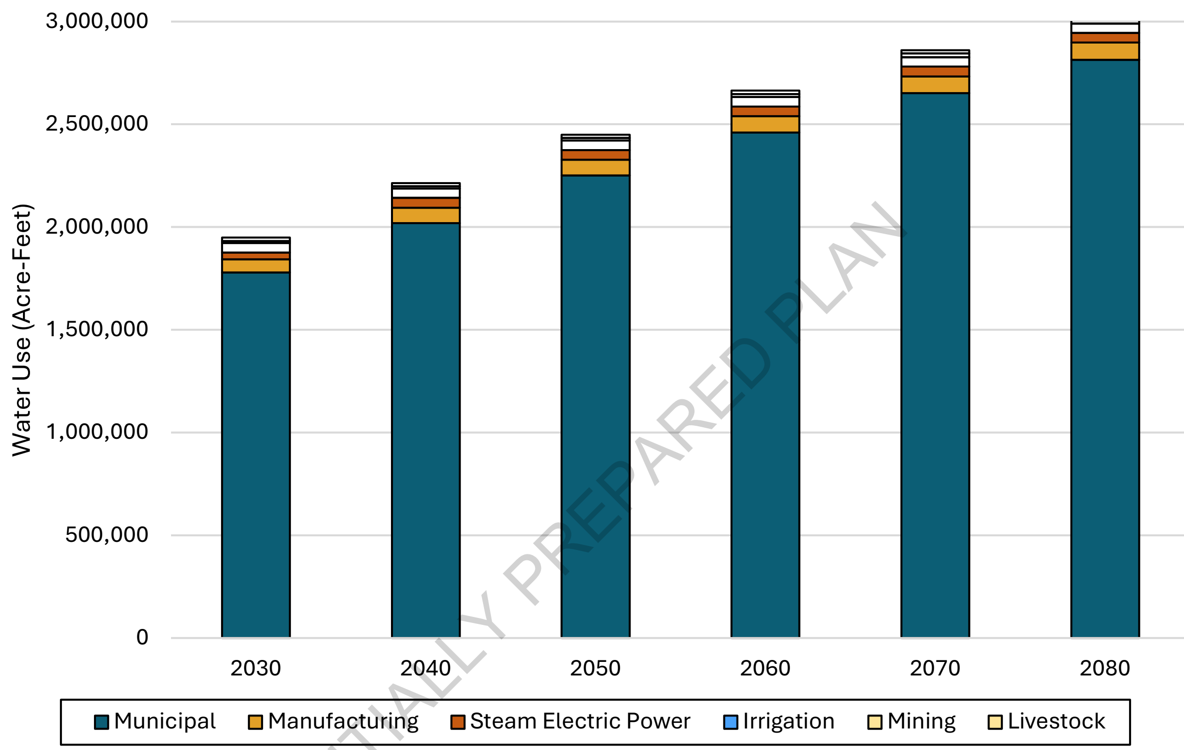
ES.2.1 Population Projections

The population of Region C is projected to grow from over 9.1 million in 2030 to over 15.1 million in 2080. These projections have been approved by the Texas Water Development Board, as required by TWDB planning guidelines. This projection reflects a substantial slowing in the rate of growth that has been experienced in Region C over the last 50 years. The distribution of the projected population by county and city is discussed in **Chapter 2**.

ES.2.2 Demand Projections

Figure ES.2 shows the projected dry year demands for water in Region C, which total over 1.9 million acre-feet per year in 2030, growing to over 3.0 million acre-feet per year in 2080. As has been the case historically, municipal demands are projected to make up the majority of the water use in Region C. Dry-year demands are significantly higher than normal year demands. Normal-year demands in Region C might be 10 to 15 percent lower than dry-year demands.

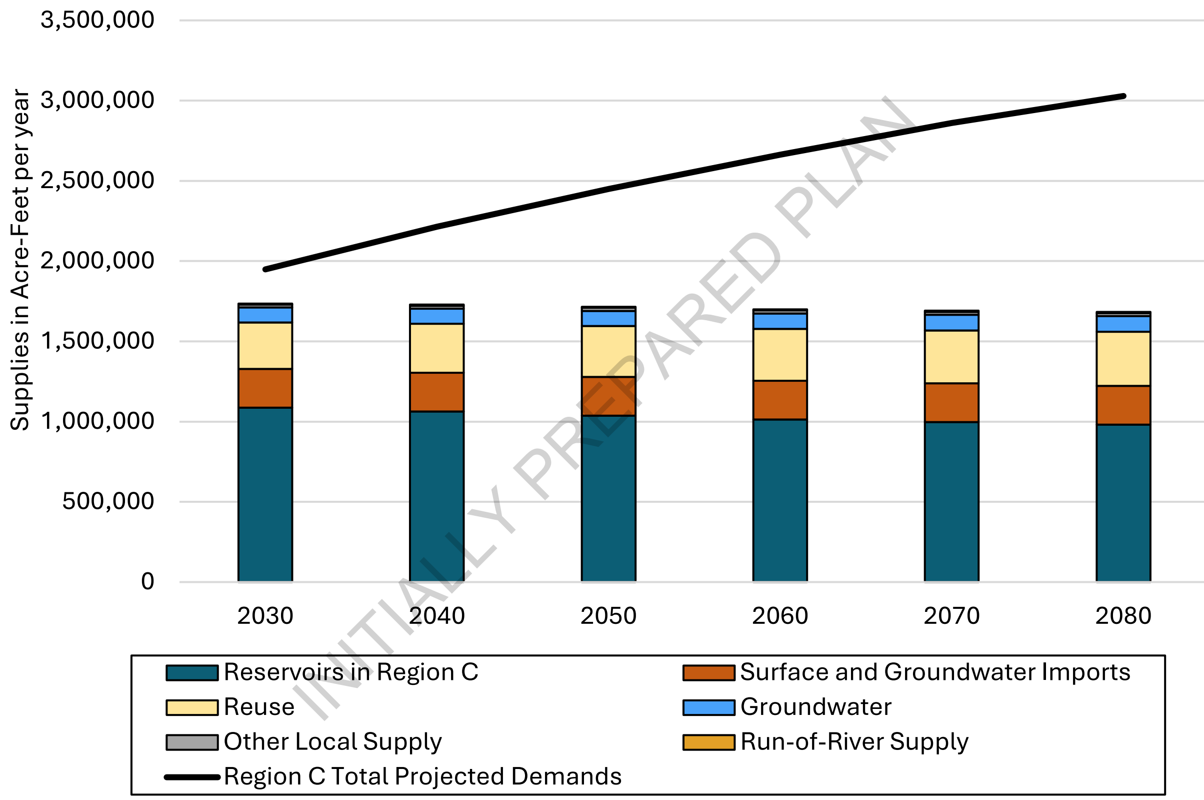
FIGURE ES.2 ADOPTED PROJECTIONS FOR DRY-YEAR WATER USE BY CATEGORY IN REGION C



ES.2.3 Comparison of Supply and Demand

Figure ES.3 shows a comparison of supplies currently available to Region C (those that are connected) and the projected demands. Currently available supplies are almost constant over time at 1.7 million acre-feet per year, as sedimentation in reservoirs is offset by increases in reuse supplies due to increased return flows. With the projected 2080 demand of 3.0 million acre-feet per year, the region has a shortage (called water needs in regional planning) of over 1.3 million acre-feet per year by 2080. Meeting the projected water needs and leaving a reasonable reserve of planned supplies beyond projected demands will require the development of significant new water supplies for Region C over the next 50 years.

FIGURE ES.3 COMPARISON OF CURRENTLY AVAILABLE SUPPLIES AND PROJECTED DEMANDS



ES.2.4 Socio-Economic Impacts of Not Meeting Projected Water Needs

The Texas Water Development Board will conduct an analysis of the socio-economic impacts of not meeting the projected water needs in Region C after the publication of the initially prepared plan (IPP) and will be included in the final plan.

More information on the socio-economic analysis will be included in **Chapter 6** and **Appendix L**.

ES.3 Identification and Selection of Water Management Strategies

The RCWPG identified and evaluated a wide variety of potentially feasible water management strategies to develop this plan. Water supply availability, costs and environmental impacts were determined for conservation and reuse efforts, the connection of existing supplies, and the development of new supplies. As required by TWDB regulations, the evaluation of water management strategies was an equitable comparison of all feasible strategies and considered the following factors:

- Evaluation of quantity, reliability, and cost of water delivered and treated
- Environmental factors
- Impacts on other water resources and on threats to agricultural and natural resources
- Other factors deemed relevant by the planning group (including consistency with the plans of water providers in the region)
- Consideration of interbasin transfer requirements and third-party impacts of voluntary redistributions of water.

ES.3.1 Water Conservation and Reuse

The RCWPG considered the municipal water conservation strategies suggested as best management practices by the Water Conservation Advisory Council and recommended a water conservation program and reuse projects for Region C that accomplish the following:

- Including the 83,811 acre-feet per year of conservation built into the demand projections, a total conservation and reuse supply of over 1.28 million acre-feet per year by 2080, which represents a 44 percent reduction of the region's demand on other supplies.
- A dry-year per capita municipal use for the region (after crediting for conservation and reuse) ranging from 114 gpcd in 2030 to 95 gpcd by 2080.

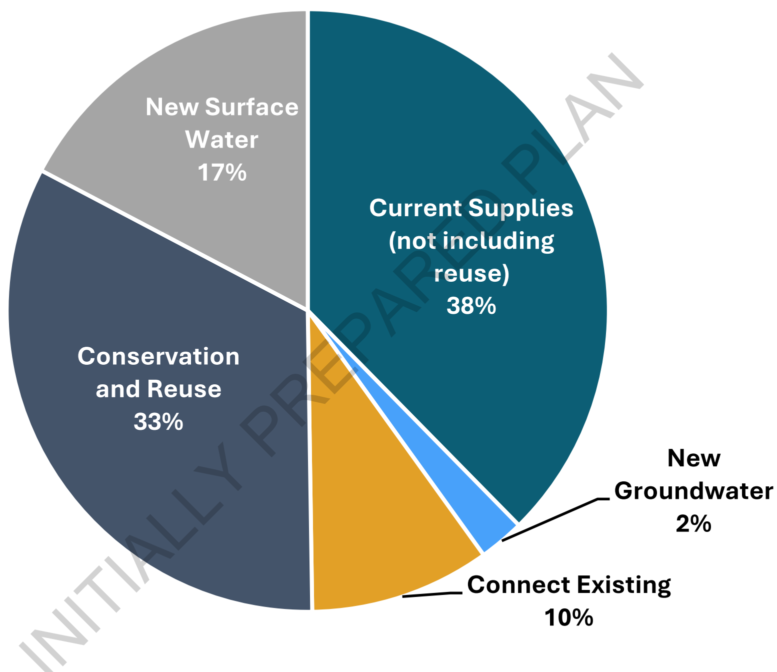
Chapter 5B includes a more detailed discussion of conservation and reuse for the region.

ES.3.2 Recommended Water Management Strategies

Table ES.1 lists the major recommended water management strategies for Region C. In total, the Region C plan includes water management strategies to develop over 1.89 million acre-feet per year of new supplies, for a total available supply of over 3.57 million acre-feet per year in 2080. The supply is about 18 percent greater than the projected demand, leaving a reasonable reserve to provide for difficulties in developing strategies in a timely manner, droughts worse than the drought of record, greater than expected growth, and supply for needs beyond this planning horizon.

Figure ES.4 shows the makeup of the 3.57 million acre-feet per year of supplies proposed to be available to the region by 2080. About 40% of the supply is already available to the region from surface water and groundwater; a third (33%) is developed from conservation and reuse efforts,10% is from the connection of existing supplies, and 17% is from the development of new surface water supply including reservoirs and run-of-river projects. The plan includes only two new on-channel reservoirs and two off-channel reservoirs (compared to more than 25 developed to supply water for Region C over the last 60 years.)

FIGURE ES.4 SOURCES OF WATER AVAILABLE TO REGION C AS OF 2080



ES.3.3 Cost of the Proposed Plan

Most of the new supplies for Region C will be developed by the major water providers in the region. **Table ES.2** shows the amount of new supply proposed for the major and regional water providers in Region C and the cost to develop that supply. The total cost of implementing all the recommended water management strategies in the plan is approximately $49 billion. The recommended water management strategies are discussed in greater detail in **Chapter 5D** and **5E** of the report.

TABLE ES.1 RECOMMENDED MAJOR WATER MANAGEMENT STRATEGIES FOR REGION C

STRATEGY	SUPPLIER	SUPPLY (AC FT/YR)	SUPPLIER CAPITAL COST	SUPPLIER UNIT COST ($/1000 GALLON)	
				WITH DEBT	AFTER DEBT
New Surface Water					
Marvin Nichols Reservoir	TRWD, NTMWD, and UTRWD	320,160	$7,364,971,000	$4.62	$0.96
Neches River Run-of-the-River[a]	DWU	53,800	$719,027,000	$3.96	$0.59
Tehuacana Reservoir	TRWD	22,330	$457,095,000	$3.32	$0.27
Wright Patman Reallocation	TRWD and NTMWD	122,200	$4,760,029,000	$7.59	$1.39
Texoma Reallocation	GTUA	28,000	See GTUA Regional System – Phase 2		
Sabine River Off-Channel Reservoir	DWU	74,200	$903,296,000	$3.08	$1.03
Connection of Existing Supplies					
Lake O' the Pines	NTMWD	75,000	$1,345,792,000	$4.05	$1.07
GTUA Regional System	GTUA – Phase I	14,150	$779,925,000	$15.35	$6.15
	GTUA – Phase II	23,800	$827,790,000	$12.45	$6.65
Parker County Regional System	New water district	22,000	$593,307,000	$7.40	$2.90
Wise County Regional System	New water district	27,463	$680,554,000	$6.92	$2.79
Integrated Pipeline (IPL)	TRWD	N/A	$1,327,000,000	N/A	N/A
	DWU	N/A	$114,000,000	N/A	N/A
Lake Palestine (Connect to Bachman)	DWU	114,337	$586,902,000	$1.21	$0.10
Lake Texoma[b]	NTMWD – (Blending)	111,693	$1,232,712,000	$2.10 - $3.17	$0.42 - $0.48
New Groundwater					
Carrizo – Wilcox Aquifer Groundwater/ Queen City Aquifer[c]	TRWD	26,800	$356,209,000	$3.75	$1.89
	DWU	25,000	$694,882,000	$6.05	$1.05
Reuse Strategies					
Marty Leonard Wetland Reuse	TRWD	88,059	$673,381,000	$2.00	$0.73
Reuse from TRA Central RWS[d]	TRWD	60,000	$0	$.39	$0.39
Reuse from Mary's Creek WWTP	TRWD (indirect)	25,928	$68,938,000	$0.64	$0.20
	Fort Worth (direct)	6,278	$66,155,000	$2.57	$0.82
Indirect Reuse Implementation	DWU and NTMWD	62,559	TBD	TBD	TBD

STRATEGY	SUPPLIER	SUPPLY (AC FT/YR)	SUPPLIER CAPITAL COST	SUPPLIER UNIT COST ($/1000 GALLON)	
				WITH DEBT	AFTER DEBT
Main Stem Balancing Reservoir	DWU	114,000	$1,767,099,000	$3.71	$0.72
Expanded Wetland Reuse	NTMWD	37,510	$686,489,000	$5.05	$0.73
Lake Ralph Hall Indirect Reuse[e]	UTRWD	20,204	$0	NA	NA

[a]The Neches River Run-of-the-River unit costs do not include the cost to transport water from Palestine to DWU through the IPL.
[b]Quantities vary by decade. The quantity shown is for 2080.
[c]Groundwater supplies are limited by the MAG.
[d]Capital costs for this strategy are included with the Marty Leonard Wetlands strategy. Only pumping and water purchase costs are shown.
[e]UTRWD will be seeking a state water right for return flows out of Lake Ralph Hall for up to 27,000 ac-ft/yr. The estimated available reuse during drought is slightly less.

TABLE ES.2 2080 SUPPLIES FOR THE MAJOR AND REGIONAL WATER PROVIDERS IN REGION C

WHOLESALE WATER PROVIDER	SUPPLIES AVAILABLE IN 2080 FROM CURRENT SOURCES[a]	SUPPLIES AVAILABLE IN 2080 FROM NEW STRATEGIES[a]	TOTAL SUPPLIES AVAILABLE IN 2080[a]	% OF TOTAL SUPPLY FROM CONSERVATION AND REUSE	COST OF STRATEGIES (MILLIONS)
Dallas Water Utilities	507,068	424,460	931,528	32.9%	$10,016
Tarrant Regional Water District	474,036	539,572	1,013,608	31.1%	$11,738
North Texas Municipal Water District	429,862	564,316	994,178	35.0%	$12,798
City of Fort Worth	280,654	222,311	502,965	32.7%	$2,300
Trinity River Authority	215,707	30,771	246,478	4.5%	$0
Upper Trinity Regional Water District	73,762	151,713	225,475	27.9%	$3,904
Corsicana	13,452	12,239	25,691	4.0%	$157
Greater Texoma Utility Authority	88,600	56,060	144,660	2.7%	$1,805
TOTAL FOR REGION C[b]	1,683,262	1,895,449	3,578,711	23.5%	$49,395
2080 DEMAND IN REGION C			***3,028,785***		
MANAGEMENT SUPPLY FACTOR FOR REGION C			***1.18***		

[a]Current sources include only those that are connected. Some supplies are used by more than one supplier. For example, TRWD supplies water to TRA and Fort Worth, DWU supplies water to UTRWD, etc.
[b]Total for Region C is not a sum of the numbers above. It includes other providers as well. Some supplies serve multiple suppliers.

Introduction

In 1997, the 75th Texas Legislature passed Senate Bill One, legislation designed to address Texas water issues. Senate Bill One put in place a grass-roots regional process to plan for the future water needs of all Texans. To implement this process, the Texas Water Development Board created 16 regional water planning groups across the state and established regulations governing regional planning efforts. The results of the first round of the Senate Bill One planning effort for Region C can be found in the *2001 Region C Water Plan* [(1)]. The regional plans from each of the 16 regions were compiled by the Texas Water Development Board into the State Water Plan, Water for Texas – 2002.

Since that time, the Texas Legislature has passed funding mechanisms to continue the regional water planning effort, which is updated every five years. Plans produced since the first round of planning include: *2006 Region C Water Plan* [(2)], *2011 Region C Water Plan* [(3)], *2016 Region C Water Plan* [(4)] and *2021 Region C Water Plan* [(5)].

This report gives the results of the latest (6th) round of planning for Region C, which represents 16 counties in and around the Dallas-Fort Worth Metroplex. The area covered by Region C is the same as in all previous rounds of Senate Bill One planning.

Required Chapters for Plan:

1. Description of Region C
2. Population and Water Demand Projections
3. Analysis of Water Supply
4. Identification of Water Needed
5. Water Management Strategies
6. Impacts of Region C Plan
7. Drought Response
8. Unique Stream Segments, Unique Reservoir Sites, and Legislative Recommendations
9. Implementation and Comparison to Previous Regional Water Plan
10. Plan Approval Process and Public Participation

The regional water planning groups created pursuant to Senate Bill One are in charge of the regional planning process. Each regional planning group includes representatives of 12 designated interest groups. **Table I.1** shows the members of the Region C water planning group and the interests they represent. The Region C Water Planning Group (RCWPG) hired a team of consultants to conduct technical analyses and prepare the regional water plan under the supervision of the planning group. The consulting team for Region C includes Freese and Nichols, Inc., Plummer Associates, Inc., and Cooksey Communications, Inc.

Texas Water Development Board planning guidelines require the regional water plan to include ten chapters. In addition to the ten required sections, this report also includes appendices providing more detailed information on the planning efforts. The elements contained in this plan meet Texas Water Development Board regional planning requirements and guidelines [(6)]. **Appendix A** contains a summary of the requirements of all regional plans and a checklist demonstrating what sections of this report meet those requirements.

The *2026 Region C Water Plan* represents the culmination of five years of working together with the RCWPG, regional and local water providers, and the public. As you read this water plan, the RCWPG would like you to keep in mind the following points:

- The *2026 Region C Water Plan* presents a comprehensive overview of the water supply issues in the region.
- The report presents planning level analysis of the recommended water management strategies. Additional engineering studies and design will be needed prior to the implementation of the strategies.
- The surpluses and needs are estimates based on the best information available at the time of publication. Actual values may vary based on changing conditions or assumptions.
- The RCWPG has no authority to regulate water supplies or implement water management strategies. The identified water management strategies are assumed to be implemented by the respective water user.

TABLE I.1 MEMBERS OF THE REGION C WATER PLANNING GROUP

INTEREST	MEMBER
Water Districts	Dan Buhman, Chair
Industry	Russell Laughlin, Vice Chair
Water Districts	Jenna Covington, Secretary
Agriculture	John Paul Dineen III
Counties	Steve Starnes, G.K. Maenius (retired)
Electric Generating Utilities	Ryan Bayle, Gary Spicer (retired)
Environment	Grace Darling
Environment	John Stevenson
Groundwater Management Areas (GMA6)	Doug Shaw
Groundwater Management Areas (GMA8)	Harold Latham
Groundwater Management Areas (GMA11)	Gary Douglas
Groundwater Management Areas (GMA12)	David Bailey
Municipalities	Stephen Gay
Municipalities	Chris Harder
Municipalities	Rick Shaffer
Municipalities	Denis Qualls
Public	Jay Barksdale
Public	John Lingenfelder
River Authorities	Glenn Clingenpeel, Kevin Ward (former chair, retired)
Small Business	Steve Mundt
Water Districts	Paul Sigle, Drew Satterwhite (retired)
Water Utilities	Chris Boyd
Water Utilities	Connie Standridge

Introduction List of References

(1) Freese and Nichols, Inc., Alan Plummer Associates, Inc., Chiang, Patel & Yerby, Inc., and Cooksey Communications, Inc.: *Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, January 2001.

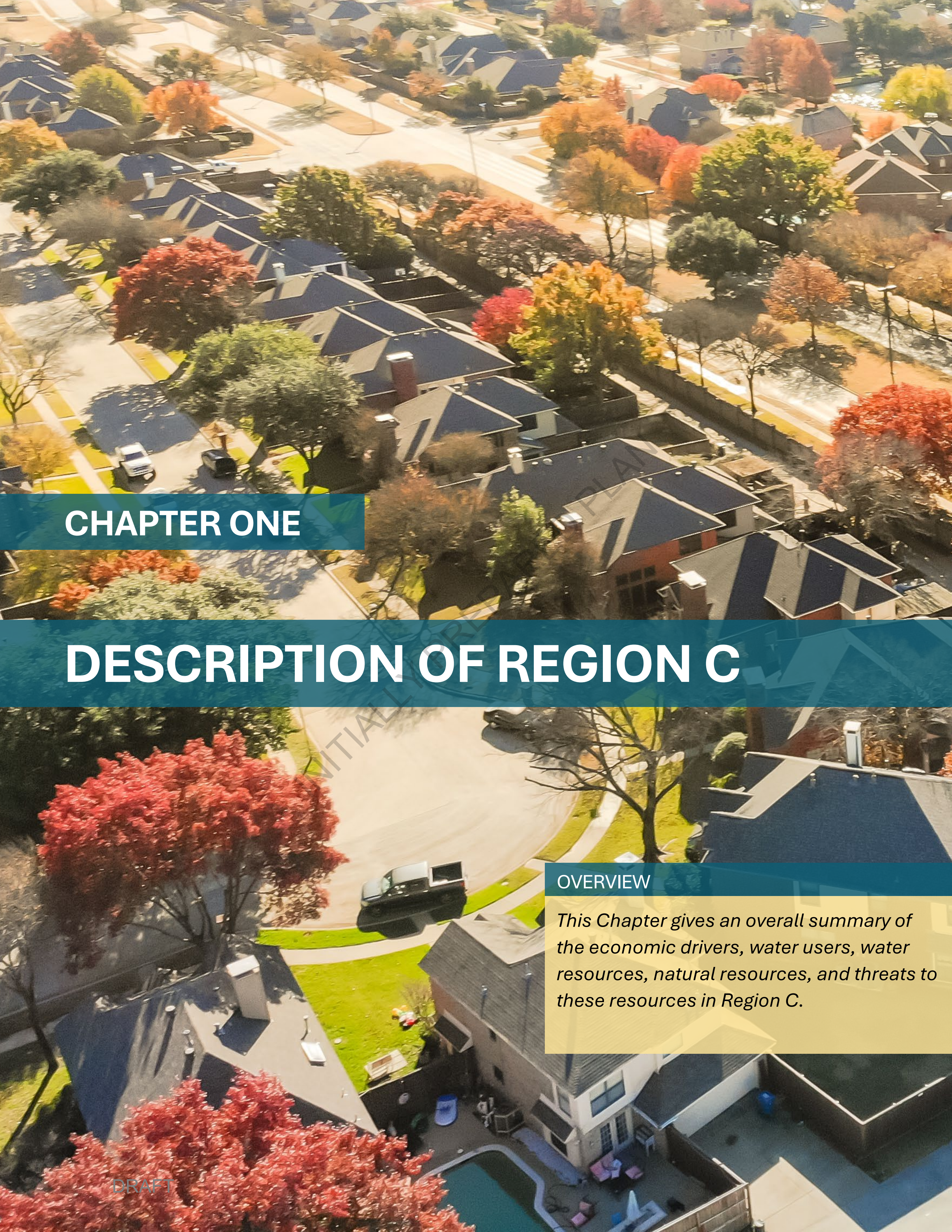
(2) Freese and Nichols, Inc., Alan Plummer Associates, Inc., Chiang, Patel & Yerby, Inc., and Cooksey Communications, Inc.: *2006 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, January 2006.

(3) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2011 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, October 2010.

(4) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2016 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, December 2015.

(5) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2021 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, November 2020.

(6) Texas Water Development Board, *Exhibit C Second Amended General Guidelines for Regional Water Plan Development* (April 2018), Austin, [Online] Available URL: http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/doc/current_docs/contract_docs/2ndAmendedExhibitC.pdf?d=11541.199999992386, August 21, 2018.



CHAPTER ONE

DESCRIPTION OF REGION C

OVERVIEW

This Chapter gives an overall summary of the economic drivers, water users, water resources, natural resources, and threats to these resources in Region C.

1 DESCRIPTION OF REGION C

CHAPTER OUTLINE

RELATED APPENDICES

Region C includes all or part of 16 counties in North Texas. The population of the region has grown from over 987,000 in 1930 to over 7,700,000 as of July 2021. In 2021, Region C included approximately 26 percent of Texas' total population. The two most populous counties in Region C, Dallas and Tarrant County, have over 60 percent of the region's population [(1)]. **Table 1.1** shows the cities in Region C with a population of 20,000 or more in 2021. These cities include 84 percent of the 2021 population of the region.

Region C at a Glance

2021 Population: 7.7 Million

26% of State's Population

30% of State's Economy

10% of State's Water Use

56 Cities over 20,000 population

89% of Demand Met by Surface Water

TABLE 1.1 CITIES IN REGION C WITH 2021 POPULATION GREATER THAN 20,000

CITY	ESTIMATED 2021 POPULATION (1)	COUNTY(IES)	CITY	ESTIMATED 2021 POPULATION (1)	COUNTY(IES)
Dallas	1,289,151	Collin, Dallas, Denton, Rockwall	**Keller**	45,644	Tarrant
Fort Worth	934,957	Denton, Parker, Tarrant, Wise	**Haltom City**	45,510	Tarrant
Arlington	392,472	Tarrant	**The Colony**	45,237	Denton
Plano	288,474	Collin, Denton	**Sherman**	45,129	Grayson
Irving	260,171	Dallas	**Waxahachie**	43,686	Ellis
Garland	247,721	Collin, Dallas, Rockwall	**Coppell**	43,071	Dallas, Denton
Frisco	211,774	Collin, Denton	**Lancaster**	40,521	Dallas
McKinney	202,084	Collin	**Hurst**	39,936	Tarrant
Grand Prairie	197,584	Dallas, Ellis, Tarrant	**Duncanville**	39,790	Dallas
Mesquite	151,232	Dallas, Kaufman	**Midlothian**	37,264	Ellis
Denton	146,428	Denton, Parker, Tarrant, Wise	**Farmers Branch**	36,562	Dallas
Carrollton	131,515	Collin, Dallas, Denton	**Prosper**	34,039	Collin, Denton
Lewisville	128,200	Dallas, Denton	**Weatherford**	33,126	Parker
Richardson	118,235	Collin, Dallas	**Southlake**	30,910	Denton, Tarrant
Allen	107,324	Collin	**Sachse**	27,863	Collin, Dallas
Flower Mound	77,450	Denton, Tarrant	**Balch Springs**	27,106	Dallas
Mansfield	75,959	Ellis, Tarrant, Johnson	**Forney**	26,960	Kaufman
North Richland Hills	69,877	Tarrant	**Colleyville**	25,801	Tarrant
Rowlett	64,148	Dallas, Rockwall	**Corsicana**	25,407	Navarro
Euless	60,342	Tarrant	**Denison**	25,175	Grayson
Wylie	45,644	Collin, Dallas, Rockwall	**University Park**	24,823	Dallas
DeSoto	55,870	Dallas	**Benbrook**	24,786	Tarrant
Little Elm	51,472	Denton	**Saginaw**	24,101	Tarrant
Grapevine	50,803	Tarrant	**Celina**	23,691	Collin, Denton
Burleson	50,689	Tarrant, Johnson	**Watauga**	23,214	Tarrant
Bedford	49,046	Tarrant	**Corinth**	22,852	Denton
Rockwall	48,516	Rockwall	**Ennis**	21,380	Ellis
Cedar Hill	48,443	Dallas, Ellis	**Murphy**	21,113	Collin

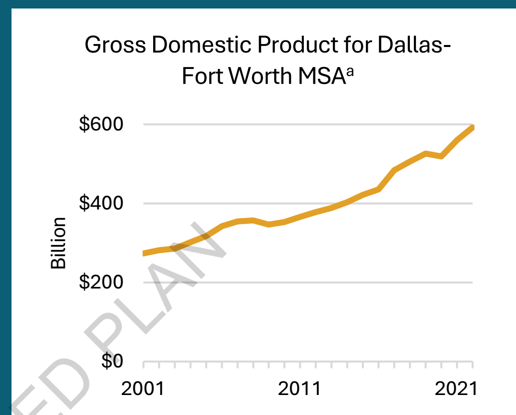
1.1 Economic Activity in Region C

Region C includes most of the Dallas and Fort Worth-Arlington metropolitan statistical areas (MSA). The largest employment sector in the Dallas and Fort Worth-Arlington MSA is the trade, transportation, and utilities sector [(2)], all of which are heavily dependent on water resources.

Payroll and employment in Region C are concentrated in the central urban counties of Dallas and Tarrant, which have 74 percent of the region's total payroll and 69 percent of the employment [(3)]. Economic activity is more concentrated than population because many workers commute from outlying counties to work in Dallas and Tarrant Counties.

Region C supported more than 5.5 million jobs and generated more than $562 billion in Gross Domestic Product (GDP) in 2021 dollars. Texas' total 2021 GDP was $1.87 trillion, making Region C account for almost one-third (30%) of the state's economy, as shown in **Figure 1.1** [(4)].

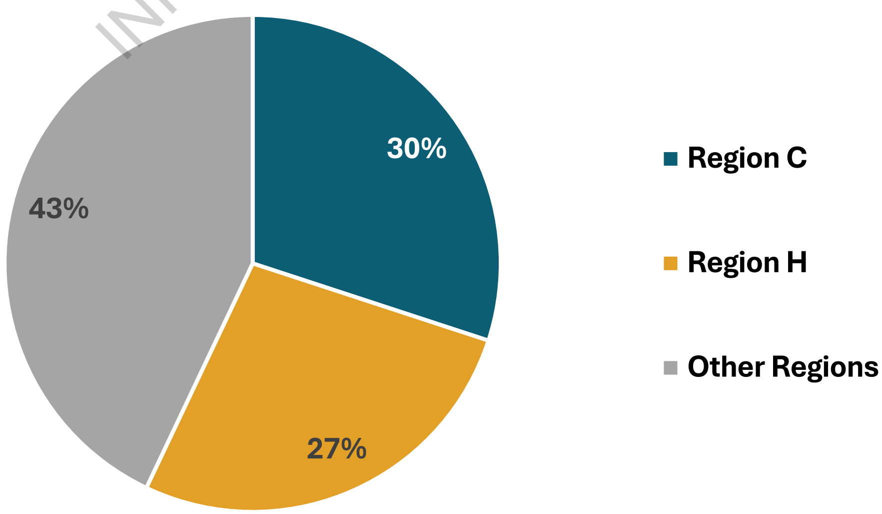
Region C accounts for nearly 1/3 of Texas' economy, making it the single largest economic engine in the State.



[a]GDP between 2001 and 2016 are in chained 2012 U.S. dollars. Subsequent years are in chained 2017 dollars.

Chapter 6 of this plan has additional information on the Socio-Economic Study that was performed by TWDB to evaluate the impacts of not meeting water needs.

FIGURE 1.1 GROSS DOMESTIC PRODUCT BY REGIONAL PLANNING AREA COMPARISON



The DFW metro area is home to over 20 Fortune 500 companies. Additionally, 79 companies headquartered in the area posted revenue of $1 billion or more in 2023 [5]. Among the companies with corporate headquarters in DFW are McKesson Corp, AT&T, Energy Transfer LP, Caterpillar Inc., and American Airlines.

Region C is also home to Dallas-Fort Worth International Airport which handles around 81 million passengers per year, making it the 2nd busiest airport in the US [6]. The DFW area attracts many visitors from around the state and country with its medical facilities and entertainment venues, including UT Southwestern Medical Center, Baylor Scott & White, Children's Medical Center, Cook Children's Hospital, AT&T Stadium, Globe Life Park, the Texas State Fair, and Texas Motor Speedway.

Food Production Companies in Region C

- Frito Lay
- Borden Dairy
- Bimbo Bakeries (Mrs. Baird's)
- Mission Foods
- DFW Dr. Pepper Bottling Company
- PepsiCo
- Coors Miller
- Nestle Waters North America
- Daisy Brand
- Americas Beverage Company

Major Universities in Region C

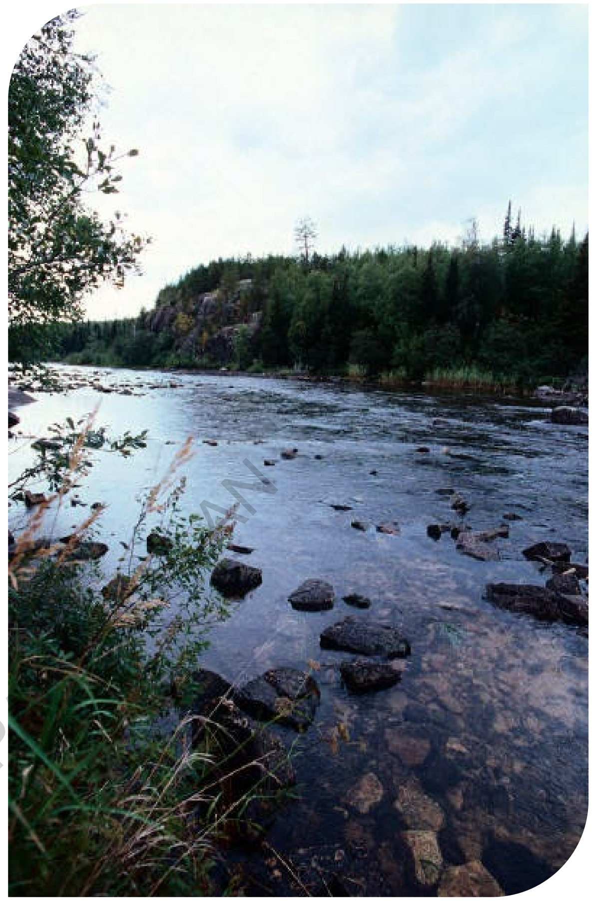
- Southern Methodist University
- Texas Christian University
- University of North Texas
- University of Texas at Arlington
- University of Texas at Dallas
- Texas A&M Law School

Other Large Employers in Region C

- Lockheed Martin Aero
- Raytheon
- Bell Helicopter Textron
- Alcon Laboratories
- Naval Air Station (Ft Worth)

MARGARET HUNT HILL BRIDGE IN DALLAS

1.2 Water-Related Physical Features in Region C



Most of Region C is in the upper portion of the Trinity River Basin, with smaller parts in the Red, Brazos, Sulphur, and Sabine Basins. With the exception of the Red River Basin, the predominant flow of the streams is from northwest to southeast, as is true for most of Texas. The Red River flows west to east, forming the north border of Region C, and its major tributaries in Region C flow southwest to northeast. Major streams in Region C include the Brazos River, Red River, Trinity River, Clear Fork Trinity River, West Fork Trinity River, Elm Fork Trinity River, East Fork Trinity River, and numerous other tributaries of the Trinity River.

Average annual precipitation in Region C increases west to east from slightly more than 30 inches per year in western Jack County to more than 43 inches per year in the northeast corner of Fannin County [7]. **Table 1.2** lists the 34 reservoirs in Region C with conservation storage over 5,000 acre-feet (see **Figure 1.2**). Of these, 26 reservoirs are actively providing water supplies. These reservoirs and others outside of Region C provide most of the region's water supply. Reservoirs are necessary to provide a reliable surface water supply in this part of the state because of the wide variations in natural streamflow. Reservoir storage serves to capture high flows when they are available and save them for use during times of normal or low flow.

Figure 1.3 and **Figure 1.4** show major and minor aquifers in Region C. The most heavily used aquifer in Region C is the Trinity aquifer, which supplies most of the groundwater used in the region. The Carrizo-Wilcox aquifer also outcrops in Region C in Navarro, Freestone, and Henderson Counties. Minor aquifers in Region C include the Woodbine aquifer, the Nacatoch aquifer, the Cross Timbers aquifer, and a small part of the Queen City aquifer.

TABLE 1.2 MAJOR RESERVOIRS IN REGION C (OVER 5,000 ACRE-FEET OF CONSERVATION STORAGE)

RESERVOIR	BASIN	STREAM	COUNTY(IES)	OWNER	WATER RIGHT HOLDER(S)
Moss	Red	Fish Creek	Cooke	Gainesville	Gainesville
Texoma	Red	Red River	Grayson, Cooke	Corps of Engineers	Red River Authority, GTUA, Denison, NTMWD, Luminant
Randell	Red	Unnamed Trib. Shawnee Creek	Grayson	Denison	Denison
Valley	Red	Sand Creek	Fannin, Grayson	Private	Luminant
Bonham	Red	Timber Creek	Fannin	Bonham	NTMWD
Bois d'Arc	Red	Bois d'Arc Creek	Fannin	NTMWD	NTMWD
Coffee Mill	Red	Coffee Mill Creek	Fannin	USDA	USDA
Kiowa	Trinity	Indian Creek	Cooke	Lake Kiowa POA Inc.	Lake Kiowa Property Owners Association, Inc.
Ray Roberts	Trinity	Elm Fork Trinity River	Denton, Cooke, Grayson	Corps of Engineers	Dallas and Denton
Lost Creek	Trinity	Lost Creek	Jack	Jacksboro	Jacksboro
Bridgeport	Trinity	West Fork Trinity River	Wise, Jack	TRWD	TRWD
Lewisville	Trinity	Elm Fork Trinity River	Denton	Corps of Engineers	Dallas and Denton
Lavon	Trinity	East Fork Trinity River	Collin	Corps of Engineers	NTMWD
Ray Hubbard	Trinity	East Fork Trinity River	Dallas, Kaufman, Collin, Rockwall	Dallas	Dallas
Weatherford	Trinity	Clear Fork Trinity River	Parker	Weatherford	Weatherford
Grapevine	Trinity	Denton Creek	Tarrant, Denton	Corps of Engineers	Dallas County Park Cities MUD, Dallas, Grapevine
Eagle Mountain	Trinity	West Fork Trinity River	Tarrant, Wise	TRWD	TRWD
Worth	Trinity	West Fork Trinity River	Tarrant	Fort Worth	Fort Worth
Benbrook	Trinity	Clear Fork Trinity River	Tarrant	Corps of Engineers	TRWD
Arlington	Trinity	Village Creek	Tarrant	Arlington	Arlington and Luminant
Cedar Creek	Trinity	Cedar Creek	Henderson, Kaufman	TRWD	TRWD
Richland Chambers	Trinity	Chambers and Richland Creek	Navarro, Freestone	TRWD	TRWD
Joe Pool	Trinity	Mountain Creek	Dallas, Tarrant	Corps of Engineers	TRA

RESERVOIR	BASIN	STREAM	COUNTY(IES)	OWNER	WATER RIGHT HOLDER(S)
Mountain Creek	Trinity	Mountain Creek	Dallas	Exelon	Exelon
North	Trinity	South Fork Grapevine Creek	Dallas	Coppell	Coppell
Waxahachie	Trinity	South Prong	Ellis	Ellis County Water Control and Improvement District No. 1	Ellis County Water Control and Improvement District No. 1
Bardwell	Trinity	Waxahachie Creek	Ellis	Corps of Engineers	TRA
White Rock	Trinity	White Rock Creek	Dallas	Dallas	Dallas
Forest Grove	Trinity	Caney Creek	Henderson	Luminant	Luminant
Trindad	Trinity	Unnamed	Henderson	Luminant	Luminant
Navarro Mills	Trinity	Richland Creek	Navarro, Hill	Corps of Engineers	TRA
Fairfield	Trinity	Big Brown Creek	Freestone	Todd Interests	Todd Interests
Mineral Wells	Brazos	Rock Creek	Parker	Mineral Wells	Mineral Wells
Ralph Hall	Sulphur	North Fork Sulphur River	Fannin	UTRWD	UTRWD

[a]*Data are from TCEQ water rights list* [(8)] *and other sources*

FIGURE 1.2 REGION C LOCATION MAP WITH MAJOR WATER SOURCES

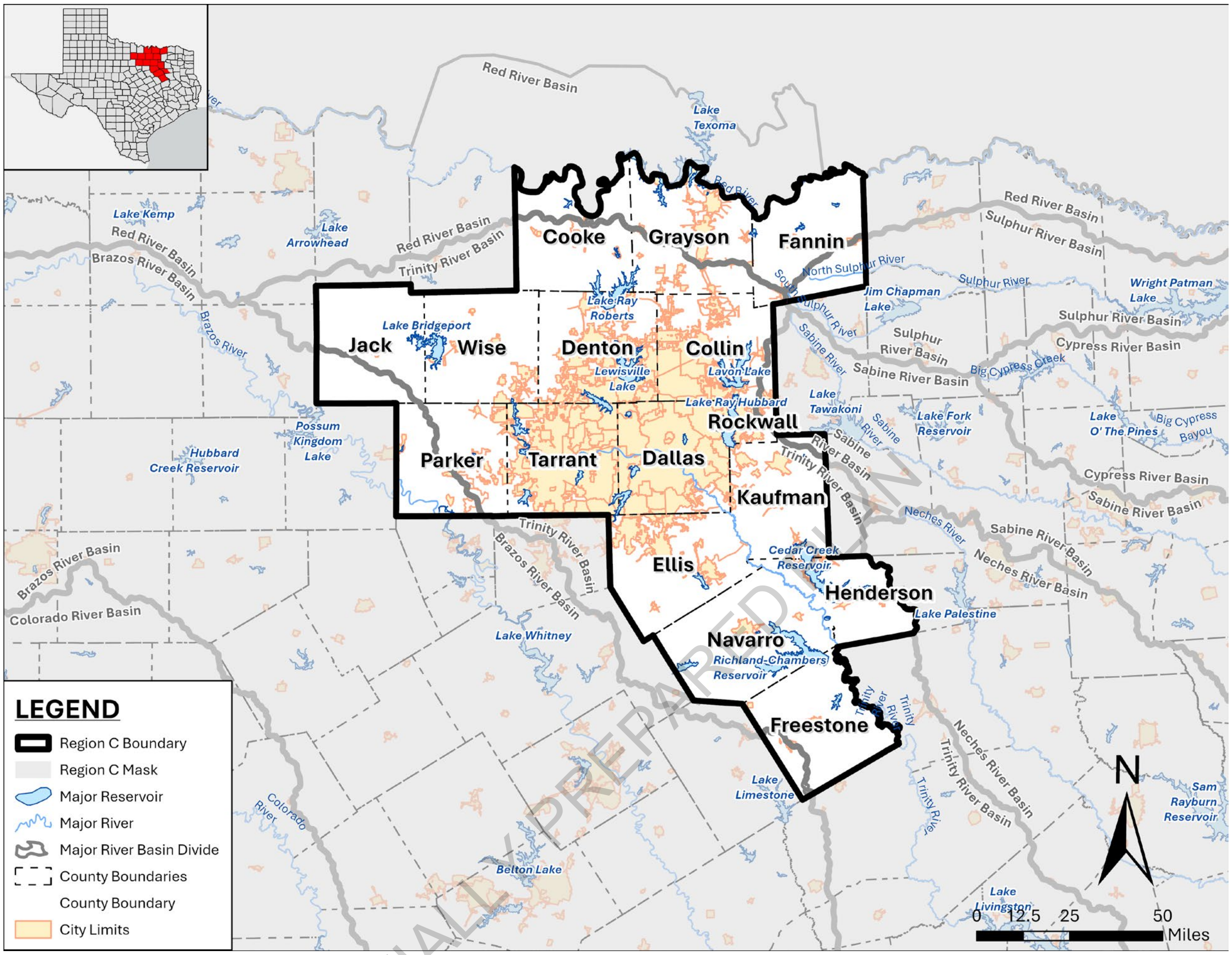


FIGURE 1.3 MAJOR AQUIFERS IN REGION C

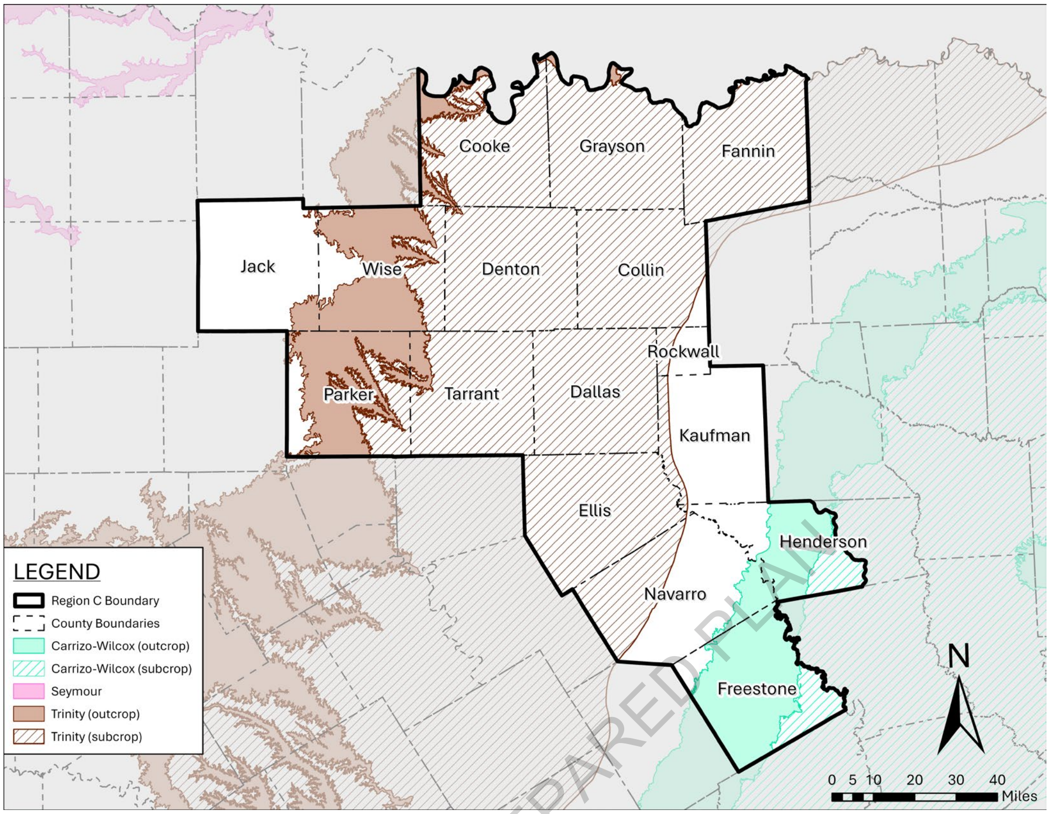
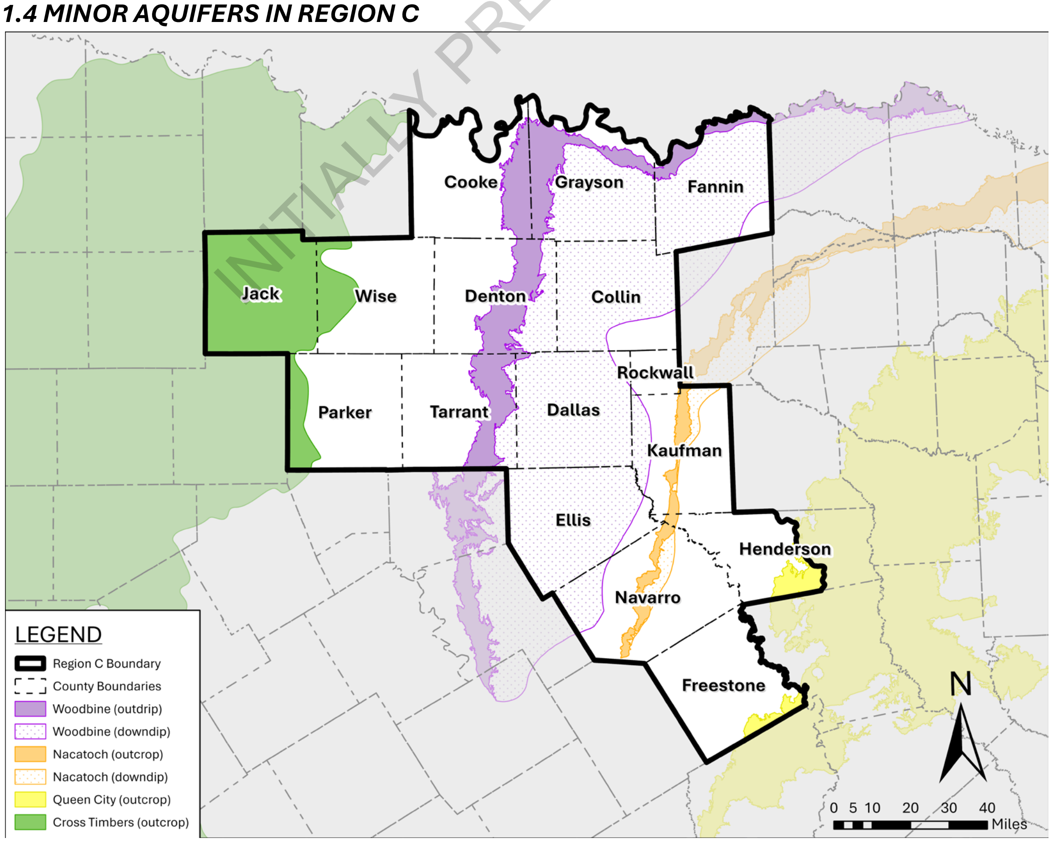


FIGURE 1.4 MINOR AQUIFERS IN REGION C



1.3 Current Water Uses and Demand Centers in Region C

Water use in Region C has increased in recent years, primarily in response to increasing population. High use years have historically been associated with dry weather, which causes higher municipal use due to increased outdoor water use (lawn watering). While this has historically been the case, the water use characteristics during dry years are now beginning to change in Region C due to major changes in conservation practices across the region. Many water providers are now imposing permanent restrictions on outdoor watering, the most common restrictions being limiting the hours for lawn watering in the summer, limiting lawn watering to no more than twice per week, and prohibiting water waste.

The TWDB categorizes water use as municipal or non-municipal (which includes irrigation, livestock, manufacturing, mining, and steam electric power generation). Municipal use is by far the largest category in Region C, accounting for 90 percent of the total use in 2021. There is limited steam electric, mining, manufacturing, irrigation, and livestock use in Region C. **Table 1.3** shows Region C water use by county and water use category for 2021 and Region C use as a percent of statewide use. It is interesting to note that Region C, with 26 percent of Texas' population, had only 9.7 percent of the state's water use in 2021. This is primarily because Region C has very limited water use for irrigation, while irrigation use is more than 55 percent of the total use for the state.

In addition to the consumptive water uses discussed above, water is used for recreation and other purposes in Region C. Reservoirs for which records of visitors are maintained show that these facilities draw millions of visitors each year in Region C. In addition, smaller lakes and streams in the region draw many visitors for fishing, boating, swimming, and other water-related recreational activities. Water in streams and lakes is also important to fish and wildlife in the region.

LAKE TEXOMA

TABLE 1.3 HISTORICAL WATER USE BY COUNTY AND CATEGORY IN 2021 FOR REGION C

COUNTY	MUNICIPAL	MANUFACTURING	MINING	STEAM ELECTRIC POWER	IRRIGATION	LIVESTOCK
Collin	195,989	4,655	0	115	1,840	799
Cooke	5,552	31	28	5	784	1,541
Dallas	435,921	18,467	1	1,174	9,636	186
Denton	153,039	539	408	536	8,867	866
Ellis	32,820	4,529	0	1,326	2,594	932
Fannin	4,648	0	37	0	2,912	1,341
Freestone	2,527	38	2	3,871	976	1,460
Grayson	19,918	2,469	3	1,491	1,702	1,017
Henderson[(a)]	11,437	14	14	104	1,231	2,931
Jack	1,239	0	1	1,939	562	672
Kaufman	18,050	934	14	20	573	1,466
Navarro	8,139	619	2,434	0	58	1,543
Parker	17,988	41	781	0	1,125	1,461
Rockwall	18,352	0	0	0	163	84
Tarrant	336,475	10,266	706	4	3,156	291
Wise	8,197	93	2,517	1,571	3,340	1,494
Region C	**1,270,291**	**42,595**	**6,946**	**12,156**	**39,519**	**18,084**
TEXAS TOTAL				***14,295,854***		
REGION C TOTAL WATER USE AS A PERCENT OF STATEWIDE WATER USE				***9.7%***		

[a]Data for Henderson County includes the entire county, not just the Region C portion.

[b]Data are from the Texas Water Development Board [(9)].

1.4 Current Sources of Water Supply

Water sources are generally categorized as surface water, groundwater, and reuse (indirect and direct). Direct reuse is when treated wastewater is delivered to a user directly from the treatment facility, such as a purple pipe system. Indirect reuse is treated wastewater that is discharged to a river or stream and then diverted and reused.

Table 1.4 shows the 2021 water use in Region C by source and water type category. The reuse shown in the table is mostly direct reuse. Most of the large-scale indirect reuse in Region C is included with surface water in the table. The irrigation water use in Region C primarily represents the use of raw water for golf course irrigation, which TWDB classifies as irrigation, rather than municipal use.

TABLE 1.4 HISTORICAL USE BY SOURCE AND CATEGORY IN 2021 FOR REGION C

WATER TYPE	MUNICIPAL	MANUFACTURING	MINING	STEAM ELECTRIC POWER	IRRIGATION	LIVESTOCK
Ground	76,750	3,627	1,989	13	17,988	3,499
Surface	1,150,023	37,774	4,136	11,889	15,750	14,585
Direct Reuse	43,519	1,194	821	254	5,781	0
TOTAL	***1,270,292***	***42,595***	***6,946***	***12,156***	***39,519***	***18,084***

[a]*Data are from the Texas Water Development Board [8]. Indirect reuse is included in Surface Water.*

Some interesting points about water use in Region C in 2021 include:

Surface water provided 90 percent of the water to Region C users, with groundwater and direct reuse comprising the remaining 10 percent. Indirect reuse is included as part of the surface water estimates.

Although groundwater provided only 7.5 percent of the overall water use in Region C, it provided 46 percent of the irrigation use, 29 percent of the mining use, and 19 percent of the livestock use.

Groundwater provided the majority of the municipal use in Cooke, Fannin, Freestone, Grayson, and Wise Counties.

1.4.1 Surface Water Sources

Most of the surface water in Region C comes from major reservoirs. **Table 1.5** lists the permitted conservation storage, and the permitted diversion for major reservoirs with over 5,000 acre-feet of conservation storage in the region.

The newest major reservoir in Region C is Bois d'Arc Lake located in Fannin County, which is owned and operated by NTMWD. Bois d'Arc Lake was the first major reservoir in Texas in over 30 years and began supplying water to the region in March 2023. Lake Ralph Hall is another new lake owned and operated by UTRWD and is currently under construction in Southeast Fannin County. Construction began in June 2021 and water delivery is expected to begin by 2026.

Another major source of supply in Region C is surface water imported from other regions. **Table 1.6** lists currently permitted imports of water to Region C from other regions. No special permit is required if importation from another region does not involve interbasin transfers, but all significant imports to Region C, except for TRA's upstream sale from Lake Livingston, currently involve interbasin transfers and thus require interbasin transfer permits.

Figure 1.2 shows the surface water reservoirs that provide these imports. There is also small-scale importation of treated water in parts of the region, where suppliers purchase water that originates in other regions, including water from Lakes Granbury and Aquilla.

TABLE 1.5 WATER RIGHTS, STORAGE, AND DIVERSIONS FOR MAJOR RESERVOIRS IN REGION C

RESERVOIR	COUNTY(IES)	WATER RIGHT NUMBER(S) [A]	PERMITTED CONSERVATION STORAGE [B]	PERMITTED DIVERSION [B]
Moss	Cooke	C4881	23,210	7,740
Texoma (Texas portion)	Grayson, Cooke	P4301, C4898, C4899, C4901, C4900, P5003	301,515	306,850
Randell	Grayson	C4901	5,400	5,280
Valley	Fannin, Grayson	C4900	15,000	16,400
Bonham	Fannin	C4925	13,000	5,340
Bois d'Arc	Fannin	P12151	367,609	175,000
Coffee Mill	Fannin	C4915	8,000	0
Kiowa	Cooke	C2334	7,000	233.5
Ray Roberts	Denton, Cooke, Grayson	C2335, C2455	799,600	799,600
Lewisville	Denton	C2348, C2456	618,400	608,400
Lost Creek	Jack	C3313	11,961	1,397
Bridgeport	Wise, Jack	C3808	387,000	27,000[c]
Eagle Mountain	Tarrant, Wise	C3809	210,000	159,600[f]
Lavon	Collin	C2410	443,800	118,670[d]
Weatherford	Parker	C3356	19,470	5,220[e]
Grapevine	Tarrant, Denton	C2362, C2363, C2458	161,250	161,250
Benbrook	Tarrant	P5157	72,500	6,833
Arlington	Tarrant	C3391	45,710	22,720
Worth	Tarrant	C3340	38,124	15,504
Joe Pool	Dallas, Tarrant	C3404	176,900	17,000[d]
Mountain Creek	Dallas	C3408	22,840	6,400
White Rock	Dallas	C2461	21,345	8,703
Ray Hubbard	Dallas, Kaufman, Rockwall	C2462	490,000	208,067
Terrell	Kaufman	C4972	8,712	5,800
Bardwell	Ellis	C5021	54,900	9,600[d]
Waxahachie	Ellis	C5018	13,500	3,570
Cedar Creek	Henderson, Kaufman	C4976	678,900	175,000[d]
Ralph Hall	Fannin	P5821	180,000	45,000
Forest Grove	Henderson	C4983	20,038	9,500[g]
Trinidad	Henderson	C4970	6,200	4,000
Navarro Mills	Navarro	C4992	63,300	19,400
Richland-Chambers	Freestone, Navarro	C5030, C5035	1,135,000	223,650[d]
Fairfield	Freestone	C5040	50,600	14,150
Mineral Wells	Parker	C4039	7,065	2,520

RESERVOIR	COUNTY(IES)	WATER RIGHT NUMBER(S) [A]	PERMITTED CONSERVATION STORAGE [B]	PERMITTED DIVERSION [B]
Northlake	Dallas	C2365	17,100	1,000

[a]*A C in front of the water right number indicates a Certificate of Adjudication. A P indicates a permit.*
[b]*Permitted conservation storage and permitted diversion are from TCEQ permits (6).*
[c]*Release of up to 78,000 acre-feet per year for diversion and use from Eagle Mountain Lake is also authorized.*
[d]*Permitted diversion does not include reuse.*
[e]*Diversion does not include 59,400 acre-feet per year of non-consumptive industrial use.*
[f]*Permitted diversion includes water releases from Lake Bridgeport.*
[g]*Permitted diversion does not include non-consumptive use.*

TABLE 1.6 PERMITTED IMPORTATION OF SURFACE WATER TO REGION C

SUPPLIER	SOURCE	SOURCE REGION	SOURCE BASIN	DESTINATION BASIN	PERMITTED AMOUNT (6)	RAW OR TREATED	STATUS
NTMWD	Chapman Lake[a]	D	Sulphur	Trinity	57,214	Raw	Operating
Irving	Chapman Lake[a]	D	Sulphur	Trinity	54,000	Raw	Operating
UTRWD	Chapman Lake[a]	D	Sulphur	Trinity	16,106	Raw	Operating
Dallas	Lake Tawakoni	D	Sabine	Trinity	190,480	Raw	Operating
Dallas	Lake Fork Reservoir	D	Sabine	Trinity	120,000	Raw	Operating
Dallas	Lake Palestine	I	Neches	Trinity	114,337	Raw	Not Yet Developed
Athens[b]	Lake Athens	I	Neches	Trinity	5,477	Treated	Operating
NTMWD	Lake Tawakoni	D	Sabine	Trinity	11,210	Raw	Operating
NTMWD	Lake Tawakoni and Lake Fork	D	Sabine	Trinity	40,000[d]	Raw	Operating
TXU Big Brown Plant	Lake Livingston[c]	H	Trinity	Trinity	20,000	Raw	Operating

[a]*Chapman Lake was formerly Cooper Lake.*
[b]*Most of Athens is in the Trinity Basin.*
[c]*Use is an upstream diversion based on Lake Livingston water right. Contract allows 20,000 acre-feet per year, with a maximum of 48,000 acre-feet over 3 years.*
[d]*This is an interim supply.*

1.4.2 Groundwater Sources

Table 1.7 lists the 2021 groundwater pumping by county and aquifer for Region C. Note that the pumping totals do not match use totals given in

Table 1.4. The Texas Water Development Board (TWDB) supplied both sets of data. The discrepancy is assumed to be due to water that is pumped in one county and used in another. The Trinity aquifer is by far the largest source of groundwater in Region C, providing 45 percent of the total groundwater pumped in 2021. (The Trinity aquifer is sometimes called the Trinity Sands and includes the Antlers, Twin Mountain, Glen Rose, and Paluxy formations.) The Woodbine and Carrizo-Wilcox aquifers provided 22.7 and 7.8 percent of the 2021 totals, respectively. The remaining 24 percent came from the Nacatoch, Queen City, Blossom, Cross Timbers, Edwards-Trinity-Plateau, and undifferentiated aquifers. The counties in which there are known to be several locally undifferentiated formations are Fannin (Red River Alluvium), Jack, and Parker. There may be other counties in which this is the case, but it is believed that the large 2021 use numbers from the Other aquifer in **Table 1.7** are likely to be pumping from one of the named aquifers that was not classified as such in the TWDB data. Groundwater pumping was highest (over 10,000 acre-feet) in Denton, Ellis, Grayson, and Tarrant Counties. These four counties had 50 percent of the region's total groundwater pumping in 2021.

Table 1.8 compares the modeled available groundwater supplies for the Trinity and Woodbine aquifers in Region C to 2021 use. The "modeled available groundwater" represents the amount of groundwater that can be pumped while maintaining stated "desired future conditions" in an aquifer. For Region C, the desired future conditions for the Trinity and Woodbine aquifer were set by Groundwater Management Area 8, a consortium of groundwater districts in North-Central and North Texas, covering most Region C and most of the area overlying the Northern Trinity and Woodbine aquifers. Once the desired future conditions were established, the TWDB determined the modeled available water that could be pumped while meeting those conditions. For planning purposes, TWDB regulations governing regional planning require that allocation of groundwater to water user groups be no more than the modeled available groundwater.

Table 1.8 shows that 2021 groundwater pumping exceeds the modeled available groundwater in certain Region C counties and aquifers. Pumping from the Woodbine aquifer in Dallas and Tarrant Counties and the Trinity aquifer in Jack County exceeded the modeled available groundwater.

In Texas, groundwater conservation districts (GCD) manage groundwater conservation, preservation, protection, recharge, and waste prevention within their borders. Typical GCD responsibilities include permitting wells, developing management plans, and adopting rules to implement management plans.

TABLE 1.7 2021 GROUNDWATER PUMPING BY COUNTY AND AQUIFER IN REGION C

VALUES IN ACRE FEET PER YEAR[b]											
COUNTY	TRINITY AQUIFER	WOODBINE AQUIFER	CARRIZO WILCOX AQUIFER	NACATOCH AQUIFER	QUEEN CITY AQUIFER	BLOSSOM AQUIFER	CROSS TIMBERS AQUIFER	EDWARDS TRINITY PLATEAU AQUIFER	OTHER/ Undiffer entiated AQUIFER	UNKNOWN	TOTAL
Collin	1,486	2,394	0	0	0	0	0	0	597	0	4,477
Cooke	4,729	379	0	0	0	0	0	0	603	0	5,711
Dallas	1,407	4,338	0	0	0	0	0	0	1,067	0	6,812
Denton	8,883	3,300	0	0	0	0	0	0	2,831	0	15,014
Ellis	3,321	1,509	0	0	0	0	0	0	7,287	0	12,117
Fannin	181	3,863	0	0	0	329	0	0	1,514	0	5,887
Freestone	0	0	2,176	0	14	0	0	0	817	0	3,007
Grayson	5,505	5,906	0	0	0	0	0	0	2,030	0	13,441
Henderson [a]	0	0	6,016	9	751	0	0	0	335	0	7,111
Jack	8	0	0	0	0	0	1	0	692	0	701
Kaufman	0	0	0	101	0	0	0	0	1,609	0	1,710
Navarro	73	0	11	22	0	0	0	0	196	0	302
Parker	8,333	0	0	0	0	0	0	26	586	0	8,945
Rockwall	0	0	0	0	0	0	0	0	361	7	368
Tarrant	6,816	2,183	0	0	0	0	0	0	2,965	0	11,964
Wise	6,810	0	0	0	0	0	0	0	783	0	7,593
TOTAL	***47,552***	***23,872***	***8,203***	***132***	***765***	***329***	***1***	***26***	***24,273***	***7***	***105,160***

[a]*Includes all of Henderson County*
[b]*Data are from TWDB (10).*

TABLE 1.8 2021 ESTIMATED GROUNDWATER PUMPING VERSUS MAG

	VALUES IN ACRE FEET PER YEAR[a]					
COUNTY	TRINITY 2021 PUMPING	TRINITY MODELED AVAILABLE GROUNDWATER (11)	TRINITY OVER PUMPING	WOODBINE 2021 PUMPING	WOODBINE MODELED AVAILABLE GROUNDWATER (11)	WOODBINE OVER PUMPING
Collin	1,486	5,795	0	2,394	4,254	0
Cooke	4,729	10,521	0	379	801	0
Dallas	1,407	3,691	0	4,338	2,798	1,540
Denton	8,883	30,091	0	3,300	3,609	0
Ellis	3,321	6,168	0	1,509	2,074	0
Fannin	181	2,088	0	3,863	4,924	0
Freestone	0	0	0	0	0	0
Grayson	5,505	10,716	0	5,906	7,526	0
Henderson	0	0	0	0	0	0
Jack	8	637	0	0	0	0
Kaufman	0	0	0	0	0	0
Navarro	73	0	73	0	68	0
Parker	8,333	11,793	0	0	0	0
Rockwall	0	0	0	0	0	0
Tarrant	6,816	17,926	0	2,183	1,139	1,044
Wise	6,810	11,452	0	0	0	0
TOTAL	***47,552***	***108,190***	***73***	***23,872***	***27,193***	***2,584***

[a]*Data are from TWDB (11).*

Seven GCDs exist within the Region C boundaries. These GCDs are shown on **Figure 1.5**. The seven GCDs include:

- Mid-East Texas GCD, which includes Freestone County,
- Neches and Trinity Valley GCD, which includes Henderson County,
- Northern Trinity GCD, which comprises only Tarrant County,
- Upper Trinity GCD, which includes Parker and Wise Counties, as well as Montague County in Region B and Hood County in Region G,
- Prairielands GCD, which includes Ellis County,
- North Texas GCD, which is comprised of Collin, Cooke, and Denton Counties, and
- Red River GCD, which is comprised of Grayson and Fannin Counties.

A portion of Region C is located within the North-Central Texas Trinity and Woodbine Aquifers Priority Groundwater Management Area (PGMA). **Figure 1.6** is a map of this and other PGMAs in Texas. The above mentioned GCDs cover all counties in North-Central Texas Trinity and Woodbine Aquifers PGMA except Dallas County. Section 35.019 of the Texas Water Code allows the commissioners court of a county in a PGMA not covered by a GCD to adopt water availability requirements. As of this time, to the best knowledge of Region C, Dallas County Commissioners Court has not promulgated any groundwater regulations or availability values.

1.4.3 Water Reuse

About half of the water used for municipal supply in Region C is discharged as treated effluent from wastewater treatment plants after use, making wastewater reclamation and reuse a potentially significant source of additional water supply. There are currently a number of direct reuse projects in Region C that reuse highly treated wastewater for non-potable uses such as the irrigation of golf courses, industrial or mining uses. There are also a number of large-scale indirect reuse projects, notably the TRWD and NTWMD wetlands reuse projects. Currently authorized reuse makes up about 17 percent of the overall available supply in Region C.

In addition to direct and indirect reuse projects, there are sizable return flows of treated wastewater upstream from many Region C reservoirs. For many Region C reservoirs, return flows can increase the reliable supply from the reservoir. To ensure the use of the return flows, a water right must be obtained; otherwise, that water can be used by other senior water right holders. Many Region C suppliers have obtained or plan to obtain water right permits for these return flows.

1.4.4 Springs in Region C

There are no springs in Region C that are currently used as a significant source of water supply. Springs are further discussed in **Section 1.10** of this report.

FIGURE 1.5 GROUNDWATER CONSERVATION DISTRICTS IN REGION C

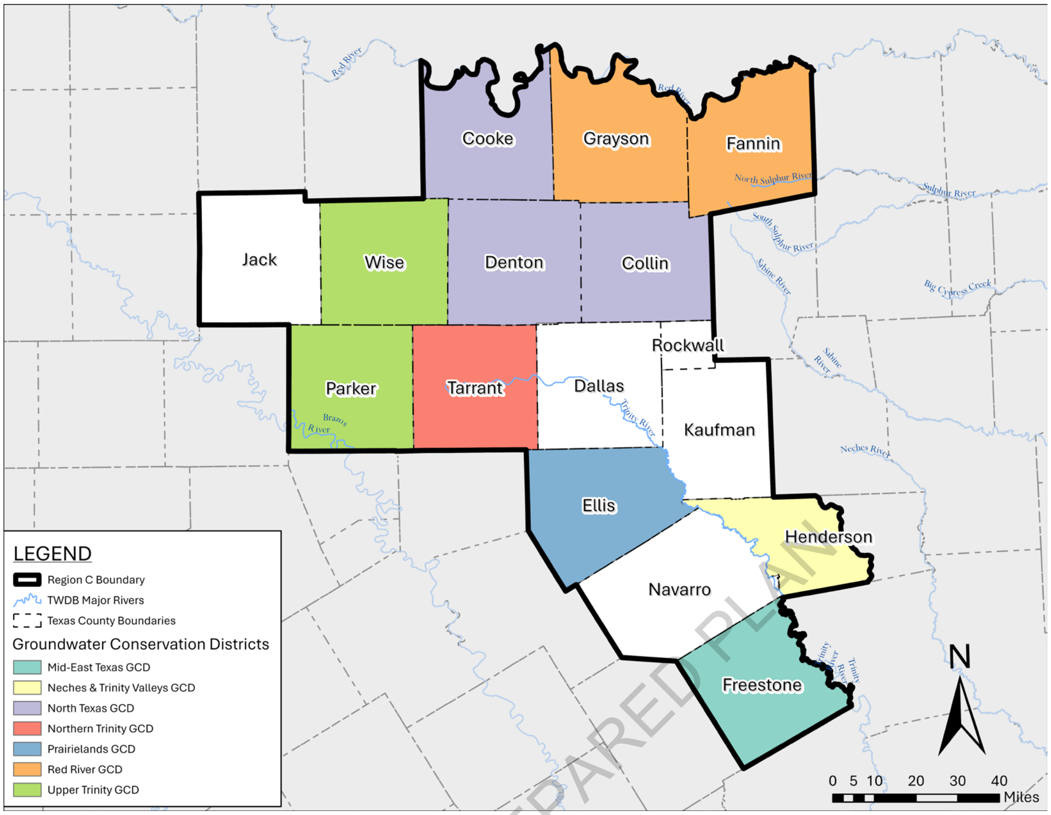
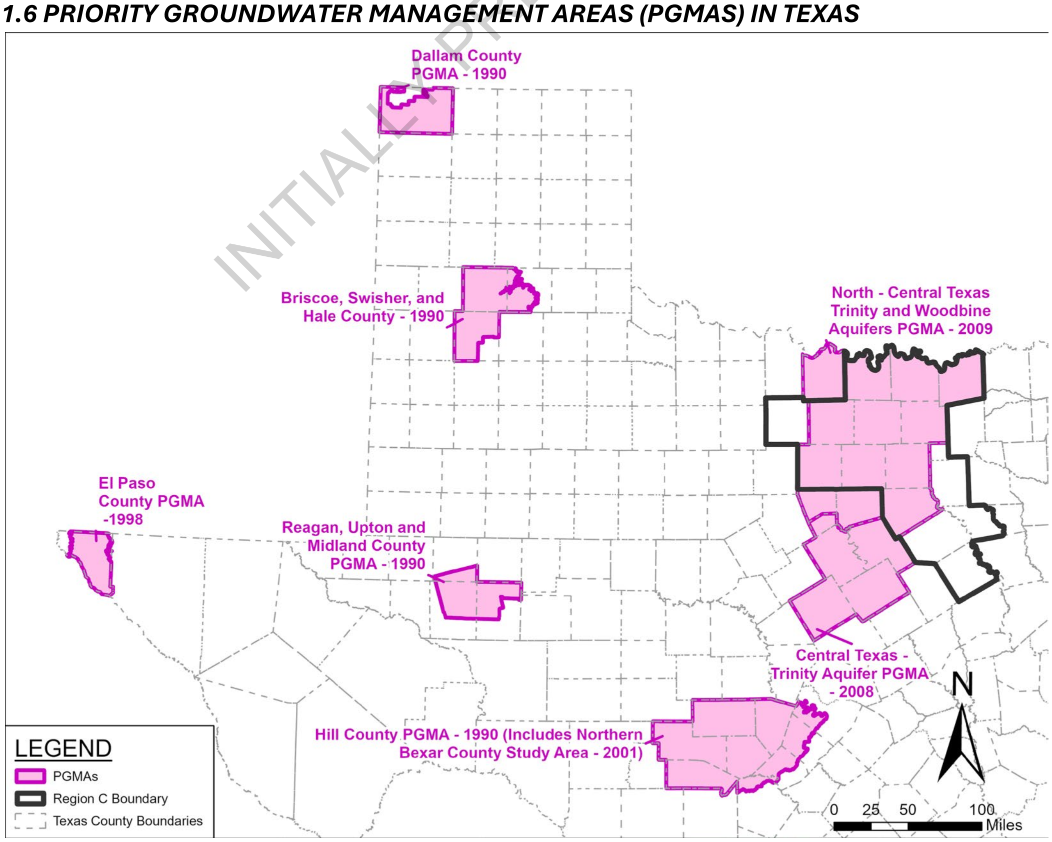


FIGURE 1.6 PRIORITY GROUNDWATER MANAGEMENT AREAS (PGMAS) IN TEXAS



1.5 Water Providers in Region C

Water providers in Region C include wholesale water providers (WWPs) and water user groups (WUGs). WWPs deliver and sell wholesale (raw or treated) water to WUGs or other WWPs. Region C has designated six of the larger WWPs as major water providers (MWPs) and two WWPs as regional providers (RWPs). These designations represent the water providers that supply large quantities of water and/or supply to a large region. Municipal WUGs provide most of the retail water within the region.

Major Water Providers

- Fort Worth
- Dallas (Dallas Water Utilities)
- North Texas Municipal Water District
- Tarrant Regional Water District
- Trinity River Authority
- Upper Trinity Regional Water District

Regional Wholesale Water Providers

- Corsicana
- Greater Texoma Utility Authority

1.5.1 Major Water Providers (MWPs)

The category of "major water providers" (MWP) was established in rules for the development of the 2022 State Water Plan in conjunction with the removal of certain reporting requirements to allow Regional Water Planning Groups (RWPGs) to establish a more consistent list of large water providers for which they are required to report information from cycle to cycle. MWPs are intended to reflect entities of particular significance to the region's water supply instead of reporting data for every WWP as previously required. The MWP designation may include public or private entities that provide water for any water use category.

Each RWPG is responsible for designating its own list of MWPs. In Region C, the RCWPG chose to designate the top tier providers of existing and future supplies as MWPs. In 2026 the following providers supplied 90 percent of Region C water and served 94 percent of the Region C population: NTMWD, TRWD, DWU, UTRWD, TRA, and the City of Fort Worth. This list of MWPs was approved by the RCWPG at its November 6, 2023 public meeting. **Figure 1.7** is a map showing the service areas for the MWPs.

City of Fort Worth. The City of Fort Worth purchases all of its raw water from Tarrant Regional Water District and has water treatment plants with combined design capacity to treat 497 MGD. The city also has a limited amount of reuse water available as supplies. The City of Fort Worth sells wholesale treated water to other water suppliers, mostly located in Tarrant County.

Dallas Water Utilities (DWU). DWU currently obtains its water supplies from Lake Ray Hubbard, Lake Tawakoni, Grapevine Lake, the Lake Ray Roberts/Lewisville/Elm Fork system, and Lake Fork. Dallas Water Utilities has contracted with the Upper Neches River Municipal Water Authority to secure water from Lake Palestine, but Lake Palestine is not currently connected to DWU's system. DWU is currently working with TRWD to construct a pipeline to connect this source. DWU has the capacity to treat up to 900 MGD with another 100 MGD of treatment capacity under construction. DWU supplies treated and raw water to wholesale customers in Dallas, Collin, Denton, Ellis, and Kaufman Counties. In addition to providing treated water, DWU owns and operates two wastewater treatment plants.

North Texas Municipal Water District (NTMWD). NTMWD supplies treated water to customers in communities north and east of Dallas. The district obtains raw water from water rights in Lake Lavon, Lake Texoma, Chapman Lake, Lake Bonham, and Bois d'Arc Lake. NTMWD also obtains water from Lake Tawakoni and Lake Fork through the Sabine River Authority (SRA). NTMWD has a permit to reuse treated wastewater effluent from its Wilson Creek Wastewater Treatment Plant and diversions from its East Fork Water Reuse Project. This supply is blended with other freshwater supplies in Lake Lavon. In addition to providing treated water, NTMWD owns and/or operates a number of wastewater treatment plants in Region C.

Tarrant Regional Water District (TRWD). TRWD supplies raw water to customers in Tarrant County, eight other counties in Region C, and Johnson County in the Brazos G Region. TRWD owns and operates Lake Bridgeport, Eagle Mountain Lake, Cedar Creek Reservoir, and Richland-Chambers Reservoir. The district's water supply system also includes Lake Arlington (owned by Arlington), Lake Worth (owned by Fort Worth), and Benbrook Lake (owned by the U.S. Army Corps of Engineers, with TRWD holding water rights), a major reuse project, and a substantial water transmission system.

Trinity River Authority (TRA). TRA provides services in the Trinity River Basin in Regions C and H. TRA is designated as a MWP in both Regions C and H. The discussion in this plan focuses on the TRA role as a regional wholesale water supplier through its projects in Region C.

TRA holds water rights in Joe Pool Lake, Navarro Mills Lake, and Bardwell Lake, all owned and operated by the U.S. Army Corps of Engineers. TRA sells raw water from these lakes for use in Region C. TRA has contracts to sell Joe Pool Lake water to Midlothian, Duncanville, Cedar Hill, and Grand Prairie. TRA sells water from Navarro Mills Lake to the City of Corsicana and from Bardwell Lake to Ennis and Waxahachie.

TRA has a regional treated water system in northeast Tarrant County, which treats raw water delivered by the Tarrant Regional Water District system through Lake Arlington and sells treated water to cities. This system is known as the Tarrant County Water Supply Project.

In addition to its raw and treated water sales, TRA operates a number of regional wastewater treatment projects in Region C. TRA also sells a large quantity of reuse water to other providers in the region.

Upper Trinity Regional Water District (UTRWD). UTRWD operates a regional treated water supply system in Denton County, which is a rapidly growing area. UTRWD has a contract with the City of Commerce to divert raw water from Chapman Lake in the Sulphur River Basin. UTRWD cooperates with the City of Irving to bring that water to Lake Lewisville. UTRWD also has contracts to buy raw water from Dallas and Denton and has an indirect reuse permit. UTRWD holds water rights to and is currently constructing Lake Ralph Hall, a new lake in Fannin County. In addition to its water supply activities, UTRWD provides regional wastewater treatment services in Denton County.

1.5.2 Regional Water Providers

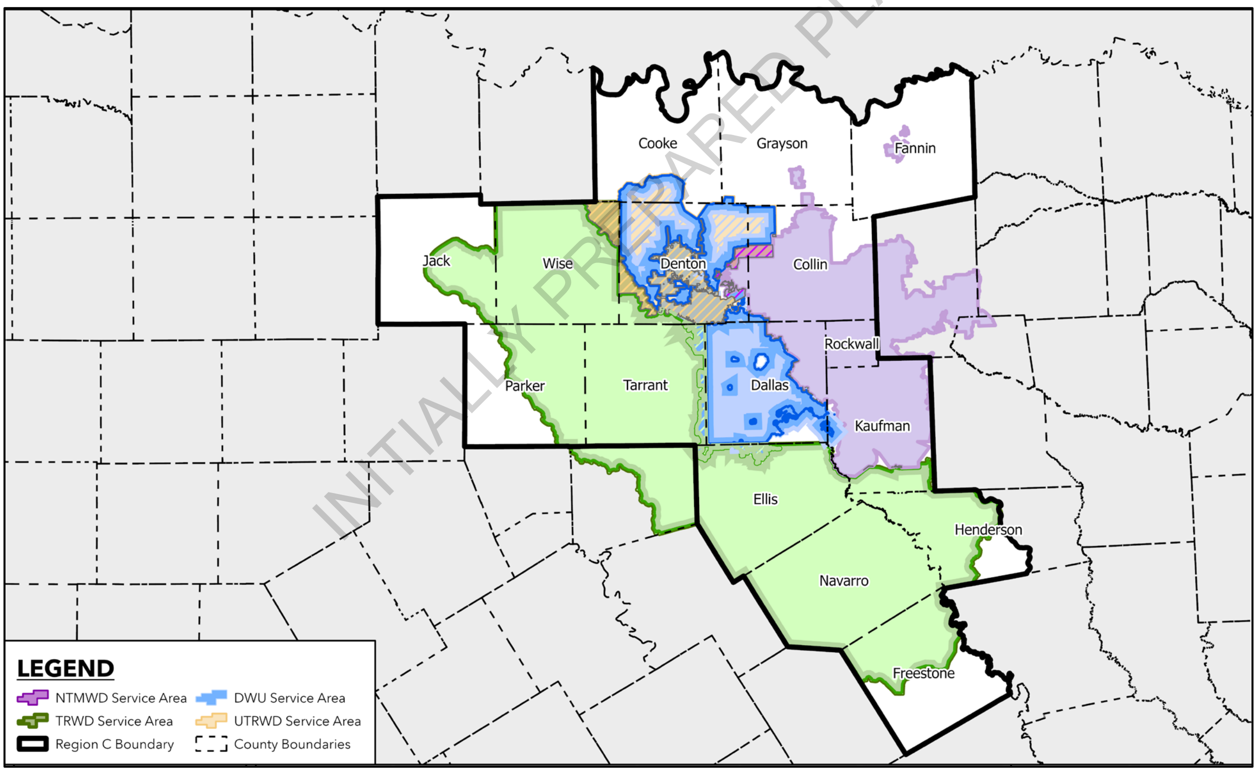
In addition to the major water providers listed in the previous section, two WWPs, the City of Corsicana and Greater Texoma Utility Authority (GTUA), are designated as regional water providers.

These were carried over from the *2021 Region C Water Plan* as they sell water to multiple WUGs or WWPs. The City Corsicana and GTUA were approved as RWPs by the RCWPG at its November 6, 2023 public meeting.

City of Corsicana. The City of Corsicana provides municipal and manufacturing water to the majority of Navarro County, and parts of Ellis, Hill, and Limestone counties. The City of Corsicana has a water right in the Richland-Chambers Reservoir and is authorized to divert water from Lake Halbert. Corsicana has a total available water supply capacity of 24 MGD limited by their water treatment plants.

Greater Texoma Utility Authority (GTUA). GTUA is a local political subdivision of the State that helps its member cities with constructing and financing their water and wastewater facilities. GTUA holds a water right in Lake Texoma but is constrained by their raw water transmission system. GTUA also provides operations services for water and wastewater facilities owned by their customers, including the Collin-Grayson Municipal Alliance that delivers water from NTMWD and wastewater treatment plants in the area.

FIGURE 1.7 MAJOR WATER PROVIDER SERVICE AREAS IN REGION



1.5.3 Water User Groups

Cities, towns, water supply corporations, and special utility districts provide most of the retail water service in Region C. The TWDB developed the term “water user group” (WUG) to identify entities that regional water planning groups must include in their plans. The TWDB states that a WUG is defined as one of the following:

- Retail public or private utilities that provide more than 100 acre-feet per year of water for municipal use
- Collective reporting units (CRUs) consisting of grouped utilities having a common association
- County-Wide WUGs
    - Includes County Other (Rural/unincorporated areas of municipal water use), Manufacturing, Steam electric power generation, Mining, Irrigation, Livestock

TABLE 1.9 REGION C NUMBER OF WATER USER GROUPS BY COUNTY

COUNTY	MUNCIPAL	NON MUNICIPAL	TOTAL
Collin	41	4	45
Cooke	10	5	15
Dallas	33	5	38
Denton	43	5	48
Ellis	22	4	26
Fannin	19	3	22
Freestone	10	5	15
Grayson	30	5	35
Henderson	15	5	20
Jack	2	4	6
Kaufman	26	5	31
Navarro	16	4	20
Parker	18	4	22
Rockwall	14	2	16
Tarrant	44	5	49
Wise	13	5	18
Adjustment for Multi-County WUGs[a]	-	-	-59
TOTAL	***297***	***70***	***367***

[a]Multi-County WUG is a WUG with retail customers in more than one county.

1.6 Pre-Existing Plans for Water Supply Development

1.6.1 Previous Water Supply Planning in Region C

The region has a long history of successful local water supply planning and development. NTMWD has recently completed a Long-Range Water Supply Plan that outlines multiple water management strategies the District may pursue. TRWD and DWU are actively updating their respective water supply plans and expect to have them completed by 2025. These studies and plans have resulted in new water supply sources for the region, such as Bois d’Arc Lake.

Some active plans for developing additional water supplies in Region C in the near future include the following:

- DWU and TRWD are actively planning and designing the segment of the Integrated Pipeline Project that will connect Lake Palestine to the Metroplex area. This connection is expected to be online by 2030.
- TRWD plans to expand the facilities that divert return flows of treated wastewater from the Trinity River into a wetland and into Cedar Creek Reservoir.
- UTRWD is constructing Lake Ralph Hall on the North Sulphur River in Fannin County.
- Several Region C water suppliers have received permits to reuse return flows of treated wastewater in Region C and are developing projects to use those supplies.
- There are on-going studies to further evaluate water supply options in the Sulphur River Basin. These studies are follow-on studies to a U.S. Army Corps of Engineers study to analyze options for water supply in the Sulphur River Basin that was completed in 2013.
- Other Region C suppliers are planning and developing smaller water supply projects to meet local needs.

1.6.2 Recommendations in the 2021 Region C Water Plan and the 2022 State Water Plan

The most significant recommendations for Region C in the *2021 Region C Water Plan* [12] and the 2022 State Water Plan [13] are summarized below. A more detailed discussion of the recommendations is available in the original documents.

A large part of the water supplied in Region C is provided by six water providers: Dallas Water Utilities, Tarrant Regional Water District, North Texas Municipal Water District, Fort Worth,Trinity River Authority, and the Upper Trinity Regional Water District. In the *2021 Region C Water Plan* and the *2022 State Water Plan*, these six entities are expected to provide the majority of the water supply for Region C through the planning cycle.

Recommended water management strategies in the *2021 Region C Water Plan* and the *2022 State Water Plan* to meet the needs of these major water providers include the following:

Dallas Water Utilities

- Conservation
- Additional Indirect Reuse
- Connect Lake Palestine (Dallas Portion of IPL and IPL to Bachman)
- Neches Run-of-River
- Lake Colombia
- Infrastructure to Treat and Deliver to Customers

Tarrant Regional Water District

- Conservation
- Aquifer Storage and Recovery Pilot
- Additional Capacity to Convey Richland Chambers Reuse (IPL)
- Cedar Creek Wetland Reuse
- Reuse from TRA Central WWTP
- Lake Tehuacana
- Carrizo-Wilcox Groundwater
- Marvin Nichols Reservoir (328)
- Wright Patman Reallocations
- Additional Transmission Pipeline

North Texas Municipal Water District

- Conservation
- Bois D'Arc Lake
- Additional Lake Texoma Blend Phase I and II
- Additional Measure to Access Full Lavon Yield (Raw Water #4)
- Expanded Wetland Reuse
- Additional Lavon Watershed Reuse
- Marvin Nichols Reservoir (328)
- Wright Patman Reallocation
- Oklahoma
- Infrastructure to Treat and Deliver to Customers
- Fannin County Water Supply System
- Treatment and Distribution Improvements (CIP)
- Chapman Booster Pump Station

City of Fort Worth

- Conservation
- Alliance Direct Reuse
- Village Creek Water Reclamation Facility (WRF) Future Direct Reuse
- Mary's Creek WRF Future Direct Reuse
- Additional supply from Tarrant Regional Water District

- Expansion of Water Treatment Plants

Trinity River Authority

- Conservation
- Additional Supply from Tarrant Regional Water District
- Ennis Indirect Reuse
- Joe Pool Lake Reuse
- Tarrant and Denton County District Reuse
- Central Reuse to TRWD
- Central Reuse to Irving

Upper Trinity Regional Water District

- Conservation
- Additional Supplies from DWU (Up to Current Contracts)
- Additional DWU (Contract Increase)
- Lake Ralph Hall
- Lake Ralph Hall Indirect Reuse
- Additional Direct Reuse
- Marvin Nichols Reservoir (328)
- Wright Patman Reallocation
- Additional Indirect Reuse
- Treatment and Distribution System Improvements

In addition to the strategies recommended for the six major water providers above, the *2021 Region C Plan* included strategies for individual water user groups. Major types of strategies included the following:

- Conservation for all water user groups
- Continued development and expansion of existing regional water supply systems
- Connection of water user groups to larger regional systems
- Construction of additional water treatment capacity as needed
- Development of reuse projects to meet growing steam electric and other demands

The estimated capital costs for all recommended water management strategies in the *2021 Region C Water Plan* totaled $23.5 billion in 2013 dollars.

1.6.3 Conservation Planning in Region C

Since completion of the *2021 Region C Water Plan*, significant legislative actions—Senate Bill 28 (SB 28) and Senate Joint Resolution 75 (SJR 75) — have been passed, directing the Texas Water Development Board (TWDB) to enhance existing programs such as the water loss technical assistance program and water conservation efforts. Additionally, TWDB has launched a new website[14] that provides water use and water loss data, along with other valuable resources for conservation for this cycle. However, the water conservation tool developed by the TWDB during the previous cycle has not been updated in this cycle. The resources and information available since the 2021 plan will inform the recommended water conservation strategies in this plan. **Chapter 5C** of this plan summarizes new information, reports existing conservation and reuse in Region C, and presents recommended water conservation and reuse strategies for Region C.

During development of this plan, the Region C Water Planning Group placed strong emphasis on water conservation and reuse as a means of meeting projected water needs. Water conservation (demand reduction) appears in this plan in four ways:

Historical Water Demand Reduction. Since the first Region C Water Plan in 2001, the average baseline per capita water demand for the region as a whole has decreased from 225 gallons per capita per day (gpcd) to 183 gpcd, largely due to water conservation efforts in the region.

Projected Passive Water Conservation Savings. The TWDB has projected municipal water savings that are expected to result from passive water conservation measures, including low-flow plumbing fixture rules, efficient new residential clothes washer standards, and efficient new residential dishwasher standards. Water savings from these measures will occur automatically, and no WUG actions are needed to realize the savings. The water demand projections presented in **Chapter 2** are the baseline water demand projections minus the projected water savings from passive measures. Therefore, the projected water savings from passive measures are built into the Region C water demand projections. The projected passive water conservation savings for the region represent 2.5 to 2.9 percent of the baseline water demand, depending on the planning decade.

Active Water Conservation Savings Since the Base Planning Year. As described in **Section 2.3**, the representative year of the Board-Adopted Baseline GPCD of approximately 93% of the WUGs in Region C is 2020. Region C WUGs have continued to implement water conservation measures since 2020. The associated water savings have reduced water demand in Region C, but this demand reduction is not reflected in the Region C water demand projections.

Active Water Conservation During the Planning Period. The recommended water management strategies include active water conservation measures that are projected to save additional water during the planning period.

In addition, Region C continues to be a leader in the implementation of reuse strategies, increasing water efficiency and reducing the need to develop new water supplies. In the *2021 Region C Water Plan*, Region C accounted for one third of the State's current and recommended reuse supplies, more than any other region.

1.7 Preliminary Assessment of Current Preparations for Drought in Region C

The drought of record for most water supplies used in Region C occurred from 1950 through 1957. The drought of 2011 through early 2015 resulted in new droughts of record for several reservoirs in the Red River Basin and low inflows and low water levels for many other Region C lakes. The recent hot and dry summers placed considerable stress on water suppliers throughout Texas, including Region C. In most years some entities across the state implement water use restrictions in response to drought conditions. Many Region C water suppliers have already made or are currently making improvements to increase delivery of raw and treated water under drought conditions.

Some smaller suppliers in Region C faced a shortage of supplies in the recent droughts. Most of those entities have moved to address this problem by connecting to a larger supplier or by developing additional supplies on their own.

TCEQ and TWDB rules require that most water suppliers develop a drought contingency plan. In addition to its regional planning provisions, Senate Bill One included a requirement that all public water suppliers and irrigation districts above a certain size develop and implement a drought contingency plan. Refer to **Chapter 7** for additional information on current preparations for drought in Region C.

1.8 Other Water-Related Programs

In addition to the Senate Bill One regional planning efforts, there are a number of other significant water-related programs that will affect water supply efforts in Region C. Perhaps the most important are Texas Commission on Environmental Quality water rights permitting, the Clean Rivers Program, the Clean Water Act, and the Safe Drinking Water Act.

Texas Commission on Environmental Quality (TCEQ) Water Rights Permitting. Surface water in Texas is a public resource, and the TCEQ is empowered to grant water rights that allow beneficial use of that resource. The development of any new surface water supply will most likely require a water right permit. Among its many other provisions, Senate Bill One set out formal criteria for the permitting of interbasin transfers for water supply. Since many of the major sources of supply that have been considered for Region C involve interbasin transfers, these criteria are important in Region C planning.

Clean Rivers Program. The Clean Rivers Program is a Texas program overseen by TCEQ and funded by fees assessed on water use and wastewater discharge permit holders. The program is designed to provide information on water quality issues and to develop plans to resolve water quality problems. The Clean Rivers Program is carried out by local entities. In Region C, the program is carried out by river authorities: the Trinity River Authority in the Trinity Basin, the Red River Authority in the Red Basin, the Brazos River Authority in the Brazos Basin, the Sulphur River Basin Authority in the Sulphur Basin, and the Sabine River Authority in the Sabine Basin.

Clean Water Act. The Clean Water Act is a federal law designed to protect water quality. The parts of the act which have the greatest impact on water supplies are the National Pollutant Discharge Elimination System (NPDES) permitting process, which covers wastewater treatment plant and storm water discharges, and the Section 404 permitting program for the discharge of dredged and fill material into the waters of the United States, which affects construction for development of water resources. In Texas, the state took over the NPDES permitting system in 1998, renaming it the Texas Pollutant Discharge Elimination System (TPDES). The TPDES Program sets the discharge requirements for wastewater treatment plants and for storm water discharges associated with construction and industrial activities. The Section 404 permit program is handled by the U.S. Army Corps of Engineers. Section 404 permitting is a required step in the development of a new reservoir and for pipelines, pump stations, and other facilities constructed in or through waters of the United States.

Safe Drinking Water Act (SDWA). The Safe Drinking Water Act is a federal program that regulates drinking water supplies. In recent years, new requirements introduced under the SDWA have required significant changes to water treatment. On-going SDWA initiatives will continue to impact water treatment requirements. Some of the initiatives that may have significant impacts in Region C are the reduction in allowable levels of trihalomethanes in treated water, the requirement for reduction of total organic carbon levels in raw water, and the reduction of the allowable level of arsenic in drinking water. In April 2024, the EPA established requirements to limit the levels of six Per- and Polyfluoroalkyl Substances (PFAS). Full implementation of these regulations will take several years as water providers monitor their systems for these compounds. There is some uncertainty regarding these regulations and the timeline for implementation. PFAs contamination is a issue that should continue to be monitored. [15]

SDWA Groundwater Rules. The EPA has developed groundwater monitoring regulations as part of the SDWA. TCEQ is the agency responsible for implementing these rules in Texas and has developed a source sampling compliance program for groundwater systems which took effect on December 1, 2009. Requirements of this rule are meant to ensure that groundwater systems 1) conduct source water monitoring, 2) address significant deficiencies, 3) address source water fecal contamination, and 4) implement corrective actions. The Groundwater Rule has the potential to encourage entities on groundwater to consider alternative sources. Systems that utilize groundwater as a supplemental supply may find that additional regulatory monitoring and reporting are more trouble than the supplemental supply is worth.

1.9 Water Loss Audits

TWDB water loss audit information for entities in Region C was compiled for 2020 through 2022 and is included in **Appendix B**. The primary purposes of a water loss audit are to account for all the water being used and to identify potential areas where water can be saved. Water audits track multiple sources of water loss that are commonly described as apparent loss and real loss. Apparent loss is water that was used but for which the utility did not receive compensation. Apparent losses are associated with customer meters under-registering, billing adjustment and waivers, and unauthorized consumption. Real loss is water that was physically lost from the system before it could be used, including main breaks and leaks, customer service line breaks and leaks, and storage overflows. The sum of the apparent loss and the real loss make up the total water loss for a utility [16]. The water loss audits were considered in the development of water conservation recommendations. **Table 1.10** summarizes the water loss audit information from 2020 through 2022. More information on water loss audits is presented in **Chapter 5B**.

TABLE 1.10 REGION C WATER LOSS AUDITS SUMMARY BY GALLONS AND PERCENT FOR 2020, 2021, AND 2022

YEAR	SYSTEM INPUT VOLUME	AUTHORIZED CONSUMPTION	WATER LOSS
2020	339,730,978,194	294,749,121,211 (86.8%)	44,981,856,983 (13.2%)
2021	361,314,449,821	314,194,172,268 (87.0%)	47,120,277,553 (13.0%)
2022	260,200,249,414	229,042,503,422 (88.0%)	31,157,745,992 (12.0%)

[a]Data are from the Texas Water Development Board [17].

1.10 Agricultural and Natural Resources in Region C

1.10.1 Springs in Region C

No springs in Region C are currently used as a significant source of water supply. Springs were important sources of water supply to Native Americans and in the initial settlement of the area and had great influence on the initial patterns of settlement. Groundwater development and the resulting water level declines have caused many springs to disappear and greatly diminished the flow from those that remain [18].

The Texas Parks and Wildlife Department (TPWD) has identified a number of small to medium-sized springs in Region C [19]. **Table 1.11** shows the distribution and number of these springs as of 1980. Former springs are springs that have run dry due to groundwater pumping, sedimentation caused by surface erosion, or other causes [20].

TABLE 1.11 DISTRIBUTION AND ESTIMATED SIZE OF SPRINGS AND SEEPS

COUNTY	MEDIUM (2.8 28 cfs)	SMALL (0.28 2.8 cfs)	VERY SMALL (0.028 0.28 cfs)	SEEP (Less than 0.028 cfs)	FORMER
Collin	0	3	10	1	4
Cooke	0	3	9	3	1
Dallas	2	6	2	0	4
Denton	0	3	8	1	1
Ellis	0	0	0	0	1
Fannin	0	3	6	3	1
Grayson	0	2	12	1	1
Parker	0	8	3	2	6
Rockwall	0	0	1	0	2
Tarrant	3	6	1	3	5
Wise	0	7	4	3	2
Total	5	41	56	17	28

[a]Data are from Texas Parks and Wildlife Department [16].

1.10.2 Wetlands

According to the regulatory definition of the U.S. Army Corps of Engineers [21], wetlands are “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Areas classified as wetlands are often dependent on water from streams and reservoirs. Some of the important functions of wetlands include providing food and habitat for fish and wildlife, water quality improvement, flood protection, shoreline erosion control, and groundwater exchange, in addition to opportunities for human recreation, education, and research.

The Natural Resources Conservation Service (NRCS) has mapped and quantified areas of hydric soils for all but one of the counties in Region C. The agency makes these data available through its local county offices and, in some cases, publishes the acreages of soil series in the soil survey report for the county. Hydric soil is defined as "soil that in its undrained condition is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation" [22]. Thus, the area of hydric soils mapped in a county provides an indication of the potential extent of wetlands in that county. However, as implied in the definition, some areas mapped as hydric soils may not occur as wetlands because the hydrology has been changed to preclude saturation or inundation. **Table 1.12** is a list of acreages of hydric soils for the counties in Region C for which the data are available.

The acreages of hydric soils listed in **Table 1.12** should be considered as an indicator of the relative abundance of wetlands in the counties and not as an absolute quantity.

TABLE 1.12 HYDRIC SOILS MAPPED BY THE NATURAL RESOURCES CONSERVATION SERVICE

COUNTY	TOTAL COUNTY ACREAGES	HYDRIC SOIL ACREAGE WITHIN COUNTY [a]	PERCENT OF COUNTY
Collin	565,760	45,110	7.97%
Cooke	568,320	13,038	2.29%
Dallas	577,920	106,908	18.50%
Denton	611,200	12,293	2.01%
Ellis	608,000	170,991	28.12%
Fannin	574,080	121,458	21.16%
Freestone	574,720	208,314	36.25%
Grayson	627,840	24,751	3.94%
Henderson [b]	604,800	209,011	34.56%
Jack	588,800	73,370	12.46%
Kaufman	517,760	265,877	51.35%
Navarro	695,680	198,088	28.47%
Parker	581,760	26,539	4.56%
Rockwall	94,080	48,311	51.35%
Tarrant	574,080	16,633	2.90%
Wise	592,000	13,358	2.26%
Total	8,956,800	1,554,050	17.35%

[a] *Data from U.S. Department of Agriculture* [19].
[b] *The values for Henderson County include all of Henderson County, not just the Region C portion.*

1.10.3 Endangered or Threatened Species

The Endangered Species Act (ESA) provides for the conservation of endangered or threatened species and their critical habitats. Recovery plans are created for each species to provide protocols, timelines, and costs for recovering endangered species. Federal agencies are required to ensure that their activities do not jeopardize listed species or their critical habitats. In addition, many federal agencies incorporate conservation of listed species into their existing authorities.

The U.S. Fish and Wildlife Service (USFWS) is the authority responsible for the federal listing of endangered and threatened species. The Texas Parks and Wildlife Department (TPWD) maintains a separate listing of species of special concern in the Texas Biological and Conservation Data System. **Table 1.13** lists federal endangered or threatened species identified by USFWS in Region C counties.

Table 1.14 lists species of special concern as identified at the state level and species that have limited range within the state. County designations indicate that a species is either known to occur or existing habitat is suitable to support a species in the particular county.

TABLE 1.13 FEDERAL ENDANGERED OR THREATENED SPECIES IN REGION C

SPECIES [a]	FEDERAL STATUS[b]	COUNTY															
		COLLIN	COOKE	DALLAS	DENTON	ELLIS	FANNIN	FREESTONE	GRAYSON	HENDERSON	JACK	KAUFMAN	NAVARRO	PARKER	ROCKWALL	TARRANT	WISE
Golden-Cheeked Warbler	E			x							x						
Large Fruited Sand Verbena	E							x									
Navasota Ladies' Tresses	E							x									
Piping Plover	T	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Red Knot	T	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Smalleye Shiner [c]	E																
Sharpnose Shiner [c]	E																
Texas Fawnfoot	T	x		x	x	x	x	x	x	x	x	x	x	x	x		
Whooping Crane	E	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

[a] *Information obtained from U.S. Fish and Wildlife Service [23].*
[b] *E is federally listed as endangered; T is federally listed as threatened, C is federally listed as a candidate species.*
[c] *Species were updated in response to Texas Parks and Wildlife comment on 2021 Initially Prepared Plan.*
[d] *TPWD List last updated 09/01/2023*

TABLE 1.14 STATE SPECIES OF SPECIAL CONCERN IN REGION C

SPECIES [a]	STATE STATUS [b]	COLLIN [c]	COOKE [c]	DALLAS [c]	DENTON [c]	ELLIS [c]	FANNIN [c]	FREESTONE [c]	GRAYSON [c]	HENDERSON [c]	JACK [c]	KAUFMAN [c]	NAVARRO [c]	PARKER [c]	ROCKWALL [c]	TARRANT [c]	WISE [c]
Alligator snapping turtle	T	x		x		x		x		x		x			x	x	
Bachman's Sparrow	T									x							
Black bear	T						x	x	x	x		x	x			x	
Black Rail	T	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Blue sucker	T								x								
Brazos Heelsplitter	T													x			
Brazos water snake	T										x			x			
Chub shiner	T		x						x								
Earth fruit	T													x			
Golden-cheeked Warbler	E			x										x			
Houston toad	E							x									
Large-fruited sand-verbena	E							x									
Louisiana pigtoe	T	x		x	x	x		x		x		x	x		x	x	x
Navasota ladies'-tresses	E							x									
Northern scarlet snake	T									x							
Paddlefish	T		x				x		x								
Piping Plover	T	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Red river pupfish	T		x														
Rufa Red Knot	T	x	x	x	x	x	x	x	x	x		x	x		x	x	x
Sandbank pocketbook	T			x	x	x		x		x		x	x			x	x
Shovelnose sturgeon	T		x				x		x								
Small-headed pipewort	T							x		x							
Southern hickorynut	T									x							
Swallow-tailed kite	T									x			x				
Texas fawnsfoot	T													x			
Texas heelsplitter	T	x	x	x	x			x	x	x		x	x		x	x	x
Texas horned lizard	T	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Texas kangaroo rat	T										x						

SPECIES [a]	STATE STATUS [b]	COLLIN [c]	COOKE [c]	DALLAS [c]	DENTON [c]	ELLIS [c]	FANNIN [c]	FREESTONE [c]	GRAYSON [c]	HENDERSON [c]	JACK [c]	KAUFMAN [c]	NAVARRO [c]	PARKER [c]	ROCKWALL [c]	TARRANT [c]	WISE [c]
Texas pigtoe	T									x							
Trinity Pigtoe	T			x		x		x		x		x	x				
White-faced Ibis	T	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Whooping Crane	E	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x
Wood Stork	T	x		x		x	x	x	x	x		x	x		x		

[a]*Information is obtained from TPWD [(24)] Rare, Threatened, and Endangered Species of Texas by Counties.*
[b]*E is endangered, T is threatened, R is rare.*
[c]*TPWD List last updated 09/01/2023.*

1.10.4 Navigation

There is very little commercial navigation in Region C. However, the U.S. Army Corps of Engineers has defined two stretches of river in Region C that qualify as "navigable." In the Red River Basin, the segment of the Red River from Denison Dam forming Lake Texoma upstream to Warrens Bend in Cooke County is defined as navigable. In the Trinity River Basin, the Trinity River has a reach that is considered to be "navigable" from the southeastern border of Freestone County up to Riverside Drive in Fort Worth. While these rivers meet the legal definition of navigable waters, they are not currently used for commercial navigation.

1.10.5 Agriculture and Prime Farmland

Table 1.15 provides some basic data on agricultural production in Region C, based on the 2022 Agricultural Census from the U.S. Department of Agriculture (USDA). Region C includes over 5,106,000 acres of farmland and over 1,536,000 acres of cropland. Irrigated agriculture does not play a significant role in Region C, with only 2 percent of the harvested cropland being irrigated.

The Natural Resources Conservation Service (NRCS) defines prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses [25]." As part of the National Resources Inventory, the NRCS has identified prime farmland throughout the country. **Figure 1.8** shows the distribution of prime farmland in Region C. Each color in the figure represents the percentage of the total acreage that is prime farmland of any kind. (There are four categories of prime farmland in the NRCS STATSGO database for Texas: prime farmland, prime farmland if drained, prime farmland if protected from flooding or not frequently flooded during the growing season, and prime farmland if irrigated.) There are large areas of prime farmland in Cooke, Denton, Collin, Tarrant, Dallas, and Ellis Counties.

Table 1.4 shows that 46 percent of the 2021 water use for irrigation in Region C came from groundwater (compared to only 8 percent of total water use from groundwater.) TWDB Report 269 [26] studied groundwater in most of Region C (except for Jack and Henderson Counties and part of Navarro County). Most irrigation wells in the study area were scattered over the outcrop areas of the Trinity and the Woodbine aquifers with only a few areas of concentrated activity. The largest concentration of irrigation wells is located on the Woodbine outcrop in an area bounded by western Grayson County, the eastern edge of Cooke County, and the northeastern corner of Denton County. Approximately 80 irrigation wells operated in this region (as of 1982), and several produced as much as 900 gpm. Several smaller irrigation well developments were located in Parker County and Wise County in the Trinity aquifer. There were also irrigation wells in Fannin County producing from the alluvium along the Red River.

1.10.6 State and Federal Natural Resource Holdings

The TPWD operates several state parks in Region C:

- Bonham State Park in Fannin County,
- Cedar Hill State Park in Dallas County,

- Eisenhower State Park in Grayson County, Fort Richardson State Park & Historic Site in Jack County,
- Lake Mineral Wells State Park in Parker County,
- Lake Ray Roberts State Park in Denton and Cooke Counties, and
- Purtis Creek State Park which is partially located in Henderson County.

TPWD also operates:

- Caddo Wildlife Management Area in Fannin County,
- Cedar Creek Islands Wildlife Management Area in Henderson County,
- Ray Roberts Wildlife Management Area in Cooke, Denton, and Grayson Counties, and
- Richland Creek Wildlife Management Area in Freestone and Navarro Counties.

Federal government natural resource holdings in Region C include the following:

- Parks and other land around all of the U.S. Army Corps of Engineers lakes in the region (Texoma, Ray Roberts, Lewisville, Lavon, Grapevine, Benbrook, Joe Pool, Bardwell, and Navarro Mills)
- Hagerman National Wildlife Refuge on the shore of Lake Texoma in Grayson County
- Caddo National Grasslands in Fannin County
- Lyndon B. Johnson National Grasslands in Wise County.

Area reservoirs provide a variety of recreational benefits, as well as water supply. **Table 1.16** lists the reservoirs located in Region C that have national or state lands associated with them and the recreational opportunities available at these sites. Recreational activities typically found at these sites include camping, fishing, boating, hiking, swimming, and picnicking.

TABLE 1.15 2022 U.S. DEPARTMENT OF AGRICULTURE COUNTY DATA [a]

	COLLIN	COOKE	DALLAS	DENTON	ELLIS	FANNIN	FREESTONE	GRAYSON	HENDERSON [b]
Farms	2,330	2,188	647	2,936	2,563	2,108	1,291	2,851	1,891
Land in Farms (acres)	197,374	513,278	67,030	272,184	377,200	417,464	372,086	394,985	263,600
Crop Land (acres)	93,314	147,151	35,546	116,619	203,455	163,905	45,766	184,758	68,636
Harvested Crop Land (acres)	63,118	104,418	19,605	78,946	146,876	120,454	33,447	105,948	48,946
Irrigated Crop Land (acres)	1,076	10,291	972	2,043	3,511	6,008	1,827	2,499	1,180
Market Value ($1,000)									
- Crops	45,111	19,860	24,837	25,217	50,972	55,953	6,737	48,035	10,380
- Livestock	53,668	89,591	7,843	110,250	27,372	47,742	116,059	39,062	33,814
- Total	98,779	109,452	32,680	135,467	78,345	103,695	122,792	87,097	44,194
	JACK	**KAUFMAN**	**NAVARRO**	**PARKER**	**ROCKWALL**	**TARRANT**	**WISE**	**TOTAL**	
Farms	889	2,478	2,213	4,379	359	1,000	3,528	***33,651***	
Land in Farms (acres)	573,752	280,030	468,616	341,108	23,466	199,120	345,021	***5,106,314***	
Crop Land (acres)	64,723	91,185	117,599	76,147	11,059	34,694	82,410	***1,536,967***	
Harvested Crop Land (acres)	13,231	62,730	86,368	40,648	9,417	11,109	58,290	***1,003,551***	
Irrigated Crop Land (acres)	565	679	426	2,191	104	509	1,995	***35,876***	
Market Value ($1,000)									
- Crops	2,022	10,815	22,173	8,531	3,055	9,059	14,755	***357,512***	
- Livestock	40,794	38,557	42,789	59,965	2,306	15,268	44,190	***769,270***	
- Total	42,816	49,371	64,962	68,496	5,361	24,327	58,945	***1,126,779***	

[a]Data are from the U.S. Department of Agriculture [27].

[b]Data for Henderson County are for the entire county.

FIGURE 1.8 PRIME FARMLAND IN REGION C

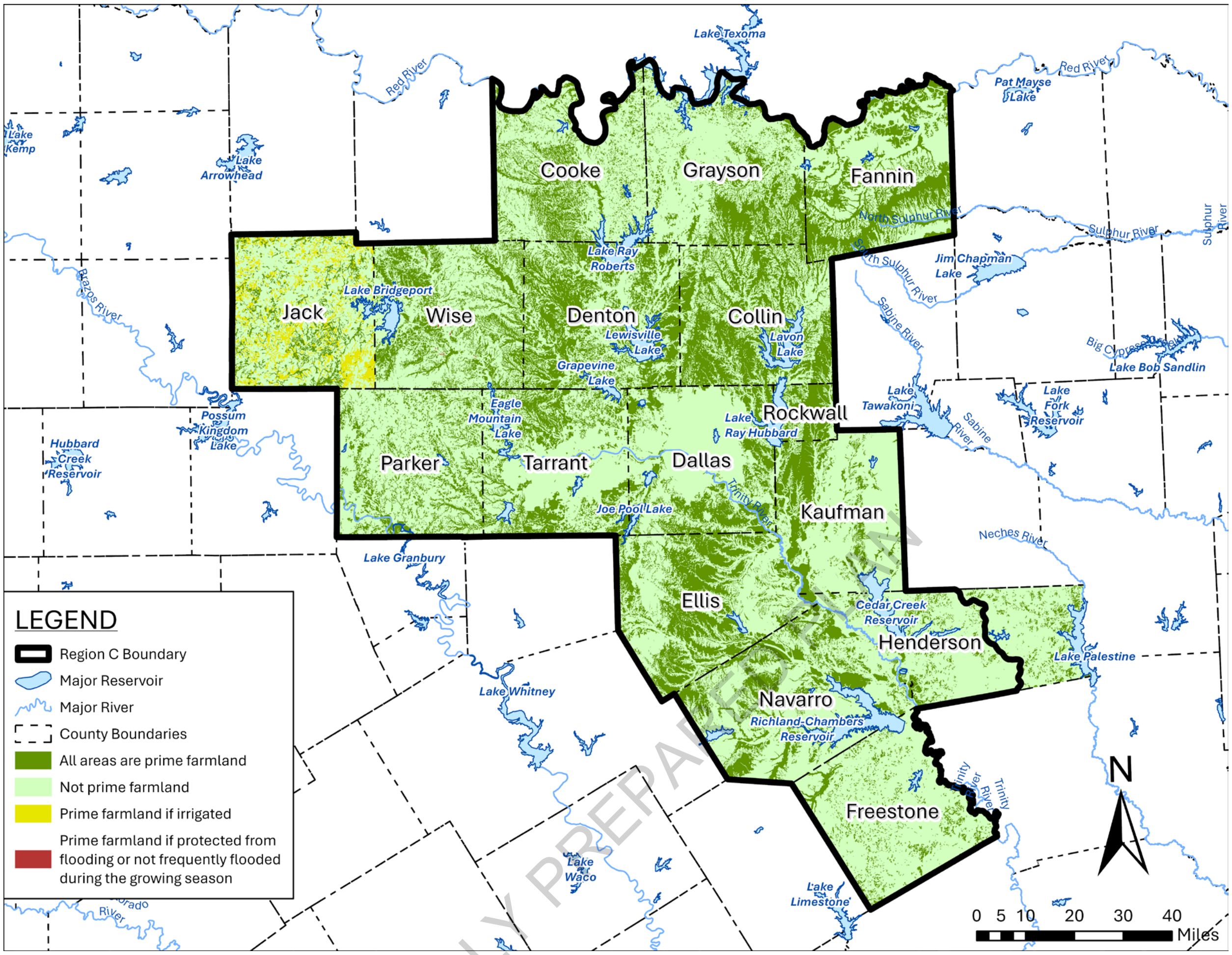


TABLE 1.16 RECREATIONAL ACTIVITIES AT REGION C RESERVOIRS [a]

RESERVOIR	NATIONAL LANDS	STATE LANDS	CAMPING	FISHING	BOATING	HIKING/NATURE TRAILS	HUNTING	SWIMMING	PICNIC SITES	BICYCLING TRAILS	EQUESTRAIN TRAILS	PLAYGROUNDS
Lavon	X		X	X	X	X	X	X	X	X	X	
Texoma	X	X	X	X	X	X	X	X	X	X	X	X
Bonham		X	X	X	X	X		X	X	X		X
Ray Roberts	X	X	X	X	X	X	X	X	X	X	X	X
Lewisville	X		X	X	X	X	X	X	X	X	X	
Benbrook	X		X	X	X	X	X	X	X	X	X	
Grapevine	X		X	X	X	X	X	X	X	X	X	
Joe Pool	X	X	X	X	X	X		X	X	X	X	X
Bardwell	X		X	X	X	X	X	X	X	X	X	
Navarro Mills	X		X	X	X	X	X	X	X			
Mineral Wells		X	X	X	X	X		X	X	X	X	X
Lost Creek Reservoir		X	X	X	X	X		X	X	X	X	
Cedar Ck. Reservoir		X	X	X	X	X		X	X	X		

[a]*Data taken from Texas Parks and Wildlife Department and U.S. Army Corps of Engineers* [28, 29].

LAKE GRAPEVINE

1.10.7 Oil and Gas Resources

Oil and natural gas fields are significant natural resources in portions of Region C.

As of September 2022, four counties within Region C had 1,500 or more regular producing gas wells (Denton, Freestone, Tarrant and Wise), with Wise County having the most at 4,104 [30]. As of February 2019, two counties within Region C had 1,200 or more regular producing oil wells (Cooke and Jack) and two Counties had between 500 and 1,000 regular producing oil wells (Grayson and Navarro).

1.10.8 Lignite Coal Fields

There are some lignite coal resources in Region C [31]. Paleozoic rocks with bituminous coal deposits underlie most of Jack County and small portions of Wise and Parker Counties. Near surface (to 200 feet in depth) lignite deposits in the Wilcox Group underlie significant portions of Freestone, Navarro, and Henderson Counties. Deposits of deep basin lignite (200 - 2,000 feet in depth) in rocks of the Wilcox Group underlie a significant portion of Freestone County. However, there are currently no active coal mines in Region C.

OIL PUMPJACK

1.11 Summary of Threats and Constraints to Water Supply in Region C

The potential threats to existing water supplies in Region C are surface water quality concerns, climate variability, groundwater drawdown, groundwater quality, and invasive species. Constraints on the development of new supplies include the availability of sites and unappropriated water for new water supply reservoirs and the challenges imposed by environmental concerns and permitting.

1.11.1 Need to Develop Additional Supplies

Many of the water suppliers in Region C will have to develop additional supplies before 2080. Each major water supplier has a projected water shortages in 2030 through 2080. They will require additional supplies to meet projected growth in the near future. Each county in Region C will have a net need for more water in 2030, with over 280 water users being predicted to need additional water by 2080. The counties with the largest water needs are Collin, Dallas, Denton, and Tarrant. Further analysis of the region's water needs is presented in **Chapter 4** of this plan.

1.11.2 Surface Water Quality Concerns

The Texas Commission on Environmental Quality (TCEQ) publishes the *Texas Integrated Report of Surface Water Quality* every two years in accordance with the schedule mandated under Section 303(d) and 305(b) of the Clean Water Act. The latest EPA-approved edition of the report was approved by the EPA in July 2022 [32]. The TCEQ has also established a list of stream segments for which it intends to develop total maximum daily load (TMDL) evaluations to address water quality concerns. None of the proposed TMDL studies in Region C are due to concerns related to public water supply. Most are due to general use, aquatic life, contact recreation, and fish consumption.

Many of the water supply reservoirs in Region C are experiencing increasing discharges of treated wastewater in their watersheds. To date, this has not presented a problem for public water supplies, but increased amounts of wastewater and greater nutrient loads may lead to concerns about eutrophication in some lakes. Some of the largest wastewater treatment plants are on the Trinity River in the Dallas-Fort Worth Metroplex and do not discharge into the watershed of any Region C reservoir. However, there are existing and proposed projects to withdraw water from rivers downstream of municipal wastewater treatment plants, polish the water with wetlands treatment, and convey the water to Region C water supply reservoirs. Additionally, there are significant permitted wastewater discharges upstream from many reservoirs in the region, and return flows are tending to increase with time.

In December 1998, the U.S. EPA published the *Stage 1 Disinfectants and Disinfection Byproducts (D/DBP) Rule* [33], which applies to water systems that treat surface water with a chemical disinfectant. This rule sets forth Maximum Contaminant Levels (MCLs) for a number of different contaminants including total organic carbon, trihalomethane, haloacetic acid, and dissolved solids. Under certain circumstances, the rule mandates the use of enhanced coagulation to remove total organic carbon (TOC), an indicator of potential disinfection byproduct formation. Effective January 1, 2004, all community and nontransient, noncommunity systems were required to comply with the MCLs for TTHM (0.080 milligrams per liter, or mg/l) and HAA5 (0.060 mg/l) based on the running annual average for the entire distribution system.

In January 2006, the U.S. EPA published the *Stage 2 Disinfectants and Disinfection Byproducts (D/DBP) Rule*, which requires utilities to evaluate their distribution systems to identify locations with high DBP concentrations. The utilities will then use these locations as sampling sites for DBP compliance monitoring [34]. This rule requires compliance with the MCLs for TTHM and HAA5 at each monitoring location.

The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) [35] is a companion rule to Stage 2 DBPR. This rule requires additional Cryptosporidium treatment techniques for higher-risk systems as well as provisions to reduce risks from uncovered finished water reservoirs and provisions to ensure that microbial protection is maintained when DBP concentrations are decreased.

Dissolved solids in the Red River and Lake Texoma along the northern boundary of Region C are generally high in comparison to other current Region C supplies. The use of Lake Texoma water for public supply requires desalination (Sherman, Red River Authority Preston Shores) or blending with higher quality water (NTMWD, Denison). This requirement has limited the use of water from the Red River and Lake Texoma for public water supply. The Red River Authority is serving as a local sponsor for the Red River Chloride Control Project, which may serve to improve the quality of Lake Texoma water for public water supply by diverting saline water before it reaches the lake. Before any of the chloride control efforts were initiated, about 3,450 tons per day of chlorides entered the Red River. Although portions of the project have been online since 1987, construction efforts were temporarily placed on hold while a cost-sharing partner for the operation and maintenance responsibilities was identified. The Water Resources Development Act of 2007 reaffirmed that operation and maintenance responsibilities would be federally funded. In 2008, funding for efforts in Texas was used to complete contract plans and specifications and continue environmental monitoring activities.

The Texas Commission on Environmental Quality (TCEQ) has the primary responsibility for enforcing state laws regarding water pollution. **Chapter 7** of the Texas Water Code also establishes laws to allow local governments to combat environmental crime, including water pollution. Local enforcement of these laws can supplement the enforcement activities of TCEQ and help protect Texas' water resources.

1.11.3 Invasive Species

The appearance of several invasive and/or harmful species (including zebra mussels, giant salvinia, and golden algae) poses a potential threat to water supplies throughout the state of Texas. Continued monitoring and management by water suppliers in Region C will be necessary in the coming decades. Invasive species will likely be an ongoing area of interest to Region C, as the appearance of additional invasive species in the future remains a possibility.

Zebra mussel (*Dreissena polymorpha*) is an invasive species that is native to Eurasia and is believed to have first entered the United States in 1988 through the ballast water in ships entering the Great Lakes. Zebra mussels multiply rapidly, can be easily transported on boats, and can clog intakes, pumps, pipes and other water supply infrastructure. Additionally, zebra mussels can impact fish populations, native mussels, and birds.

TPWD has four classifications of lakes relating to zebra mussels: Infested, Positive, Suspect, and Inconclusive. Infested Lakes are those where the water body has an established, reproducing zebra mussel population. Positive Lakes are those where zebra mussels or their larvae have been detected on more than one occasion. Suspect Lakes are those where zebra mussels or their larvae have been found once in recent years. Inconclusive Lakes are those where zebra mussel DNA or an unverified suspect organism has been found. As of March 2024 TPWD [36] has identified the following reservoirs used for Region C water supply in relation to zebra mussels:

Infested: Bridgeport, Eagle Mountain, Lewisville, Grapevine, Randell, Ray Roberts, Richland-Chambers, Texoma, and Worth

Positive: Lavon

Suspect: Ray Hubbard

Inconclusive: None

Due to the number of water transfers in Region C and other potential pathways of transferring zebra mussels into a reservoir (boats, birds), reservoirs should continue to be monitored for the appearance of zebra mussels. As zebra mussels spread into Region C water supply reservoirs, the operation and maintenance cost of control and removal from water supply infrastructure could be significant. To avoid further spread of this invasive species, strategies in this plan that involve transfer of water from basins or reservoirs with known presence of zebra mussels have been modified to transfer water directly to water treatment plants.

Giant salvinia (*salvinia molesta*) is a floating plant that is native to South America. Colonies of giant salvinia can develop, covering the water surface. Under certain environmental conditions (light, temperature, and available nutrients), oxygen depletion and fish kills can occur. In addition, colonies of giant salvinia can block sunlight penetration to submerged plants. Lower water levels typically experienced during the summer months help prevent the spread of giant salvinia.

Giant salvinia was first discovered in Texas in the Houston area in 1998, and has spread to over a dozen Texas lakes, including Toledo Bend and Sam Rayburn. Due to the number of water transfers in Region C and other potential pathways of transferring, reservoirs should continue to be monitored for the appearance of giant salvinia. If giant salvinia appears in Region C water supply reservoirs, mechanical techniques and herbicide can be applied during the summer months to control the population.

Golden algae (*prymnesium parvum*) is a type of aquatic plant that produces toxins that can be lethal to fish, mussels, clams, and certain amphibians. Under certain environmental

ZEBRA MUSSELS

conditions, an explosive increase in the algal population can occur, which can result in fish kills. Golden algae typically occur in waters with a high TDS concentration, and appears to have a competitive advantage over beneficial algae during the winter and spring months. Golden alga blooms have occurred in the Rio Grande, Brazos, Canadian, Colorado, and Red River basins. Golden algae were first identified in Texas in the 1980s; it remains unclear whether the species is native or invasive. Research is ongoing to better understand, detect, and manage golden alga blooms.

1.11.4 Groundwater Drawdown

Overdevelopment of aquifers and the resulting decline in water levels poses a threat to small water suppliers and to household water use in rural areas. As water levels decline, the cost of pumping water grows and water quality generally suffers. Wells that go dry must be redrilled to reach deeper portions of the aquifer. Water level declines have been reported in localized areas in each of the major and minor aquifers in Region C. In particular, the annual pumpage from the Trinity aquifer in some counties is estimated to be greater than the annual recharge [(24)]. Concern about groundwater drawdown is likely to prevent any substantial increase in groundwater use in Region C and may require conversion to surface water in some areas.

1.11.5 Groundwater Quality

Figure 1.3 and **Figure 1.4** show the major and minor aquifers in Region C. Major aquifers are the Trinity aquifer and the Carrizo-Wilcox aquifer. Minor aquifers are the Woodbine aquifer, the Nacatoch aquifer, the Cross Timbers aquifer and the Queen City aquifer. Water quality in the Trinity aquifer is acceptable for most municipal and industrial purposes [(37)]. However, in some areas, natural concentrations of arsenic, fluoride, nitrate, chloride, iron, manganese, sulfate, and total dissolved solids in excess of either primary or secondary drinking water standards can be found. Water on the outcrop tends to be harder with relatively high iron concentration. Downdip, water tends to be softer, with concentrations of TDS, chlorides, and sulfates higher than on the outcrop. Groundwater contamination from man-made sources is found in localized areas. TWDB Report 269 reported contaminated water in wells located between Springtown in Parker County and Decatur in Wise County [(24)]. The apparent source of the contamination was improperly completed oil and gas wells. Other potential contaminant sources (agricultural practices, abandoned wells, septic systems, etc.) are known to exist on the Trinity outcrop, but existing data are insufficient to quantify their impact on the aquifer.

Water from the Carrizo-Wilcox aquifer is fresh to slightly saline. In the outcrop, the water is hard and low in TDS [(38)]. In the downdip, the water is softer, with a higher temperature and higher TDS concentrations. Hydrogen sulfide and methane may be found in localized areas. In much of the northeastern part of the aquifer, water is excessively corrosive and has high iron content. In this area, the groundwater may also have high concentrations of TDS, sulfate, and chloride. Some of these sites may be mineralized due to waters passing through lignite deposits, especially in the case of high sulfate. Another cause may be the historic practice of storing oil field brines in unlined surface storage pits.

Water quality in the layers of the Woodbine aquifer used for public water supply is good along the outcrop. Water quality decreases downdip (southeast), with increasing concentrations of sodium, chloride, TDS, and bicarbonate. High sulfate and boron concentrations may be found in Tarrant, Dallas, Ellis, and Navarro Counties. Excessive iron concentrations also occur in parts of the Woodbine formation.

Water from the Cross Timbers aquifer occurs under mostly unconfined conditions and is typically discontinuous with isolated sandstone layers. The groundwater occurs in a shallow flow system that is susceptible to water level changes due to variable recharge and discharge. The groundwater quality ranges from fresh to brackish. The geometry and aquifer properties of water-bearing strata vary widely and contribute to variability in well yields [39].

The Nacatoch and Queen City aquifers provide very little water in Region C. Available data indicate that the quality of the Nacatoch in this area is acceptable for most uses. Water quality data on the Queen City aquifer in Region C are very limited.

1.12 Water-Related Threats to Agricultural and Natural Resources in Region C

Water-related threats to agricultural and natural resources in Region C include changes to natural flow conditions, water quality concerns, and inundation of land due to reservoir development. In general, there are few significant water-related threats to agricultural resources in Region C due to the limited use of water for agricultural purposes. Water-related threats to natural resources are more significant. Further information on how this plan is consistent with the long-term protection of the State's agricultural and natural resources is presented in **Section 6.4** of this report.

1.12.1 Changes to Natural Flow Conditions

Reservoir development, groundwater drawdown, and return flows of treated wastewater have greatly altered natural flow patterns in Region C. Spring flows in Region C have diminished, and many springs have dried up because of groundwater development and the resulting drawdown. This has reduced reliable flows for many tributary streams. Reservoir development also changes natural hydrology, diminishing flood flows and capturing low flows. (Some reservoirs provide steady flows in downstream reaches due to releases to empty flood control storage or meet permit requirements.) Downstream from the Dallas-Fort Worth Metroplex, base flows on the Trinity River have greatly increased due to return flows of treated wastewater. It is unlikely that future changes to flow conditions in Region C will be as dramatic as those that have already occurred. If additional reservoirs are developed, they will likely be required to release some inflow to maintain downstream stream conditions, which was often not required in the past. It is likely that return flows from the Dallas-Fort Worth area will continue to increase over the long term, thus increasing flows in the Trinity River. On balance, this will probably enhance habitat in this reach.

1.12.2 Water Quality Concerns

There are a number of reaches in which the TCEQ has documented concerns over water quality impacts to aquatic life or fish consumption. In general, these concerns are due to low dissolved oxygen levels or to levels of lead, pesticides, or other pollutants that can harm aquatic life or present a threat to humans eating fish in which these compounds tend to accumulate. Baseline water quality conditions used to evaluate water management strategies are included in **Appendix I**.

1.12.3 Inundation Due to Reservoir Development

The impacts of a new reservoir on natural resources include the inundation of habitat, often including wetlands and bottomland hardwoods, and changes to downstream flow patterns. Depending on the location, a reservoir may also inundate prime farmland. The impacts of specific projects depend on the location, the mitigation required, and the operation of the projects.

In the *2021 Region C Water Plan*, four new reservoirs were considered: Bois d'Arc Lake, Lake Ralph Hall, Tehuacana, and the Main Stem Balancing Reservoir. Bois d'Arc Lake has been completed and is actively supplying water. Lake Ralph Hall is currently under construction. The other two reservoirs are still under consideration.

1.13 Chapter 1 List of References

(1) Texas Demographic Center: *Estimates of the Total Populations of Counties and Places in Texas for July 1, 2021 and January 1, 2022,* [ONLINE], Available URL: https://www.demographics.texas.gov/Estimates/2021/, February 2023.

(2) United States Department of Labor - Bureau of Labor Statistics: *May 2021 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates – Dallas-Fort Worth-Arlington, TX*, [ONLINE], Available URL: https://www.bls.gov/oes/2022/may/oes_tx.htm, April 2023.

(3) United States Department of Commerce – Bureau of Economic Analysis: *County and MSA Economic Profile*, [ONLINE], Available URL: https://apps.bea.gov/itable/?ReqID=70&step=1&_gl=1*o72n58*_ga*NzA0NjEzNTc5LjE3MTg3MjMxOTg.*ga_J4698JNNFT*MTcxODgwNTIwMi40LjEuMTcxODgwODgyOC40MC4wLjA.#eyJhcHBpZCI6NzAsInN0ZXBzIjpbMSwyOSwyNSwzMSwyNl0sImRhdGEiOltbIlRhYmxlSWQiLCIxMiJdLFsiTWFqb3JfQXJlYSIsIjQiXSxbIlN0YXRlIixbIjQ4MDAwIl1dXX0=, November 2023.

(4) United States Department of Commerce – Bureau of Economic Analysis: *County and MSA gross domestic product summary*, [ONLINE], Available URL: https://apps.bea.gov/itable/?ReqID=70&step=1&_gl=1*o72n58*_ga*NzA0NjEzNTc5LjE3MTg3MjMxOTg.*_ga_J4698JNNFT*MTcxODgwNTIwMi40LjEuMTcxODgwODgyOC40MC4wLjA.#eyJhcHBpZCI6NzAsInN0ZXBzIjpbMSwyOSwyNV0sImRhdGEiOltbIlRhYmxlSWQiLCI1MDMiXV19. December 2023.

(5) Dallas Morning News, *D-FW's 150 largest companies for 2023 – from black gold to out-of-state relocations,* https://www.dallasnews.com/business/2023/07/06/d-fws-150-largest-companies-for-2023-from-black-gold-to-out-of-state-relocations/, July 6, 2023.

(6) World Atlas, *The 10 Busiest Airports in the United States,* https://www.worldatlas.com/places/the-10-busiest-airports-in-the-united-states.html, August 2, 2024.

(7) United States Department of Agriculture - Natural Resource Conservation Service: Geospatial Data Gateway: *Average Annual* and *Average Monthly Rainfall Data by State*, [ONLINE], Available URL: http://datagateway.nrcs.usda.gov/GDGOrder.aspx, August 2014.

(8) Texas Commission on Environmental Quality: Water Rights Database and Related Files, [Online], Available URL: https://www.tceq.texas.gov/permitting/water_rights/wr_databases.html, July 7, 2013.

(9) Texas Water Development Board: Historical Water Use Data files, Austin, [Online], Available URL: http://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/index.asp, accessed June 2024.

(10) Texas Water Development Board: Historical Groundwater Pumpage, Austin, [Online], 2021 Data, https://www.twdb.texas.gov/waterplanning/waterusesurvey/historical-pumpage.asp, accessed June 2024.

(11) Texas Water Development Board: Modeled Available Groundwater files, Austin, accessed June 2024.

(12) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2021 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, November 2020.

(13) Texas Water Development Board: *2022 State Water Plan for Texas,* Austin, [Online] Available URL: https://www.twdb.texas.gov/waterplanning/swp/2022/, July 2022

(14) Texas Water Development Board: *Conservation Resources for 2026 Regional Water Plan Development*, Austin, [Online], Available URL: https://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2026/conservationresources.asp

(15) United States Environmental Protection Agency: *Per and Polyfluoroalkyl Substances (PFAS)* [Online], Available URL: https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas, July 2024

(16) Cavanaugh, WSO, and Black & Veatch: *Texas Water Loss Audit Validation Study*, prepared for the Texas Water Development Board, Fort Worth, December 2021.

(17) Texas Water Development Board: Water Loss Audit Data by Region, Austin, [Online], Available URL: http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/current_docs.asp, January 2022.

(18) Brune, Gunnar: *Springs of Texas, Volume I*, Branch-Smith, Inc., Fort Worth, 1981.

(19) Texas Parks and Wildlife Department: *Evaluation of Selected Natural Resources in Part of the North-Central Texas Area*, Austin, 1999.

(20) United States Department of the Interior - U.S. Geological Survey (Franklin T. Heitmuller and Brian D. Reece): *Open File Report 03-315, Database of Historically Documented Springs and Spring Flow Measurements in Texas*, Austin, 2003.

(21) Wetland Training Institute, Inc.: *Field Guide for Wetland Delineation*, 1987 U.S. Army Corps of Engineers Manual, Glenwood, NM, WTI91-2, 1991.

(22) United States Department of Agriculture, Natural Resources Conservation Service Texas, Hydric Soils, NRCS Soils, [Online], Available URL: https://www.nrcs.usda.gov/publications/query-by-state.html#reportref, Accessed June 2024.

(23) U.S. Fish and Wildlife Service: *Listed species with spatial current range believed to or known to occur in Texas*, [Online], Available URL: https://ecos.fws.gov/ecp/report/species-listings-by-state?stateAbbrev=TX&stateName=Texas&statusCategory=Listed, Accessed June 2024.

(24) Texas Parks and Wildlife Department, Wildlife Division, Diversity and Habitat Assessment Programs: *County Lists of Texas' Special Species. Region C Counties*, Accessed June 2024.

(25) U.S. Department of Agriculture and Natural Resources Conservation Service: *National Soil Survey Handbook, title 430-VI*. [Online] Available URL: http://soils.usda.gov/technical/handbook/, 2003.

(26) Texas Department of Water Resources: *Report 269: Occurrence, Availability, and Chemical Quality of Groundwater in the Cretaceous Aquifers of North-Central Texas*, Austin, 1982.

(27) U.S. Department of Agriculture: 2022 Census of Agriculture, Volume 1, Chapter 2: Texas County Level Data, Table 1, [Online], Available URL: https://www.nass.usda.gov/Publications/AgCensus/2022/Full_Report/Volume_1,_Chapter_2_County_Level/Texas/st48_2_001_001.pdf, February 2024.

(28) Texas Parks and Wildlife Department: Texas Lake Finder, Austin, [Online], Available URL: https://tpwd.texas.gov/fishboat/fish/recreational/lakes/, Accessed August 2024.

(29) U.S. Army Corps of Engineers, Fort Worth District: Lakes and Recreation Information, Fort Worth, [Online], Available URL: https://www.swf.usace.army.mil/About/Lakes-and-Recreation-Information/, July 2024.

(30) Texas Railroad Commission: *Well Distribution by County – Well Counts,* Austin, [Online], Available URL: http://www.rrc.state.tx.us/oil-gas/research-and-statistics/well-information/well-distribution-by-county-well-counts/, September 2022.

(31) Texas Center for Policy Studies: *Texas Environmental Almanac*, Austin, [Online], Available URL: http://www.texascenter.org/almanac/index.html, 1995.

(32) U.S. Environmental Protection Agency: 2022 Texas Integrated Report of Surface Water Quality for Clean Water Act Sections 305(b) and 303(d), [Online], Available URL: https://www.tceq.texas.gov/waterquality/assessment/22twqi/22txir, July 7, 2022.

(33) U.S. Environmental Protection Agency: *Stage 1 Disinfectants and Disinfection Byproducts Rule*, EPA 815-F-98-010, December 1998.

(34) U.S. Environmental Protection Agency: *Stage 2 Disinfectants and Disinfection Byproducts Rule*, [Online] Available URL: http://www.epa.gov/safewater/disinfection/stage2/regulations.html, January 2006.

(35) U.S. Environmental Protection Agency: *Long Term 2 Enhanced Surface Water Treatment Rule*, [Online], Available URL: http://www.epa.gov/OGWDW/disinfection/lt2/index.html, January 5, 2006.

(36) Texas Parks and Wildlife Department: *Zebra Mussel Classification*, [Online], https://tpwd.texas.gov/huntwild/wild/species/exotic/zebramusselmap.phtml Austin, 2024.

(37) Texas Commission on Environmental Quality: *2022 State of Texas Water Quality Inventory Groundwater Assessment*, Austin, April 2022.

(38) Texas Water Development Board Report 345: *Aquifers of Texas*, Austin, 1996.

(39) Texas Water Development Board and Water Conservation Implementation Task Force: *Amending the 2017 State Water Plan to designate the Cross Timbers Aquifer as a minor aquifer*, [Online], Available URL: https://www.twdb.texas.gov/board/2017/09/Board/Brd08.pdf, March 19, 2019.

Bardwell Lake

CHAPTER TWO

POPULATION AND WATER DEMAND PROJECTIONS

OVERVIEW

This chapter summarizes the population and water demand projections for Region C as approved by the Texas Water Development Board (TWDB).

2 POPULATION AND WATER DEMAND PROJECTIONS

CHAPTER OUTLINE	
Section 2.1	Historical Perspective
Section 2.2	Population Projections
Section 2.3	Water Demand Projections
Attachment 1	Region C Population Projections by WUG, by County
Attachment 2	Projected Population for WUGs in Multiple Counties or Regions
Attachment 3	Region C Projected Municipal Demand by WUG, by County
Attachment 4	Municipal Demand for WUGs in Multiple Counties or Regions
Attachment 5	Population Served by Major Water Providers and Projected Dry-Year Water Demand on Major Water Providers by Use Category
RELATED APPENDICES	
Appendix C	Adjustments to Projections
Appendix D	DB27 Reports

This chapter summarizes the population and water demand projections for Region C as approved by the Texas Water Development Board (TWDB). It includes a discussion on historical growth trends in Region C, the basis of projections, and the final population and water demand projections for Region C. Region C is the most populous of the 16 regional planning areas, making up approximately a quarter of the State's population. Region C's total population is projected to increase by ~ 65% from 9.1 million in 2030 to over 15 million in 2080. This is almost double the 2021 population of 7.7 million. The region is projected to account for almost one-third of the State's population by 2080. Region C's municipal demand is projected to increase as well (~58%) from 1.8 million acre-feet per year in 2030 to 2.8 million acre-feet per year in 2080. Total demand increases to over 3 million acre-feet per year by 2080. Although Region C is densely populated, the region has historically used less than 10 percent of the State's total annual water use.

2.1 Historical Perspective

The sixteen counties that comprise Region C have been among the fastest growing areas in Texas and the nation since the 1950s. The population of the region more than tripled from 1960 to 2020. The region's highest population density is centered in and around Dallas and Tarrant Counties.

For many years, the population growth in the region was concentrated in the cities of Dallas and Fort Worth. In the 1960s and 1970s, growth expanded into the suburbs in Dallas and Tarrant Counties. Then in the 1980s and more so since the 1990s, population growth extended into Collin, Denton, Rockwall, and Ellis Counties.

According to the U.S. Census Bureau, the 2010 population of Region C was 6,455,044. The 2020 Census determined that the Region C population grew to 7,733,058 in 2020 [(1)]. The total Region C water demand in 2020 (an above average rainfall year) was 1,382,808 acre-feet [(2)].

Figure 2.1 shows the historical population for Region C from 1970 to 2020, and **Figure 2.2** shows the historical water use for Region C from 1990 to 2020.

FIGURE 2.1 HISTORICAL POPULATION

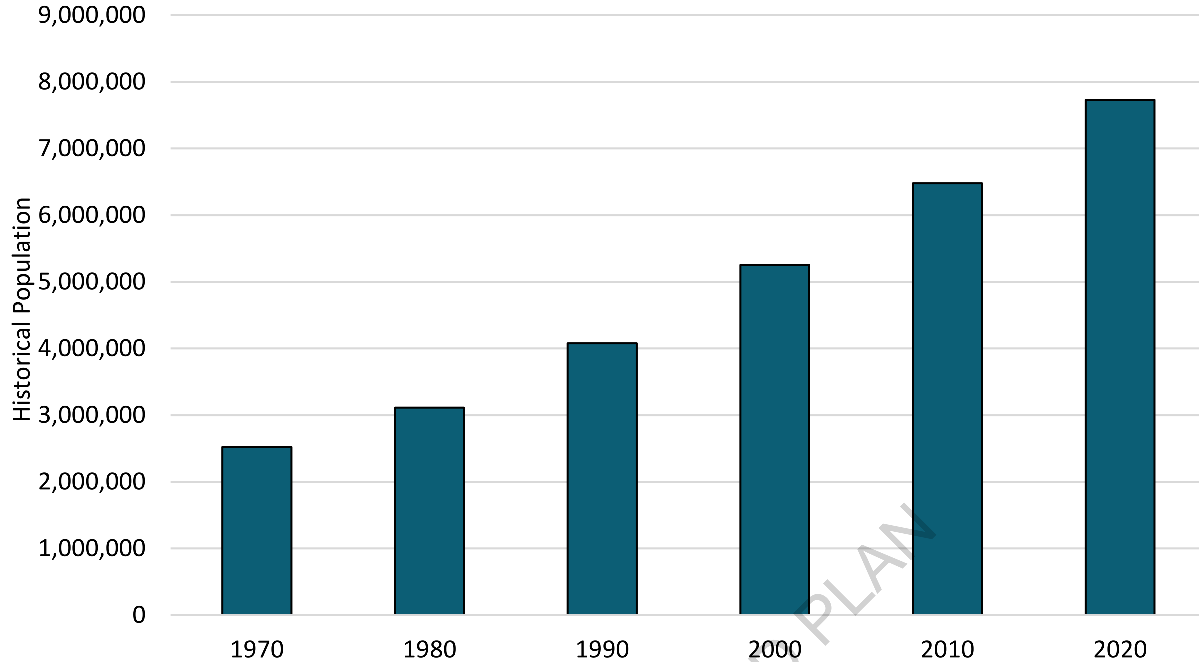
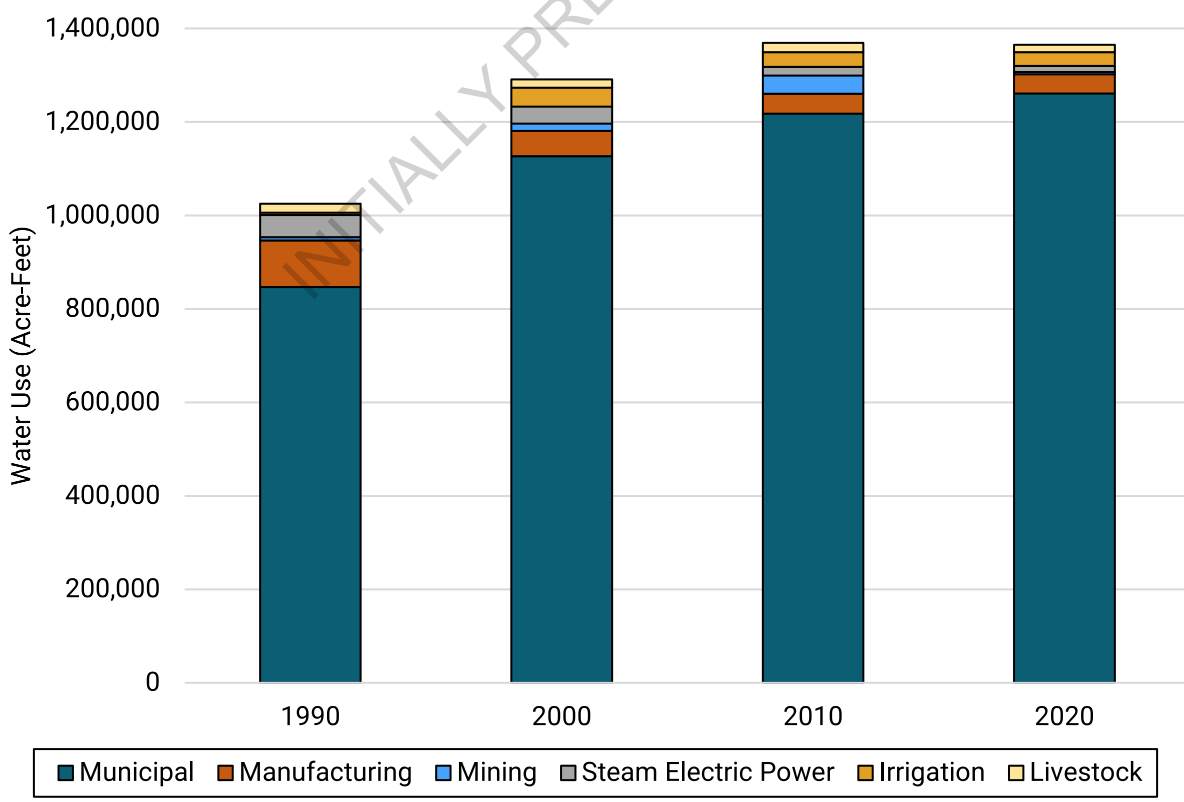


FIGURE 2.2 HISTORICAL WATER USE IN REGION C



2.2 Population Projections

Population and water demand projections have been developed for all water user groups (WUGs).

2.2.1 Basis for Population Projections

For this update of the Region C Plan, ten new water user groups (WUGs) have been added and one WUG was combined with another WUG. Four WUGs were also renamed. The list of new, removed, and renamed WUGs can be found in **Appendix C**. There are 296 municipal WUGs in Region C.

Population projections presented in this section are based on draft population projections provided by the Texas Water Development Board on January 23, 2023. Those draft projections were developed from county-level population projections from the Texas Demographic Center (TDC), which projected future growth using the full migration scenario (1.0) based on the 2020 U.S. decennial Census. These were adjusted to match utility service area boundaries for each WUG. Region C analyzed the draft projections and made changes based on input from water user groups and wholesale water providers (WWPs) in Region C, the North Central Texas Council of Governments, and other sources. Detailed explanation of these changes is in **Appendix C**. TWDB allowed population adjustments to be made between WUGs and counties, but initially required that the total regional population remain the same as the total of their draft projections. After further consideration, TWDB allowed a slight increase (varying by decade, at most 4.3 percent) in the overall population projections due to the under-estimation of the Region C population in the 2020 U.S. Census and a significantly differing growth rate in the draft regional projections from the 2015-2020 growth rate.

As stated in the previous paragraph, revisions to the projections were made based on input from water user groups and wholesale water providers in Region C. Each municipal WUG in Region C was emailed a survey regarding their population projections. An example of this survey is included in **Appendix C**. In the survey, each WUG was provided TWDB's draft population projection for the 2026 Region C Water Plan along with any revisions the Region C consultants were suggesting based on available data. If the WUG was not in agreement with the projections, they were asked to provide alternative projections. Twenty-nine WUGs responded with suggestions for revisions to the population projections, and those revisions were incorporated to the extent feasible. Email notification was sent to all WUGs for which revisions were made. A summary of the justification for all changes made to population projections is included in **Appendix C**.

As required by TWDB regulations, these projections were posted for public review on the Region C website in advance of the Region C Planning Group meeting at which they were considered for approval. The population projections were approved by the Region C Water Planning Group at the November 6, 2023 Public Meeting and were subsequently adopted by TWDB. No public comments were received on these projection revisions.

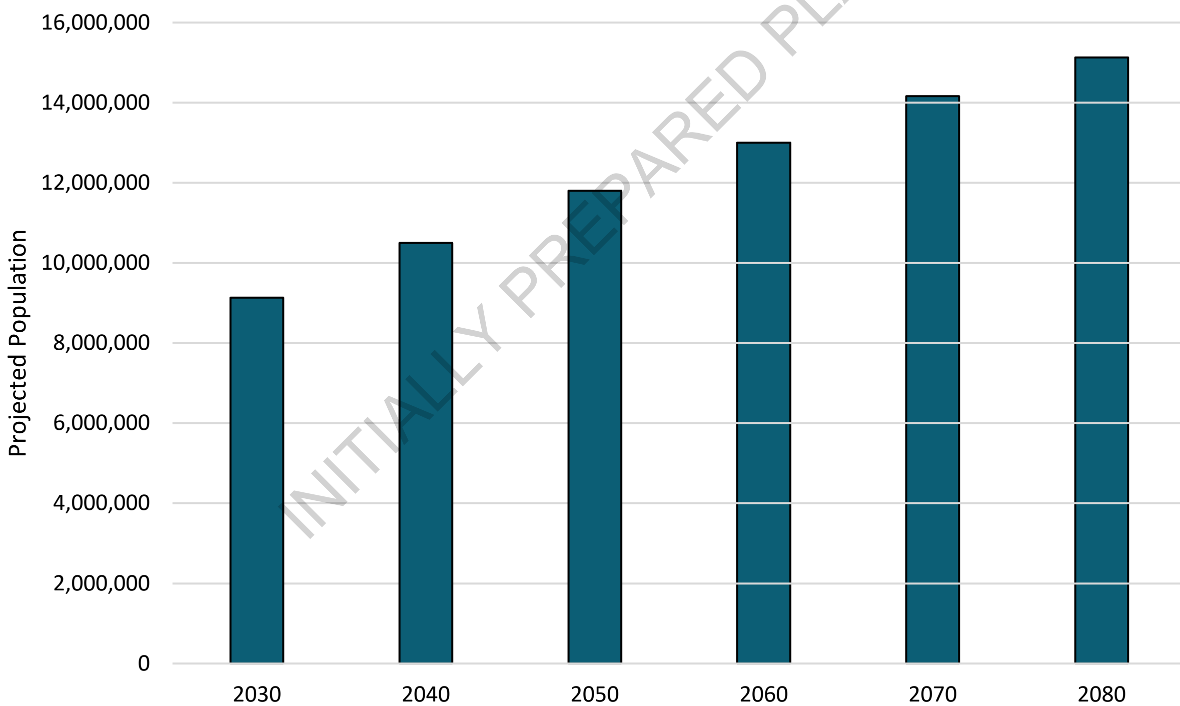
2.2.2 Water User Group Projections

Figure 2.3 and **Table 2.1** present the projected population for the Region C counties, as adopted by TWDB. The projected 2030 population for Region C is 9,133,116. This 2030 projection is about 3.1

percent more than the projected 2030 population from the *2021 Region C Water Plan* [3] and about 5.6% more than the 2030 population projection from the *2016 Region C Water Plan* [4]. The 2080 population projection for Region C is 15,126,596 in the *2026 Region C Water Plan*. **Figure 2.4** shows how the population will increase across Region C from 2030 to 2080. Generally, the overall long-term population projections are consistent with previous plans.

Attachment 1 at the end of this chapter is a summary of the projected populations for Region C by water user group, by county, and by basin as approved by the RCWPG and TWDB. Many of the water user groups have a population that is split among multiple basins, counties, and regions. For convenience, **Attachment 2** at the end of this chapter includes the total projected populations for those water user groups in multiple basins, counties, and regions. As required for Regional Planning, this report also contains population tables generated directly from TWDB's Regional Water Planning Database (DB27). Those tables are in **Appendix D** (DB27 tables). Table of the projected dry-year demands for WUGs and wholesale water providers are also shown in **Appendix D**.

FIGURE 2.3 ADOPTED POPULATION PROJECTIONS FOR REGION C



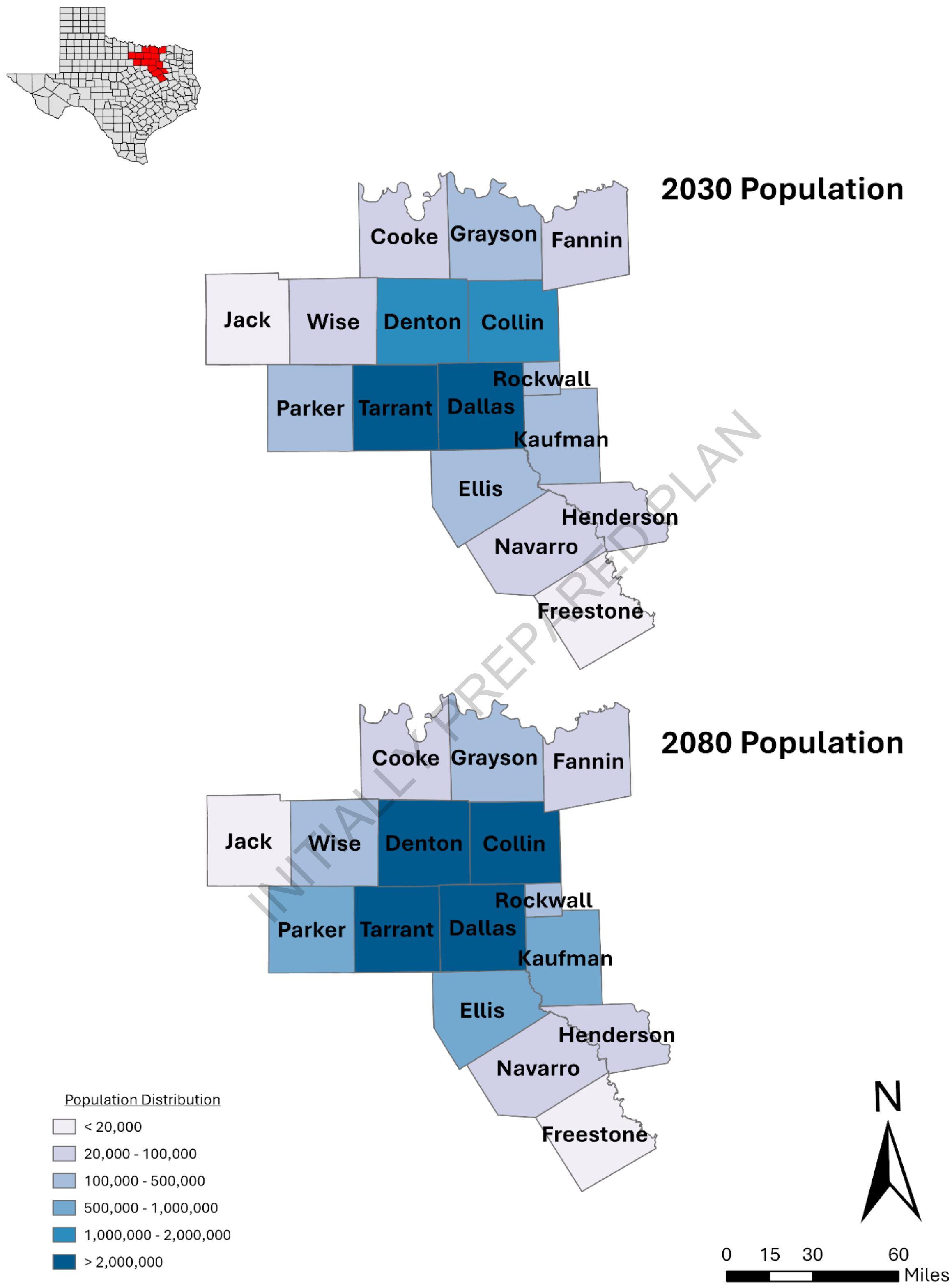
Region C's population is increasing by more than 300 people per day.

TABLE 2.1 ADOPTED POPULATION PROJECTIONS FOR REGION C BY COUNTY

COUNTY	HISTORICAL 2000	HISTORICAL 2010	HISTORICAL 2020	2030	2040	2050	2060	2070	2080
Collin	491,774	782,341	1,066,465	1,418,872	1,764,402	2,126,310	2,351,305	2,505,630	2,612,777
Cooke	36,363	38,437	41,671	44,200	45,693	46,466	47,694	49,742	51,732
Dallas	2,218,774	2,368,139	2,611,491	2,744,243	2,899,298	3,045,184	3,162,467	3,277,308	3,372,187
Denton	432,976	662,614	906,455	1,229,659	1,498,214	1,772,935	1,998,120	2,244,614	2,456,768
Ellis	111,360	149,610	192,441	241,747	290,486	346,554	397,716	455,844	513,797
Fannin	31,242	33,915	35,661	40,069	44,955	53,396	62,521	74,244	84,502
Freestone	17,867	19,816	19,445	19,057	18,648	18,067	17,514	16,905	16,234
Grayson	110,595	120,877	135,552	169,780	200,021	231,274	257,654	292,518	317,713
Henderson [a]	51,984	78,532	82,145	65,669	71,460	78,514	84,827	92,129	97,538
Jack	8,763	9,044	8,474	8,214	7,957	7,770	7,740	7,859	7,787
Kaufman	71,313	103,350	145,303	209,309	257,499	335,063	431,671	542,246	627,644
Navarro	45,124	47,735	52,623	57,263	61,718	65,957	70,146	75,206	80,385
Parker	88,495	116,927	148,228	190,921	254,388	340,869	442,691	566,315	675,719
Rockwall	43,080	78,337	107,832	155,987	214,364	280,320	340,099	378,980	403,891
Tarrant	1,446,219	1,809,034	2,110,608	2,446,041	2,749,019	2,878,997	3,093,389	3,272,494	3,438,106
Wise	48,793	59,127	68,632	92,085	125,921	176,629	234,863	311,934	369,816
REGION C TOTAL	***5,254,722***	***6,477,835***	***7,732,976***	***9,133,116***	***10,504,043***	***11,804,305***	***13,000,417***	***14,163,968***	***15,126,596***

[a]Projections for Henderson County only include the portion of Henderson County located within Region C.

FIGURE 2.4 REGION C POPULATION PROJECTIONS



2.3 Water Demand Projections

Water demand projections are divided into two main water use categories: municipal and non-municipal. Non-municipal water use is further divided into five water use categories for the purposes of regional planning: irrigation, livestock, manufacturing, mining, and steam electric power. Additionally, non-municipal demands are sometimes referred to more simply as agricultural (irrigation and livestock) and industrial (manufacturing, mining, and steam electric).

Region C was given the opportunity to request adjustments to TWDB draft water demand projections if needed. Region C did request several revisions, and those revisions are detailed in separate memoranda for each use category. **Appendix C** contains the memoranda detailing the demands and requested revisions for Region C.

As required by TWDB regulations, these projections were posted for public review on the Region C website in advance of the Region C Planning Group meeting at which they were considered for approval. The demand projections were approved at the November 6, 2023, Public Meeting and were subsequently adopted by TWDB. No public comments were received on these projection revisions.

2.3.1 Municipal Water Demand

Municipal water demand includes water used by a variety of consumers in Region C, including single-family residence, multi-family residence, and nonresidential establishments (commercial, institutional, and light industrial). Residential and nonresidential consumers use water for purposes such as drinking, cooking, sanitation, cooling, and landscape watering. Municipal demands were developed for water utilities, cities, and aggregated rural areas (referred to collectively as "county other" for planning purposes).

Although some nonresidential establishments are included in municipal water use, water-intensive industrial customers such as large manufacturing plants, steam electric power generation facilities, and mining operations are not included but instead have their own non-municipal categories. Examples of nonresidential municipal demand include hospitals, universities, offices, shopping, hotels, entertainment venues, airports, and telecom facilities.

The TWDB has defined municipal water user group (WUG) boundaries differently in this round of planning than in previous rounds. A municipal WUG is now defined based on utility service area boundaries instead of political boundaries.

Municipal water user groups include:

- Privately-owned utilities that provide an average of more than 100 acre-feet per year for municipal use for all owned water systems,
- Water systems serving institutions or facilities owned by the state or federal government that provide more than 100 acre-feet per year for municipal use;
- All other retail public utilities not covered in the first two bullets that provide more than 100 acre-feet per year for municipal use;

- Collective reporting units, or groups of retail public utilities that have a common association and are requested for inclusion by the regional water planning group;
- Municipal and domestic water use, referred to as county other, not included in any of the above.

The municipal water demand projections presented in this section are based on per capita dry-year water use and the adopted population projections from the previous section. TWDB provided 2010 through 2020 historical per capita water use data based on the updated utility service area boundaries for Region C WUGs. Region C used this historical data to identify utilities for which per capita uses should be changed from TWDB draft numbers. This process is outlined in the memorandum "Comparison of Historical GPCDs for Region C; Requested GPCD Changes," which is included in **Appendix C**. Region C requested changes to the base per capita usage for 51 WUGs.

Using the final base-year per capita values for each WUG, the TWDB calculated the 2030 through 2080 per capita values incorporating the reduction in per capita values each decade expected to be caused by state and federally regulated plumbing codes (low flow plumbing fixtures, efficient residential clothes washer standards, and efficient residential dishwasher standards). TWDB then calculated the projected volume of water savings from these plumbing codes for each municipal WUG. This information (split by county and WUG) is included at the end of **Appendix C**. In total, Region C's projected water savings due to plumbing codes is 46,333 acre-feet in 2030, increasing to 84,464 acre-feet in 2080.

TABLE 2.2: PROJECTED DEMANDS FOR MUNICIPAL WUGS BY COUNTY (ACRE-FEET PER YEAR)

COUNTY	2030	2040	2050	2060	2070	2080
Collin	302,809	364,010	432,644	474,677	500,084	518,589
Cooke	6,441	6,637	6,751	6,923	7,209	7,486
Dallas	553,384	581,955	609,651	632,389	654,626	673,940
Denton	230,466	277,448	324,113	360,284	400,044	435,176
Ellis	46,238	55,761	66,855	76,781	87,634	98,630
Fannin	5,314	5,983	7,237	8,598	10,353	11,884
Freestone	2,847	2,770	2,682	2,583	2,478	2,369
Grayson	32,673	38,417	44,111	49,215	55,817	60,395
Henderson	10,112	10,990	12,234	13,321	14,594	15,487
Jack	1,276	1,237	1,229	1,244	1,289	1,296
Kaufman	29,170	35,289	45,524	58,162	72,710	83,379
Navarro	9,815	10,525	11,205	11,852	12,616	13,417
Parker	29,505	38,134	50,118	64,174	81,050	96,055
Rockwall	28,096	37,964	49,734	60,137	66,468	70,642
Tarrant	476,863	534,431	561,636	607,270	641,681	673,770
Wise	13,853	18,233	25,078	32,836	43,127	51,036
REGION C TOTAL	**1,778,862**	**2,019,784**	**2,250,802**	**2,460,446**	**2,651,780**	**2,813,551**

2.3.2 Irrigation Water Demand

Irrigation water demand includes water used in irrigated field crops, vineyards, orchards, and self-supplied golf courses. In each planning cycle, the previous cycle's irrigation projections are adjusted by factors and trends including changes in the number of crops under irrigation, increases in irrigation application efficiency, changes in canal losses for surface water diversions, and changes in cropping patterns. Irrigation demand is expected to decline over time as a result of more efficient irrigation systems, reduced groundwater supplies, the economic difficulty of pumping water from increasingly greater depths, and the transfer of water rights from agricultural to municipal uses.

There is some irrigation demand in Region C; however, this demand is mainly composed of golf courses watered by raw water or reclaimed water. The TWDB classifies the use of raw water or reuse of treated wastewater effluent for golf course irrigation as irrigation use and classifies the use of potable water for golf course irrigation as part of municipal use.

TWDB provided the draft irrigation projections for Region C on August 23, 2022. TWDB draft irrigation demands were based on an average of TWDB's 2015-2019 irrigation water use estimates. Any revisions requested by the Region C Regional Water Planning Group are summarized in **Appendix C**. **Table 2.3** summarizes the final projected demands for irrigation by county.

TABLE 2.3 PROJECTED DEMAND FOR IRRIGATION WUGS (ACRE-FEET PER YEAR)

COUNTY	2030	2040	2050	2060	2070	2080
Collin	2,811	2,811	2,811	2,811	2,811	2,811
Cooke	1,038	1,038	1,038	1,038	1,038	1,038
Dallas	10,468	10,468	10,468	10,468	10,468	10,468
Denton	2,973	2,973	2,973	2,973	2,973	2,973
Ellis	2,725	2,725	2,725	2,725	2,725	2,725
Fannin	11,186	11,186	11,186	11,186	11,186	11,186
Freestone	565	565	565	565	565	565
Grayson	4,450	4,450	4,450	4,450	4,450	4,450
Henderson	743	743	743	743	743	743
Jack	84	84	84	84	84	84
Kaufman	353	353	353	353	353	353
Navarro	447	447	447	447	447	447
Parker	1,136	1,136	1,136	1,136	1,136	1,136
Rockwall	201	201	201	201	201	201
Tarrant	4,964	4,964	4,964	4,964	4,964	4,964
Wise	1,440	1,440	1,440	1,440	1,440	1,440
REGION C TOTAL	***45,584***	***45,584***	***45,584***	***45,584***	***45,584***	***45,584***

2.3.3 Livestock Water Demand

Livestock water demand consists of water used in the production of various types of livestock, including cattle (beef and dairy), hogs, poultry, horses, sheep, and goats. Livestock use in Region C is projected to remain fairly constant.

TWDB provided the draft livestock projections on January 20, 2023. TWDB draft livestock demands were based on an average of TWDB's 2015-2019 livestock water use estimates. Any revisions requested by the Region C Regional Water Planning Group are summarized in **Appendix C**.

Table 2.4 summarizes the finalized, projected demands for the livestock water user groups by county.

TABLE 2.4 PROJECTED DEMAND FOR LIVESTOCK WUGS (ACRE-FEET PER YEAR)

COUNTY	2030	2040	2050	2060	2070	2080
Collin	801	801	801	801	801	801
Cooke	1,508	1,508	1,508	1,508	1,508	1,508
Dallas	248	248	248	248	248	248
Denton	840	840	840	840	840	840
Ellis	923	923	923	923	923	923
Fannin	1,375	1,375	1,375	1,375	1,375	1,375
Freestone	1,430	1,430	1,430	1,430	1,430	1,430
Grayson	1,106	1,106	1,106	1,106	1,106	1,106
Henderson	694	694	694	694	694	694
Jack	685	685	685	685	685	685
Kaufman	1,413	1,413	1,413	1,413	1,413	1,413
Navarro	1,512	1,512	1,512	1,512	1,512	1,512
Parker	1,503	1,503	1,503	1,503	1,503	1,503
Rockwall	106	106	106	106	106	106
Tarrant	341	341	341	341	341	341
Wise	1,415	1,415	1,415	1,415	1,415	1,415
REGION C TOTAL	***15,900***	***15,900***	***15,900***	***15,900***	***15,900***	***15,900***

2.3.4 Manufacturing Water Demand

Manufacturing water demand consists of the water necessary for large facilities including those that process chemicals, oil and gas, food, paper, and other materials. Demands take into consideration economic projections for the manufacturing industry as well as incorporated efficiency improvements from new technology. Growth in manufacturing water demand was generally predicted to be located in the same counties in which the facilities currently exist. Manufacturing demands in Region C include larger manufacturing facilities, food processing operations, defense industry operations, and others. TWDB provided the draft manufacturing projections on January 20, 2022. TWDB draft manufacturing demands were based on 2015-2019 data from TWDB's Water Use Survey.

For the current round of regional water planning, the TWDB adopted a new policy for projecting water demands for manufacturing WUGs. The baseline was determined by the maximum water use volume and estimated unaccounted water. Since the first projected decade (2030) is more than a decade out from the baseline water use data, the historical water use rate of change from 2010-2019 was used to adjust the baseline value to 2030. For the planning decades after 2030, an annual rate of change was applied based on the 2010-2019 U.S. Census Bureau's County Business Patterns (CBP). **Table 2.5** summarizes the final projected demands for Region C manufacturing by county.

TABLE 2.5 PROJECTED DEMAND FOR MANUFACTURING WUGS (ACRE-FEET PER YEAR)

COUNTY	2030	2040	2050	2060	2070	2080
Collin	8,623	8,942	9,273	9,616	9,972	10,341
Cooke	139	144	149	155	161	167
Dallas	21,497	22,292	23,117	23,972	24,859	25,779
Denton	605	627	650	674	699	725
Ellis	5,660	5,869	6,086	6,311	6,545	6,787
Fannin	5	5	5	5	5	5
Freestone	55	57	59	61	63	65
Grayson	11,148	19,092	19,197	19,306	19,419	19,536
Henderson	1,269	1,316	1,365	1,416	1,468	1,522
Jack	0	0	0	0	0	0
Kaufman	1,177	1,221	1,266	1,313	1,362	1,412
Navarro	1,634	1,694	1,757	1,822	1,889	1,959
Parker	85	88	91	94	97	101
Rockwall	445	461	478	496	514	533
Tarrant	12,339	12,796	13,269	13,760	14,269	14,797
Wise	254	263	273	283	293	304
REGION C TOTAL	***64,935***	***74,867***	***77,035***	***79,284***	***81,615***	***84,033***

2.3.5 Mining Water Demand

Mining water demand consists of water used in the exploration, development and extraction of oil, gas, coal, aggregates, and other materials.

TWDB provided the draft mining projections on August 23, 2022. TWDB draft mining demands were based on a study by the University of Texas' Bureau of Economic Geology (BEG) [(5)].

Any revisions requested by the Region C Regional Water Planning Group are summarized in **Appendix C**. **Table 2.6** summarizes the final projected demands for the mining water use in Region C by county.

TABLE 2.6 PROJECTED DEMAND FOR MINING WUGS (ACRE-FEET PER YEAR)

COUNTY	VALUES IN ACRE FEET PER YEAR					
	2030	2040	2050	2060	2070	2080
Collin	0	0	0	0	0	0
Cooke	12	12	12	13	13	13
Dallas	32	32	32	32	32	32
Denton	259	75	87	99	111	120
Ellis	0	0	0	0	0	0
Fannin	1,747	2,070	2,561	3,376	4,258	5,130
Freestone	200	200	200	200	200	200
Grayson	295	295	295	295	295	295
Henderson	15	16	17	19	22	26
Jack	35	35	35	35	35	35
Kaufman	1,453	1,736	2,101	2,679	3,357	4,134
Navarro	1,748	1,915	2,125	2,352	2,723	3,293
Parker	1,062	1,126	1,385	1,712	2,060	2,411
Rockwall	0	0	0	0	0	0
Tarrant	525	106	115	121	129	136
Wise	3,084	3,074	3,650	4,246	5,193	6,663
REGION C TOTAL	***10,467***	***10,692***	***12,615***	***15,179***	***18,428***	***22,488***

2.3.7 Steam Electric Water Demand

Steam Electric Power Plants

- Calpine Plant (Freestone)
- Garland Power and Light Spencer Plant
- Forney Energy Center
- Exelon Mountain Creek Station
- Panda Power Company
- Luminant Trinidad Plant
- Ennis Power Plant
- Midlothian Energy LLC
- Handley Power Plant
- Others

Steam Electric water demand consists of water used for the purpose of generating power. A generation facility usually diverts surface water, uses it for cooling purposes, and then returns a large portion to a body of water. Because the returned water is heated by the cooling process, there is some additional evaporation (called forced evaporation). The water use for the facility is the volume consumed in the cooling process, including water that is not returned and forced evaporation. Most future water demand growth is expected to take place in the same counties in which current facilities exist. In Freestone and Tarrant Counties, there are retired facilities that still retain their water right for power generation. Demand projections for these counties assume that some of these water rights may be used for new electrical generation facilities in the future. TWDB provided the draft steam electric projections on January 20, 2022. TWDB draft steam electric power generation demands were based on 2015-2019 historical use data. **Table 2.7**summarizes the final projected demands for the steam electric power water use in Region C by county.

TABLE 2.7 PROJECTED DEMAND FOR STEAM ELECTRIC POWER WUGS (ACRE-FEET PER YEAR)

COUNTY	VALEUS IN ACRE FEET PER YEAR					
	2030	2040	2050	2060	2070	2080
Collin	40	40	40	40	40	40
Cooke	6	6	6	6	6	6
Dallas	2,412	2,412	2,412	2,412	2,412	2,412
Denton	1,175	1,175	1,175	1,175	1,175	1,175
Ellis	1,854	1,854	1,854	1,854	1,854	1,854
Fannin	0	0	0	0	0	0
Freestone	4,831	14,269	14,269	14,269	14,269	14,269
Grayson	4,573	4,573	4,573	4,573	4,573	4,573
Henderson	132	2,192	2,192	2,192	2,192	2,192
Jack	3,772	3,772	3,772	3,772	3,772	3,772
Kaufman	9,793	9,793	9,793	9,793	9,793	9,793
Navarro	0	0	0	0	0	0
Parker	0	0	0	0	0	0
Rockwall	0	0	0	0	0	0
Tarrant	1,157	4,249	4,249	4,249	4,249	4,249
Wise	2,894	2,894	2,894	2,894	2,894	2,894
REGION C TOTAL	***32,639***	***47,229***	***47,229***	***47,229***	***47,229***	***47,229***

2.3.8 Water User Group Projections

Figure 2.5 summarizes the adopted projections for total dry-year water use by category in Region C. As can be seen in the figure, Region C's total water demand is heavily municipal (over 90 percent). **Table 2.8** presents the projected total dry-year water demand for the Region C counties, as adopted by TWDB. **Table 2.9** and **Table 2.10** show the projected dry-year water demand for the region by type of use. **Table 2.10** summarizes the projected dry-year water demand for each Region C county by type of use.

For more detail, the municipal water demand projections are listed by water user group by county and basin in **Attachment 3** at the end of this chapter.

Attachment 4 lists the total projected municipal water demand for those water user groups that are split among multiple basins, counties, and regions.

FIGURE 2.5 ADOPTED PROJECTIOSN FOR TOTAL DRY-YEAR WATER USE BY CATEGORY IN REGION C

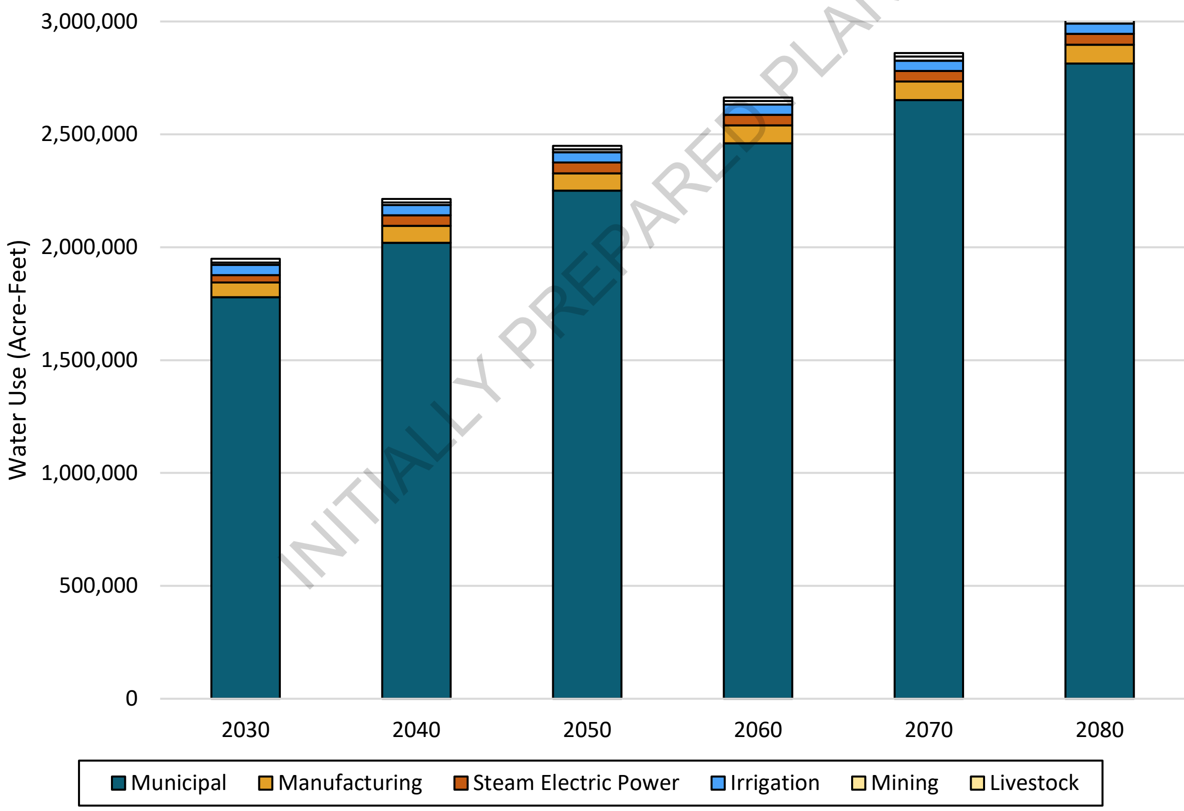


TABLE 2.8 ADOPTED TOTAL DRY-YEAR WATER DEMAND PROJECTIONS FOR REGION C BY COUNTY

COUNTY	PROJECTED DRY YEAR WATER DEMAND (ACRE FFET PER YEAR)					
	2030	2040	2050	2060	2070	2080
Collin	315,084	376,604	445,569	487,945	513,708	532,582
Cooke	9,144	9,345	9,464	9,643	9,935	10,218
Dallas	588,041	617,407	645,928	669,521	692,645	712,879
Denton	236,318	283,138	329,838	366,045	405,842	441,009
Ellis	57,400	67,132	78,443	88,594	99,681	110,919
Fannin	19,627	20,619	22,364	24,540	27,177	29,580
Freestone	9,928	19,291	19,205	19,108	19,005	18,898
Grayson	54,245	67,933	73,732	78,945	85,660	90,355
Henderson	12,965	15,951	17,245	18,385	19,713	20,664
Jack	5,852	5,813	5,805	5,820	5,865	5,872
Kaufman	43,359	49,805	60,450	73,713	88,988	100,484
Navarro	15,156	16,093	17,046	17,985	19,187	20,628
Parker	33,291	41,987	54,233	68,619	85,846	101,206
Rockwall	28,848	38,732	50,519	60,940	67,289	71,482
Tarrant	496,189	556,887	584,574	630,705	665,633	698,257
Wise	22,940	27,319	34,750	43,114	54,362	63,752
REGION C TOTAL	***1,948,387***	***2,214,056***	***2,449,165***	***2,663,622***	***2,860,536***	***3,028,785***

TABLE 2.9 ADOPTED DRY-YEAR WATER DEMAND PROJECTIONS FOR REGION C BY TYPE OF USE

USE	PROJECTED DRY YEAR WATER DEMAND (ACRE FEET PER YEAR)					
	2030	2040	2050	2060	2070	2080
Municipal	1,778,862	2,019,784	2,250,802	2,460,446	2,651,780	2,813,551
Manufacturing	64,935	74,867	77,035	79,284	81,615	84,033
Steam Electric	32,639	47,229	47,229	47,229	47,229	47,229
Irrigation	45,584	45,584	45,584	45,584	45,584	45,584
Mining	10,467	10,692	12,615	15,179	18,428	22,488
Livestock	15,900	15,900	15,900	15,900	15,900	15,900
REGION C TOTAL	***1,948,387***	***2,214,056***	***2,449,165***	***2,663,622***	***2,860,536***	***3,028,785***

TABLE 2.10 ADOPTED DRY-YEAR WATER DEMAND PROJECTIONS BY COUNTY AND TYPE OF USE

TYPE OF USE	PROJECTED DRY YEAR WATER DEMAND (ACRE FEET PER YEAR)					
	2030	2040	2050	2060	2070	2080
Collin County						
Municipal	302,809	364,010	432,644	474,677	500,084	518,589
Manufacturing	8,623	8,942	9,273	9,616	9,972	10,341
Steam Electric Power	40	40	40	40	40	40
Irrigation	2,811	2,811	2,811	2,811	2,811	2,811
Mining	0	0	0	0	0	0
Livestock	801	801	801	801	801	801
COLLIN TOTAL	***315,084***	***376,604***	***445,569***	***487,945***	***513,708***	***532,582***
Cooke County						
Municipal	6,441	6,637	6,751	6,923	7,209	7,486
Manufacturing	139	144	149	155	161	167
Steam Electric Power	6	6	6	6	6	6
Irrigation	1,038	1,038	1,038	1,038	1,038	1,038
Mining	12	12	12	13	13	13
Livestock	1,508	1,508	1,508	1,508	1,508	1,508
COOKE TOTAL	***9,144***	***9,345***	***9,464***	***9,643***	***9,935***	***10,218***
Dallas County						
Municipal	553,384	581,955	609,651	632,389	654,626	673,940
Manufacturing	21,497	22,292	23,117	23,972	24,859	25,779
Steam Electric Power	2,412	2,412	2,412	2,412	2,412	2,412
Irrigation	10,468	10,468	10,468	10,468	10,468	10,468
Mining	32	32	32	32	32	32
Livestock	248	248	248	248	248	248
DALLAS TOTAL	***588,041***	***617,407***	***645,928***	***669,521***	***692,645***	***712,879***
Denton County						
Municipal	230,466	277,448	324,113	360,284	400,044	435,176
Manufacturing	605	627	650	674	699	725
Steam Electric Power	1,175	1,175	1,175	1,175	1,175	1,175
Irrigation	2,973	2,973	2,973	2,973	2,973	2,973
Mining	259	75	87	99	111	120
Livestock	840	840	840	840	840	840
DENTON TOTAL	***236,318***	***283,138***	***329,838***	***366,045***	***405,842***	***441,009***
Ellis County						
Municipal	46,238	55,761	66,855	76,781	87,634	98,630
Manufacturing	5,660	5,869	6,086	6,311	6,545	6,787
Steam Electric Power	1,854	1,854	1,854	1,854	1,854	1,854
Irrigation	2,725	2,725	2,725	2,725	2,725	2,725
Mining	0	0	0	0	0	0
Livestock	923	923	923	923	923	923
ELLIS TOTAL	***57,400***	***67,132***	***78,443***	***88,594***	***99,681***	***110,919***

TYPE OF USE	PROJECTED DRY YEAR WATER DEMAND (ACRE FEET PER YEAR)					
	2030	2040	2050	2060	2070	2080
Fannin County						
Municipal	5,314	5,983	7,237	8,598	10,353	11,884
Manufacturing	5	5	5	5	5	5
Steam Electric Power	0	0	0	0	0	0
Irrigation	11,186	11,186	11,186	11,186	11,186	11,186
Mining	1,747	2,070	2,561	3,376	4,258	5,130
Livestock	1,375	1,375	1,375	1,375	1,375	1,375
FANNIN TOTAL	***19,627***	***20,619***	***22,364***	***24,540***	***27,177***	***29,580***
Freestone County						
Municipal	2,847	2,770	2,682	2,583	2,478	2,369
Manufacturing	55	57	59	61	63	65
Steam Electric Power	4,831	14,269	14,269	14,269	14,269	14,269
Irrigation	565	565	565	565	565	565
Mining	200	200	200	200	200	200
Livestock	1,430	1,430	1,430	1,430	1,430	1,430
FREESTONE TOTAL	***9,928***	***19,291***	***19,205***	***19,108***	***19,005***	***18,898***
Grayson County						
Municipal	32,673	38,417	44,111	49,215	55,817	60,395
Manufacturing	11,148	19,092	19,197	19,306	19,419	19,536
Steam Electric Power	4,573	4,573	4,573	4,573	4,573	4,573
Irrigation	4,450	4,450	4,450	4,450	4,450	4,450
Mining	295	295	295	295	295	295
Livestock	1,106	1,106	1,106	1,106	1,106	1,106
GRAYSON TOTAL	***54,245***	***67,933***	***73,732***	***78,945***	***85,660***	***90,355***
Henderson County (Region C Portion Only)						
Municipal	10,112	10,990	12,234	13,321	14,594	15,487
Manufacturing	1,269	1,316	1,365	1,416	1,468	1,522
Steam Electric Power	132	2,192	2,192	2,192	2,192	2,192
Irrigation	743	743	743	743	743	743
Mining	15	16	17	19	22	26
Livestock	694	694	694	694	694	694
HENDERSON TOTAL	***12,965***	***15,951***	***17,245***	***18,385***	***19,713***	***20,664***
Jack County						
Municipal	1,276	1,237	1,229	1,244	1,289	1,296
Manufacturing	0	0	0	0	0	0
Steam Electric Power	3,772	3,772	3,772	3,772	3,772	3,772
Irrigation	84	84	84	84	84	84
Mining	35	35	35	35	35	35
Livestock	685	685	685	685	685	685
JACK TOTAL	***5,852***	***5,813***	***5,805***	***5,820***	***5,865***	***5,872***
Kaufman County						
Municipal	29,170	35,289	45,524	58,162	72,710	83,379
Manufacturing	1,177	1,221	1,266	1,313	1,362	1,412
Steam Electric Power	9,793	9,793	9,793	9,793	9,793	9,793
Irrigation	353	353	353	353	353	353
Mining	1,453	1,736	2,101	2,679	3,357	4,134
Livestock	1,413	1,413	1,413	1,413	1,413	1,413

TYPE OF USE	PROJECTED DRY YEAR WATER DEMAND (ACRE FEET PER YEAR)					
	2030	2040	2050	2060	2070	2080
KAUFMAN TOTAL	***43,359***	***49,805***	***60,450***	***73,713***	***88,988***	***100,484***
Navarro County						
Municipal	9,815	10,525	11,205	11,852	12,616	13,417
Manufacturing	1,634	1,694	1,757	1,822	1,889	1,959
Steam Electric Power	0	0	0	0	0	0
Irrigation	447	447	447	447	447	447
Mining	1,748	1,915	2,125	2,352	2,723	3,293
Livestock	1,512	1,512	1,512	1,512	1,512	1,512
NAVARRO TOTAL	***15,156***	***16,093***	***17,046***	***17,985***	***19,187***	***20,628***
Parker County						
Municipal	29,505	38,134	50,118	64,174	81,050	96,055
Manufacturing	85	88	91	94	97	101
Steam Electric Power	0	0	0	0	0	0
Irrigation	1,136	1,136	1,136	1,136	1,136	1,136
Mining	1,062	1,126	1,385	1,712	2,060	2,411
Livestock	1,503	1,503	1,503	1,503	1,503	1,503
PARKER TOTAL	***33,291***	***41,987***	***54,233***	***68,619***	***85,846***	***101,206***
Rockwall County						
Municipal	28,096	37,964	49,734	60,137	66,468	70,642
Manufacturing	445	461	478	496	514	533
Steam Electric Power	0	0	0	0	0	0
Irrigation	201	201	201	201	201	201
Mining	0	0	0	0	0	0
Livestock	106	106	106	106	106	106
ROCKWALL TOTAL	***28,848***	***38,732***	***50,519***	***60,940***	***67,289***	***71,482***
Tarrant County						
Municipal	476,863	534,431	561,636	607,270	641,681	673,770
Manufacturing	12,339	12,796	13,269	13,760	14,269	14,797
Steam Electric Power	1,157	4,249	4,249	4,249	4,249	4,249
Irrigation	4,964	4,964	4,964	4,964	4,964	4,964
Mining	525	106	115	121	129	136
Livestock	341	341	341	341	341	341
TARRANT TOATAL	***496,189***	***556,887***	***584,574***	***630,705***	***665,633***	***698,257***
Wise County						
Municipal	13,853	18,233	25,078	32,836	43,127	51,036
Manufacturing	254	263	273	283	293	304
Steam Electric Power	2,894	2,894	2,894	2,894	2,894	2,894
Irrigation	1,440	1,440	1,440	1,440	1,440	1,440
Mining	3,084	3,074	3,650	4,246	5,193	6,663
Livestock	1,415	1,415	1,415	1,415	1,415	1,415
WISE TOTAL	***22,940***	***27,319***	***34,750***	***43,114***	***54,362***	***63,752***

2.3.9 Water Provider Projections

Table 2.11 shows the projected dry-year demand in Region C by major, regional and wholesale water provider. **Attachment 5** shows the demand for each major water provider by demand category.

TABLE 2.11 PROJECTED DRY-YEAR WATER DEMAND (ACRE-FEET PER YEAR) BY WHOLESALE WATER PROVIDER

WHOLESALE WATER PROVIDER	2030	2040	2050	2060	2070	2080
Major Water Providers						
North Texas Municipal Water District	520,120	605,726	697,080	772,158	818,200	847,173
Tarrant Regional Water District	574,095	664,127	729,484	811,496	886,139	957,604
Dallas Water Utilities	542,614	586,248	629,262	660,043	693,776	724,300
Upper Trinity Regional Water District	78,087	109,284	144,867	161,617	182,100	199,943
Trinity River Authority	206,809	225,816	235,932	246,411	244,849	243,288
Fort Worth	336,410	385,315	404,880	435,657	470,446	502,965
Regional Wholesale Water Providers						
Corsicana	12,883	13,779	14,666	15,522	16,498	17,526
Greater Texoma Utility Authority	63,993	84,112	112,890	117,126	121,276	123,579
Other Region C Wholesale Water Providers						
Arlington	80,244	89,221	94,973	99,666	105,978	109,365
Athens Municipal Water Authority	5,270	5,803	6,797	7,650	8,680	9,311
Dallas County Park Cities MUD	15,017	14,987	14,987	14,987	14,987	14,987
Denison	13,480	16,751	19,693	22,661	26,522	28,690
Denton	35,124	42,271	51,886	61,299	72,966	84,374
Ennis	6,868	7,159	7,487	7,798	8,144	8,525
Forney	19,423	21,532	25,307	29,884	34,878	37,981
Gainesville	3,690	3,766	3,810	3,946	4,188	4,427
Garland	51,674	54,825	56,840	58,337	58,708	58,800
Grand Prairie	36,679	41,393	46,254	47,524	49,261	49,281
Mansfield	4,592	7,128	9,939	12,916	16,247	20,016
Midlothian	18,051	19,963	21,653	23,239	24,899	26,204
Mustang SUD	20,351	27,219	35,008	42,733	48,931	54,273
North Richland Hills	16,664	17,557	17,802	17,996	18,278	18,278
Princeton	6,401	12,286	16,433	18,378	20,081	20,323
Rockett SUD	6,442	7,340	8,449	9,464	11,013	12,298
Rockwall	15,879	19,442	25,707	32,027	33,712	34,567
Seagoville	2,547	2,789	2,955	3,079	3,217	3,367
Sherman	267	461	642	816	1,005	1,213
Terrell	7,233	8,649	11,142	13,910	17,290	20,256
Walnut Creek SUD	55	87	158	267	436	578
Waxahachie	13,304	15,916	18,733	21,654	24,913	28,487
Weatherford	0	1,000	1,500	2,000	2,500	4,000
Wise County WSD	2,940	3,476	4,671	5,747	7,262	8,411
Wholesale Water Providers based in Other Regions [a]						
Sabine River Authority	234,782	234,699	234,616	234,533	234,451	234,368
Upper Neches River MWA	0	95,086	93,967	92,874	91,778	90,673
Sulphur River Municipal Water District	11,292	11,023	10,755	10,486	10,217	9,948
Red River Authority of Texas	254	304	347	390	436	486

[a] *Only the demand from Region C customers*

2.4 Chapter 2 List of References

(1) Texas Water Development Board: Historical and Board-Adopted Projected Population | Region C, Austin, [Online], Available URL: http://www.twdb.texas.gov/waterplanning/data/projections/2027/municipal.asp, accessed July 1, 2024.

(2) Texas Water Development Board: 2020 Texas Water Use Summary Estimates for Region C, Austin, [Online], Available URL: https://www3.twdb.texas.gov/apps/reports/WU_REP/SumFinal_CountyReportWithReuse, downloaded July 1, 2024.

(3) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2021 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, November 2020.

(4) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2016 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, December 2015.

(5) Bureau of Economic Geology in conjunction with Texas Water Development Board: *Water Use by the Mining Industry in Texas*, Austin, [Online}, Available URL: https://www.twdb.texas.gov/waterplanning/data/projections/MiningStudy/doc/Final%20TWDB%20Mining%20Water%20Use%20Report.PDF, August 2022.

Attachment One

Region C Population Projections by WUG, by County

ATTACHMENT 1 – REGION C POPULATION PROJECTIONS BY WUG, BY COUNTY

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	COLLIN	ALLEN	125,000	140,000	140,000	140,000	140,000	140,000
	COLLIN	ANNA	42,924	69,571	88,103	104,876	121,250	130,000
Yes	COLLIN	BEAR CREEK SUD	25,815	45,451	51,976	56,600	62,043	62,043
	COLLIN	BLUE RIDGE	1,653	2,162	2,740	3,320	3,959	4,664
Yes	COLLIN	CADDO BASIN SUD	2,289	11,747	18,804	21,710	24,225	25,047
Yes	COLLIN	CELINA	65,403	114,328	190,491	198,744	245,262	296,640
	COLLIN	COPEVILLE WSC	7,703	12,179	17,902	19,644	21,942	24,238
	COLLIN	COUNTY-OTHER	3,794	5,035	6,276	7,518	8,759	10,000
	COLLIN	CULLEOKA WSC	12,542	14,383	17,346	19,661	22,127	24,442
Yes	COLLIN	DALLAS	53,145	59,190	65,922	73,420	81,771	91,072
Yes	COLLIN	DESERT WSC	365	401	440	480	524	572
Yes	COLLIN	EAST FORK SUD	17,422	20,787	24,665	28,063	30,999	34,243
	COLLIN	FAIRVIEW	13,152	16,629	20,418	20,418	20,418	20,418
	COLLIN	FARMERSVILLE	5,700	14,074	27,886	31,725	35,920	39,678
Yes	COLLIN	FRISCO	183,058	221,642	222,104	222,104	222,104	222,104
Yes	COLLIN	FROGNOT WSC	2,077	2,593	3,181	3,772	4,422	5,138
Yes	COLLIN	HICKORY CREEK SUD	99	128	161	194	230	271
Yes	COLLIN	JOSEPHINE	5,389	11,989	17,424	19,491	21,800	21,800
	COLLIN	LUCAS	11,475	13,122	13,442	13,442	13,442	13,442
	COLLIN	MCKINNEY	227,593	269,464	344,909	433,869	433,869	433,869
	COLLIN	MELISSA	43,840	65,280	87,678	108,878	119,072	119,072
	COLLIN	MILLIGAN WSC	3,352	3,525	4,137	4,824	5,593	6,231
	COLLIN	MURPHY	21,373	21,822	24,104	26,718	29,564	31,653
Yes	COLLIN	MUSTANG SUD	3,517	5,124	6,520	7,970	9,133	10,213

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
Yes	COLLIN	NEVADA SUD	5,579	7,080	10,527	22,206	39,638	53,270
	COLLIN	NORTH COLLIN SUD	7,544	8,523	10,409	12,496	14,565	16,977
	COLLIN	NORTH FARMERSVILLE WSC	465	550	715	834	942	992
	COLLIN	PARKER	6,878	8,782	12,121	14,089	14,089	14,089
Yes	COLLIN	PLANO	277,913	279,472	307,762	316,996	316,996	316,996
	COLLIN	PRINCETON	48,722	103,793	140,731	157,121	171,027	171,027
Yes	COLLIN	PROSPER	39,104	45,350	54,280	56,527	59,802	59,802
Yes	COLLIN	RICHARDSON	63,141	66,547	72,087	74,250	74,250	74,250
Yes	COLLIN	ROYSE CITY	8,394	15,496	22,376	24,692	27,747	27,747
Yes	COLLIN	SACHSE	9,745	10,386	11,796	12,331	12,692	12,692
	COLLIN	SEIS LAGOS UD	2,348	2,270	2,383	2,479	2,535	2,541
Yes	COLLIN	SOUTH GRAYSON SUD	1,269	1,671	2,128	2,586	3,092	3,649
	COLLIN	VERONA SUD	3,345	4,217	5,210	6,206	7,303	8,512
Yes	COLLIN	WEST LEONARD WSC	337	422	518	614	720	837
Yes	COLLIN	WESTMINSTER SUD	2,138	2,674	3,283	3,894	4,567	5,309
	COLLIN	WYLIE	47,379	46,874	49,115	50,589	50,589	50,589
	COLLIN	WYLIE NORTHEAST SUD	15,891	19,669	24,240	25,954	26,648	26,648
	COLLIN TOTAL		**1,418,872**	**1,764,402**	**2,126,310**	**2,351,305**	**2,505,630**	**2,612,777**
Yes	COOKE	BOLIVAR WSC	1,869	2,045	2,112	2,154	2,196	2,244
	COOKE	CALLISBURG WSC	1,614	1,686	1,717	1,728	1,740	1,752
	COOKE	COUNTY-OTHER	5,976	6,178	6,367	6,557	6,800	7,000
	COOKE	GAINESVILLE	19,705	20,309	20,590	21,533	23,237	24,916
	COOKE	LAKE KIOWA SUD	2,346	2,477	2,532	2,555	2,581	2,609

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	COOKE	LINDSAY	1,718	1,758	1,777	1,777	1,776	1,776
Yes	COOKE	MOUNTAIN SPRINGS WSC	1,933	1,942	1,952	1,940	1,927	1,913
	COOKE	MUENSTER	2,139	2,139	2,139	2,139	2,139	2,139
Yes	COOKE	TWO WAY SUD	43	43	50	51	54	55
Yes	COOKE	WOODBINE WSC	6,857	7,116	7,230	7,260	7,292	7,328
	COOKE TOTAL		**44,200**	**45,693**	**46,466**	**47,694**	**49,742**	**51,732**
	DALLAS	ADDISON	20,465	23,069	24,456	25,276	26,179	27,173
Yes	DALLAS	AMC CREEKSIDE	544	673	742	782	828	879
	DALLAS	BALCH SPRINGS	28,412	30,394	33,234	36,214	40,018	42,000
Yes	DALLAS	CARROLLTON	55,007	58,186	61,664	65,328	69,216	69,480
	DALLAS	CEDAR HILL	53,645	58,553	63,911	69,070	74,646	80,672
	DALLAS	COCKRELL HILL	3,610	3,380	3,255	3,176	3,089	2,993
Yes	DALLAS	COMBINE WSC	769	823	853	870	888	908
Yes	DALLAS	COPPELL	42,352	42,256	42,339	42,405	42,500	42,500
	DALLAS	COUNTY-OTHER	1,000	1,400	1,800	2,200	2,600	3,000
Yes	DALLAS	DALLAS	1,254,601	1,302,256	1,351,721	1,403,065	1,456,359	1,511,677
	DALLAS	DESOTO	59,901	63,934	66,069	67,304	68,664	70,162
	DALLAS	DUNCANVILLE	43,672	45,939	47,157	47,307	47,307	47,307
Yes	DALLAS	EAST FORK SUD	4,577	5,461	6,479	7,372	8,143	8,995
	DALLAS	FARMERS BRANCH	36,454	39,795	41,570	42,609	43,754	45,014
	DALLAS	GARLAND	259,490	280,255	292,596	301,612	303,416	303,416
Yes	DALLAS	GLENN HEIGHTS	13,834	15,160	15,864	16,278	16,732	17,233
Yes	DALLAS	GRAND PRAIRIE	146,304	166,714	188,910	194,371	201,657	201,657
	DALLAS	HIGHLAND PARK	9,311	9,311	9,311	9,311	9,311	9,311

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	DALLAS	HUTCHINS	8,346	9,300	9,808	10,107	10,436	10,799
	DALLAS	IRVING	285,073	302,931	303,163	303,400	303,641	303,641
	DALLAS	LANCASTER	44,667	47,419	48,875	49,713	50,637	51,653
	DALLAS	LANCASTER MUD 1	2,286	2,844	3,142	3,321	3,517	3,734
Yes	DALLAS	LEWISVILLE	1,046	1,053	1,126	1,141	1,163	1,163
	DALLAS	MESQUITE	166,080	173,044	192,008	216,237	243,324	266,415
Yes	DALLAS	OVILLA	464	504	547	594	645	701
Yes	DALLAS	RICHARDSON	54,374	56,289	58,980	60,750	60,750	60,750
Yes	DALLAS	ROCKETT SUD	755	836	912	938	966	976
Yes	DALLAS	ROWLETT	65,945	69,670	80,411	84,929	88,280	88,280
Yes	DALLAS	SACHSE	19,762	21,212	24,032	25,085	25,770	25,770
	DALLAS	SEAGOVILLE	20,875	22,892	23,964	24,593	25,285	26,047
	DALLAS	SUNNYVALE	9,064	11,417	13,548	14,129	14,340	14,340
	DALLAS	UNIVERSITY PARK	25,656	25,656	25,656	25,656	25,656	25,656
	DALLAS	WILMER	5,902	6,672	7,081	7,324	7,591	7,885
	DALLAS TOTAL		**2,744,243**	**2,899,298**	**3,045,184**	**3,162,467**	**3,277,308**	**3,372,187**
Yes	DENTON	AMC CREEKSIDE	2,140	2,686	3,261	3,846	4,490	5,199
	DENTON	ARGYLE WSC	13,736	17,803	23,593	29,159	33,250	36,250
	DENTON	AUBREY	8,276	14,448	24,810	33,745	40,586	40,586
	DENTON	BLACK ROCK WSC	1,560	1,959	2,377	2,804	3,274	3,791
Yes	DENTON	BOLIVAR WSC	9,399	11,786	14,299	16,855	20,524	25,205
Yes	DENTON	CARROLLTON	86,261	91,375	96,677	102,308	108,261	108,673
Yes	DENTON	CELINA	1,265	2,170	3,739	3,970	5,005	6,054
Yes	DENTON	COPPELL	1,425	1,376	1,418	1,452	1,500	1,500

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	DENTON	CORINTH	29,174	31,493	39,215	40,348	42,000	42,000
	DENTON	COUNTY-OTHER	51,205	80,964	110,723	140,482	185,121	214,880
	DENTON	CROSS TIMBERS WSC	9,808	12,310	14,944	17,622	20,802	25,403
Yes	DENTON	DALLAS	34,543	42,657	53,054	64,065	76,324	89,553
	DENTON	DENTON	179,044	229,192	283,800	337,235	403,484	468,260
	DENTON	DENTON COUNTY FWSD 10	6,246	6,246	6,246	6,246	6,246	6,246
	DENTON	DENTON COUNTY FWSD 11-C	5,406	8,467	11,690	14,965	18,573	22,547
	DENTON	DENTON COUNTY FWSD 1-A	23,532	31,738	33,928	34,388	35,057	35,057
	DENTON	DENTON COUNTY FWSD 7	12,779	13,500	13,500	13,500	13,500	13,500
Yes	DENTON	FLOWER MOUND	94,783	118,816	144,099	144,099	144,099	144,099
Yes	DENTON	FORT WORTH	26,302	39,396	48,326	60,243	73,369	87,826
Yes	DENTON	FRISCO	136,967	166,055	167,552	167,552	167,552	167,552
	DENTON	HACKBERRY	5,999	8,480	11,092	13,748	16,673	19,894
	DENTON	HIGHLAND VILLAGE	16,656	17,822	18,020	18,020	18,020	18,020
	DENTON	JUSTIN	6,949	9,741	13,654	19,140	26,830	37,608
	DENTON	KRUM	7,146	9,532	12,715	16,961	22,625	30,180
	DENTON	LAKE CITIES MUNICIPAL UTILITY AUTHORITY	17,721	21,502	22,513	22,753	22,897	22,897
Yes	DENTON	LEWISVILLE	114,210	114,924	122,855	124,518	126,942	126,942
	DENTON	LITTLE ELM	44,322	42,372	44,739	46,710	48,000	48,000
Yes	DENTON	MOUNTAIN SPRINGS WSC	68	86	103	122	142	164
Yes	DENTON	MUSTANG SUD	105,046	149,073	199,398	249,230	289,198	323,398

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	DENTON	NORTHLAKE	26,264	29,172	36,205	42,530	48,940	53,700
	DENTON	PALOMA CREEK NORTH	5,853	5,853	5,853	5,853	5,853	5,853
	DENTON	PALOMA CREEK SOUTH	9,088	9,088	9,088	9,088	9,088	9,088
Yes	DENTON	PILOT POINT	6,229	8,047	13,854	19,888	21,454	21,454
Yes	DENTON	PLANO	8,311	8,643	9,518	9,804	9,804	9,804
	DENTON	PONDER	4,798	6,403	8,093	9,811	11,703	13,786
Yes	DENTON	PROSPER	16,171	19,746	23,468	24,348	25,630	25,630
	DENTON	PROVIDENCE VILLAGE WCID	7,235	7,235	7,235	7,235	7,235	7,235
	DENTON	ROANOKE	13,999	13,658	13,952	14,185	14,524	14,524
	DENTON	SANGER	11,153	14,002	17,000	22,119	27,933	35,269
Yes	DENTON	SOUTHLAKE	699	648	582	513	440	367
	DENTON	TERRA SOUTHWEST	3,143	3,996	4,895	5,808	6,814	7,922
	DENTON	THE COLONY	51,496	60,502	67,600	67,600	67,600	67,600
Yes	DENTON	TROPHY CLUB MUD 1	13,252	13,252	13,252	13,252	13,252	13,252
	DENTON TOTAL		**1,229,659**	**1,498,214**	**1,772,935**	**1,998,120**	**2,244,614**	**2,456,768**
	ELLIS	AVALON WATER SUPPLY & SEWER SERVICE	992	1,109	1,236	1,360	1,498	1,650
	ELLIS	BUENA VISTA-BETHEL SUD	7,152	8,701	10,384	12,081	13,948	16,004
	ELLIS	COUNTY-OTHER	6,500	6,960	7,420	7,880	8,340	8,800
	ELLIS	EAST GARRETT WSC	1,806	2,295	2,825	3,363	3,954	4,605
	ELLIS	ENNIS	20,220	21,227	22,316	23,303	24,413	25,655
	ELLIS	FERRIS	2,455	2,602	2,761	2,907	3,072	3,256

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
Yes	ELLIS	FILES VALLEY WSC	848	1,024	1,214	1,406	1,617	1,850
Yes	ELLIS	GLENN HEIGHTS	8,344	10,749	13,364	16,019	18,936	22,144
Yes	ELLIS	HILCO UNITED SERVICES	605	651	701	748	801	860
	ELLIS	ITALY	1,939	1,942	1,944	1,933	1,923	1,915
Yes	ELLIS	MANSFIELD	581	698	824	951	1,091	1,245
	ELLIS	MIDLOTHIAN	33,669	38,530	45,987	52,996	60,311	66,058
Yes	ELLIS	MOUNTAIN PEAK SUD	21,088	28,150	35,829	43,651	52,242	61,684
	ELLIS	NASH FORRESTON WSC	2,095	2,514	2,970	3,428	3,933	4,489
Yes	ELLIS	OVILLA	4,974	6,323	7,790	9,277	10,911	12,710
	ELLIS	PALMER	2,543	3,053	3,606	4,162	4,775	5,449
	ELLIS	RED OAK	12,039	15,009	18,237	21,502	25,093	29,044
Yes	ELLIS	RICE WATER SUPPLY AND SEWER SERVICE	5,565	6,678	7,888	9,106	10,446	11,922
Yes	ELLIS	ROCKETT SUD	37,615	44,938	53,859	62,009	74,775	85,142
	ELLIS	SARDIS LONE ELM WSC	20,865	25,783	31,135	32,524	32,524	32,524
Yes	ELLIS	SOUTH ELLIS COUNTY WSC	1,458	1,750	2,067	2,386	2,737	3,124
	ELLIS	WAXAHACHIE	48,394	59,800	72,197	84,724	98,504	113,667
	ELLIS TOTAL		**241,747**	**290,486**	**346,554**	**397,716**	**455,844**	**513,797**
	FANNIN	ARLEDGE RIDGE WSC	1,364	1,474	1,531	1,578	1,629	1,684
Yes	FANNIN	BOIS D ARC MUD	3,031	3,180	3,269	3,325	3,386	3,453
	FANNIN	BONHAM	12,465	15,204	21,585	28,467	37,686	45,834
	FANNIN	COUNTY-OTHER	3,800	3,838	4,069	4,333	4,760	5,000
Yes	FANNIN	DELTA COUNTY MUD	72	84	90	96	102	109

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
Yes	FANNIN	DESERT WSC	798	905	957	1,006	1,059	1,119
Yes	FANNIN	FROGNOT WSC	30	42	48	53	60	67
Yes	FANNIN	HICKORY CREEK SUD	274	252	245	232	217	202
	FANNIN	HONEY GROVE	1,782	1,828	1,828	1,828	1,828	1,828
	FANNIN	LADONIA	774	953	1,373	2,026	2,500	2,500
	FANNIN	LEONARD	2,799	3,019	3,580	4,187	5,000	6,000
Yes	FANNIN	NORTH HUNT SUD	107	112	116	117	119	122
	FANNIN	SAVOY	711	704	706	698	689	678
Yes	FANNIN	SOUTHWEST FANNIN COUNTY SUD	6,879	7,606	7,967	8,289	8,643	9,030
	FANNIN	TRENTON	798	857	889	913	940	970
Yes	FANNIN	WEST LEONARD WSC	1,914	2,301	2,478	2,661	2,862	3,082
	FANNIN	WHITE SHED WSC	2,344	2,460	2,528	2,571	2,618	2,670
Yes	FANNIN	WHITEWRIGHT	78	98	107	117	127	139
Yes	FANNIN	WOLFE CITY	49	38	30	24	19	15
	FANNIN TOTAL		**40,069**	**44,955**	**53,396**	**62,521**	**74,244**	**84,502**
	FREESTONE	BUTLER WSC	838	830	818	794	767	737
	FREESTONE	COUNTY-OTHER	3,337	3,063	2,622	2,661	2,675	2,657
	FREESTONE	FAIRFIELD	4,932	4,782	4,639	4,338	4,039	3,742
Yes	FREESTONE	FLO COMMUNITY WSC	150	150	150	150	150	150
Yes	FREESTONE	PLEASANT GROVE WSC	1,323	1,430	1,574	1,530	1,482	1,429
Yes	FREESTONE	POINT ENTERPRISE WSC	842	834	823	823	823	823
	FREESTONE	SOUTH FREESTONE COUNTY WSC	2,598	2,720	2,880	2,799	2,708	2,608

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
Yes	FREESTONE	SOUTHERN OAKS WATER SUPPLY	675	856	1,099	1,073	1,043	1,009
	FREESTONE	TEAGUE	3,437	3,142	2,738	2,646	2,545	2,435
	FREESTONE	WORTHAM	925	841	724	700	673	644
	FREESTONE TOTAL		**19,057**	**18,648**	**18,067**	**17,514**	**16,905**	**16,234**
	GRAYSON	BELLS	1,743	1,900	2,031	2,147	2,275	2,416
	GRAYSON	COLLINSVILLE	2,641	2,907	3,129	3,331	3,552	3,794
	GRAYSON	COUNTY-OTHER	11,157	10,489	11,085	11,680	12,800	13,000
	GRAYSON	DENISON	45,619	58,130	69,278	80,563	95,278	103,443
Yes	GRAYSON	DESERT WSC	701	765	818	864	915	972
	GRAYSON	DORCHESTER	1,287	1,322	1,350	1,361	1,376	1,394
	GRAYSON	GUNTER	1,940	2,258	2,523	2,782	3,064	3,371
	GRAYSON	HOWE	4,785	5,735	6,531	7,320	8,178	9,111
	GRAYSON	KENTUCKYTOWN WSC	2,863	3,139	3,368	3,574	3,801	4,050
	GRAYSON	LUELLA SUD	2,717	2,717	2,717	2,717	2,717	2,717
Yes	GRAYSON	MUSTANG SUD	2,344	3,424	4,396	5,368	6,088	6,808
	GRAYSON	NORTHWEST GRAYSON COUNTY WCID 1	2,032	2,265	2,459	2,640	2,838	3,054
	GRAYSON	OAK RIDGE SOUTH GALE WSC	2,811	2,875	2,927	2,942	2,962	2,988
Yes	GRAYSON	PILOT POINT	125	153	283	394	438	438
	GRAYSON	PINK HILL WSC	2,210	2,449	2,648	2,832	3,033	3,253
	GRAYSON	POTTSBORO	3,613	3,938	4,210	4,450	4,715	5,007
Yes	GRAYSON	RED RIVER AUTHORITY OF TEXAS	1,052	1,265	1,443	1,621	1,814	2,024

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	GRAYSON	SHERMAN	46,811	50,903	54,318	57,317	60,622	64,264
Yes	GRAYSON	SOUTH GRAYSON SUD	4,034	4,496	4,882	5,240	5,631	6,061
	GRAYSON	SOUTHMAYD	964	992	1,015	1,026	1,039	1,055
Yes	GRAYSON	SOUTHWEST FANNIN COUNTY SUD	1,534	1,673	1,788	1,891	2,003	2,127
	GRAYSON	STARR WSC	2,325	2,533	2,708	2,862	3,032	3,219
	GRAYSON	TIOGA	1,773	2,106	2,386	2,662	2,961	3,288
	GRAYSON	TOM BEAN	1,113	1,113	1,113	1,113	1,113	1,113
Yes	GRAYSON	TWO WAY SUD	6,004	6,357	7,569	8,275	9,187	9,756
	GRAYSON	VAN ALSTYNE	8,398	16,284	25,925	31,829	41,706	49,029
Yes	GRAYSON	WESTMINSTER SUD	30	36	41	46	53	58
	GRAYSON	WHITESBORO	4,847	5,280	5,642	5,960	6,311	6,699
Yes	GRAYSON	WHITEWRIGHT	2,220	2,421	2,588	2,737	2,899	3,079
Yes	GRAYSON	WOODBINE WSC	87	96	103	110	117	125
	GRAYSON TOTAL		**169,780**	**200,021**	**231,274**	**257,654**	**292,518**	**317,713**
Yes	HENDERSON	ATHENS	12,998	15,700	20,673	24,945	30,100	33,252
Yes	HENDERSON	B B S WSC	17	17	17	17	17	17
Yes	HENDERSON	BETHEL ASH WSC	3,053	3,205	3,238	3,316	3,403	3,499
Yes	HENDERSON	BRUSHY CREEK WSC	681	702	719	733	750	768
	HENDERSON	COUNTY-OTHER	5,000	6,000	7,000	8,000	9,000	10,000
	HENDERSON	CRESCENT HEIGHTS WSC	1,801	1,857	2,064	2,099	2,137	2,178
	HENDERSON	DOGWOOD ESTATES WATER	1,179	1,154	1,226	1,239	1,253	1,267
	HENDERSON	EAST CEDAR CREEK FWSD	23,746	25,120	25,323	25,882	26,501	27,183

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	HENDERSON	EUSTACE	3,105	3,399	3,333	3,441	3,562	3,696
	HENDERSON	LOG CABIN	671	671	702	712	723	735
Yes	HENDERSON	MABANK	3,474	3,826	3,737	3,863	4,004	4,161
	HENDERSON	MALAKOFF	2,416	2,562	2,689	2,727	2,766	2,809
	HENDERSON	TRINIDAD	1,134	1,152	1,191	1,213	1,236	1,261
Yes	HENDERSON	VIRGINIA HILL WSC	1,547	1,594	1,633	1,667	1,704	1,744
Yes	HENDERSON	WEST CEDAR CREEK MUD	4,847	4,501	4,969	4,973	4,973	4,968
	HENDERSON TOTAL		**65,669**	**71,460**	**78,514**	**84,827**	**92,129**	**97,538**
	JACK	COUNTY-OTHER	4,500	4,300	4,000	3,800	3,600	3,400
	JACK	JACKSBORO	3,714	3,657	3,770	3,940	4,259	4,387
	JACK TOTAL		**8,214**	**7,957**	**7,770**	**7,740**	**7,859**	**7,787**
Yes	KAUFMAN	ABLES SPRINGS SUD	5,944	6,183	7,218	8,131	9,208	9,669
	KAUFMAN	BECKER JIBA WSC	4,425	6,986	9,459	11,174	13,077	15,179
	KAUFMAN	COLLEGE MOUND SUD	12,664	14,078	19,045	29,451	40,174	50,886
Yes	KAUFMAN	COMBINE WSC	2,835	3,271	3,825	4,439	5,121	5,876
	KAUFMAN	COUNTY-OTHER	13,740	15,926	21,310	24,949	32,058	36,575
	KAUFMAN	CRANDALL	5,598	12,005	20,084	29,172	41,195	49,395
	KAUFMAN	ELMO WSC	2,332	2,733	3,243	3,810	4,440	5,137
	KAUFMAN	FORNEY	29,597	38,044	47,108	55,621	61,829	61,829
	KAUFMAN	FORNEY LAKE WSC	19,207	22,100	23,000	25,000	25,500	26,000
	KAUFMAN	GASTONIA SCURRY SUD	12,512	14,583	19,563	32,939	48,748	59,846
Yes	KAUFMAN	HEATH	193	271	379	388	388	388
Yes	KAUFMAN	HIGH POINT WSC	19,458	30,077	43,664	59,266	76,390	95,209

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	KAUFMAN	KAUFMAN	7,626	8,606	12,368	15,632	18,682	21,791
	KAUFMAN	KAUFMAN COUNTY DEVELOPMENT DISTRICT 1	3,842	4,083	6,318	9,791	14,527	16,798
	KAUFMAN	KAUFMAN COUNTY MUD 11	4,340	5,159	6,629	8,374	10,269	11,378
	KAUFMAN	KAUFMAN COUNTY MUD 14	6,300	6,300	6,300	6,300	6,300	6,300
	KAUFMAN	KEMP	1,611	1,671	1,745	1,813	1,894	1,987
Yes	KAUFMAN	MABANK	6,335	6,398	6,461	6,467	6,498	6,549
Yes	KAUFMAN	MACBEE SUD	276	336	412	498	592	696
	KAUFMAN	MARKOUT WSC	2,958	3,514	4,903	7,062	9,422	12,571
	KAUFMAN	NORTH KAUFMAN WSC	3,448	4,535	5,920	7,495	9,231	11,141
Yes	KAUFMAN	POETRY WSC	1,856	2,392	3,856	6,149	9,670	11,584
	KAUFMAN	ROSE HILL SUD	4,968	6,001	7,087	8,151	9,005	9,948
	KAUFMAN	TALTY SUD	12,151	13,567	20,000	28,710	39,600	46,568
	KAUFMAN	TERRELL	24,866	28,404	34,827	40,479	47,940	53,769
Yes	KAUFMAN	WEST CEDAR CREEK MUD	227	276	339	410	488	575
	KAUFMAN TOTAL		**209,309**	**257,499**	**335,063**	**431,671**	**542,246**	**627,644**
	NAVARRO	B AND B WSC	1,871	2,060	2,217	2,364	2,525	2,701
	NAVARRO	BLOOMING GROVE	1,038	1,078	1,168	1,251	1,355	1,465
Yes	NAVARRO	BRANDON IRENE WSC	76	90	100	111	122	135
	NAVARRO	CHATFIELD WSC	3,318	3,572	3,782	3,967	4,172	4,396
	NAVARRO	CORBET WSC	2,465	2,647	2,797	2,928	3,072	3,232
	NAVARRO	CORSICANA	27,916	29,886	31,517	32,925	34,477	36,187

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	NAVARRO	COUNTY-OTHER	6,928	7,261	7,776	8,390	9,400	10,000
	NAVARRO	DAWSON	825	834	842	839	837	835
	NAVARRO	KERENS	1,469	1,359	1,257	1,163	1,076	995
	NAVARRO	M E N WSC	3,732	4,307	4,782	5,255	5,771	6,334
Yes	NAVARRO	NAVARRO MILLS WSC	2,814	3,021	3,193	3,343	3,507	3,689
Yes	NAVARRO	PLEASANT GROVE WSC	122	130	137	144	151	159
Yes	NAVARRO	POST OAK SUD	505	472	445	408	367	325
Yes	NAVARRO	RICE WATER SUPPLY AND SEWER SERVICE	3,953	4,697	5,581	6,632	7,881	9,365
Yes	NAVARRO	SOUTH ELLIS COUNTY WSC	68	83	94	106	118	132
Yes	NAVARRO	SOUTHERN OAKS WATER SUPPLY	163	221	269	320	375	435
	NAVARRO TOTAL		**57,263**	**61,718**	**65,957**	**70,146**	**75,206**	**80,385**
	PARKER	ALEDO	7,847	8,462	10,380	11,847	13,500	14,500
	PARKER	ANNETTA	3,180	3,810	4,439	5,068	5,698	6,327
Yes	PARKER	AZLE	3,347	4,258	5,287	6,382	7,584	8,906
Yes	PARKER	COMMUNITY WSC	39	60	82	107	135	165
	PARKER	COUNTY-OTHER	69,436	111,025	163,883	223,591	298,000	355,000
Yes	PARKER	FORT WORTH	3,751	4,321	4,438	4,856	5,321	5,835
	PARKER	HORSESHOE BEND WATER SYSTEM	1,304	1,474	1,864	2,452	3,334	4,367
	PARKER	HUDSON OAKS	5,500	5,693	5,851	6,044	6,300	6,500
Yes	PARKER	MINERAL WELLS	1,801	1,900	1,999	2,099	2,099	2,099
Yes	PARKER	NORTH RURAL WSC	1,391	1,684	2,015	2,364	2,747	3,170
	PARKER	PARKER COUNTY SUD	9,100	12,400	16,800	22,592	30,900	41,800

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
Yes	PARKER	RENO (PARKER)	4,194	5,107	6,138	7,226	8,424	9,741
	PARKER	SANTO SUD	155	186	219	256	297	340
	PARKER	SPRINGTOWN	5,436	7,245	10,032	12,229	14,192	15,677
Yes	PARKER	STURDIVANT PROGRESS WSC	23	21	19	16	13	10
Yes	PARKER	WALNUT CREEK SUD	20,927	22,831	31,740	47,518	66,114	84,631
	PARKER	WEATHERFORD	45,410	54,197	64,123	74,543	86,019	98,660
	PARKER	WILLOW PARK	8,080	9,714	11,560	13,501	15,638	17,991
	PARKER TOTAL		**190,921**	**254,388**	**340,869**	**442,691**	**566,315**	**675,719**
Yes	ROCKWALL	BEAR CREEK SUD	1,967	3,266	3,728	4,060	4,458	4,458
	ROCKWALL	BLACKLAND WSC	4,634	4,824	5,199	6,029	6,491	6,988
Yes	ROCKWALL	CASH SUD	2,977	3,950	5,128	6,367	7,730	9,229
	ROCKWALL	COUNTY-OTHER	2,650	2,193	3,269	3,768	5,843	7,294
Yes	ROCKWALL	EAST FORK SUD	2,737	3,267	3,877	4,411	4,873	5,383
	ROCKWALL	FATE	25,597	36,969	50,748	65,318	81,326	98,927
Yes	ROCKWALL	HEATH	11,635	15,447	20,471	20,975	20,975	20,975
Yes	ROCKWALL	HIGH POINT WSC	1,853	2,687	3,698	4,768	5,943	7,235
	ROCKWALL	MOUNT ZION WSC	2,079	2,148	2,226	2,294	2,373	2,462
Yes	ROCKWALL	NEVADA SUD	226	284	430	921	1,652	2,220
	ROCKWALL	R C H WSC	5,684	6,457	8,240	10,994	13,407	16,350
	ROCKWALL	ROCKWALL	55,075	67,561	89,991	120,077	124,696	124,696
Yes	ROCKWALL	ROWLETT	11,930	12,265	14,770	15,942	16,815	16,815
Yes	ROCKWALL	ROYSE CITY	26,943	53,046	68,545	74,175	82,398	80,859
	ROCKWALL TOTAL		**155,987**	**214,364**	**280,320**	**340,099**	**378,980**	**403,891**

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	TARRANT	ARLINGTON	443,307	482,455	513,986	539,421	574,231	591,297
Yes	TARRANT	AZLE	12,981	14,517	15,787	16,787	17,888	19,099
	TARRANT	BEDFORD	52,345	56,345	57,255	60,166	60,166	60,166
	TARRANT	BENBROOK WATER AUTHORITY	27,156	29,353	31,526	33,698	35,871	38,044
Yes	TARRANT	BETHESDA WSC	349	386	417	441	467	496
	TARRANT	BLUE MOUND	2,690	2,976	3,213	3,398	3,602	3,826
Yes	TARRANT	BURLESON	9,765	10,956	11,941	12,718	13,573	14,513
	TARRANT	COLLEYVILLE	28,000	28,000	28,000	28,000	28,000	28,000
Yes	TARRANT	COMMUNITY WSC	4,084	4,570	4,972	5,289	5,638	6,021
	TARRANT	COUNTY-OTHER	30,000	44,000	58,000	72,000	86,000	100,000
Yes	TARRANT	CROWLEY	22,194	26,367	29,831	32,630	35,703	39,078
	TARRANT	DALWORTHINGTON GARDENS	2,303	2,326	2,343	2,344	2,348	2,352
	TARRANT	EDGECLIFF	3,761	3,761	3,761	3,761	3,761	3,761
	TARRANT	EULESS	60,820	60,820	60,820	60,820	60,820	60,820
	TARRANT	EVERMAN	6,600	6,600	6,600	6,600	6,600	6,600
Yes	TARRANT	FLOWER MOUND	907	1,060	1,321	1,382	1,456	1,456
	TARRANT	FOREST HILL	15,535	17,189	18,556	19,624	20,798	22,093
Yes	TARRANT	FORT WORTH	1,091,983	1,287,121	1,310,518	1,401,360	1,501,256	1,611,117
Yes	TARRANT	GRAND PRAIRIE	77,247	83,733	92,502	95,043	98,744	98,744
	TARRANT	GRAPEVINE	54,037	54,037	54,037	54,037	54,037	54,037
	TARRANT	HALTOM CITY	50,000	50,000	50,000	50,000	50,000	50,000
	TARRANT	HASLET	6,540	8,959	11,803	12,845	14,000	14,000
	TARRANT	HURST	40,912	40,821	40,900	40,962	41,053	41,053
Yes	TARRANT	JOHNSON COUNTY SUD	2,706	3,147	3,266	3,386	3,511	3,642

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	TARRANT	KELLER	51,130	51,974	51,974	51,974	51,974	51,974
	TARRANT	KENNEDALE	10,713	14,532	19,028	23,760	28,592	33,035
	TARRANT	LAKE WORTH	5,861	6,414	6,809	7,145	7,474	7,767
	TARRANT	LAKESIDE	2,144	2,144	2,144	2,144	2,144	2,144
Yes	TARRANT	MANSFIELD	102,621	108,197	131,234	185,294	185,154	185,000
	TARRANT	NORTH RICHLAND HILLS	80,119	85,636	87,051	88,170	89,800	89,800
	TARRANT	PANTEGO	2,653	2,653	2,653	2,653	2,653	2,653
	TARRANT	PELICAN BAY	2,958	3,967	5,320	7,134	9,567	12,830
Yes	TARRANT	RENO (PARKER)	79	88	95	101	106	113
	TARRANT	RICHLAND HILLS	9,616	10,622	11,452	12,911	14,217	15,655
	TARRANT	RIVER OAKS	8,077	8,053	8,106	8,149	8,210	8,210
	TARRANT	SAGINAW	29,916	32,879	33,167	33,395	33,727	33,727
	TARRANT	SANSOM PARK	6,087	6,736	7,272	7,690	8,152	8,659
Yes	TARRANT	SOUTHLAKE	35,117	39,471	42,199	44,631	47,071	49,365
Yes	TARRANT	TROPHY CLUB MUD 1	995	1,282	1,521	1,717	1,933	2,169
	TARRANT	WATAUGA	24,525	24,525	24,525	24,525	24,525	24,525
	TARRANT	WESTLAKE	3,052	4,001	4,791	5,441	6,152	6,933
	TARRANT	WESTOVER HILLS	676	674	677	679	682	682
	TARRANT	WESTWORTH VILLAGE	3,129	3,203	3,406	3,582	3,755	3,912
	TARRANT	WHITE SETTLEMENT	20,351	22,469	24,218	25,582	27,083	28,738
	TARRANT TOTAL		**2,446,041**	**2,749,019**	**2,878,997**	**3,093,389**	**3,272,494**	**3,438,106**
	WISE	ALVORD	3,020	3,736	4,375	4,888	5,453	6,073
Yes	WISE	BOLIVAR WSC	952	1,047	1,133	1,199	1,272	1,351
	WISE	BOYD	1,477	1,879	2,574	3,202	3,800	4,200

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	FINAL REGION C POPULATION PROJECTIONS					
			2030	2040	2050	2060	2070	2080
	WISE	BRIDGEPORT	5,814	5,958	6,093	6,165	6,246	6,337
	WISE	CHICO	2,054	2,054	2,054	2,054	2,054	2,054
	WISE	COUNTY-OTHER	52,332	80,325	120,420	166,350	227,000	270,000
	WISE	DECATUR	10,796	12,824	17,299	21,328	27,000	31,300
Yes	WISE	FORT WORTH	2,480	2,862	2,948	3,243	3,567	3,924
	WISE	NEWARK	1,238	1,571	2,274	3,323	4,941	6,310
	WISE	RHOME	2,290	2,958	4,367	6,339	9,332	12,443
	WISE	RUNAWAY BAY	1,878	2,304	2,826	3,467	4,253	5,217
Yes	WISE	WALNUT CREEK SUD	3,707	3,965	5,477	8,249	11,667	14,935
	WISE	WEST WISE SUD	4,047	4,438	4,789	5,056	5,349	5,672
	WISE TOTAL		**92,085**	**125,921**	**176,629**	**234,863**	**311,934**	**369,816**
	REGION C TOTAL		***9,133,116***	***10,504,043***	***11,804,305***	***13,000,417***	***14,163,968***	***15,126,596***

Attachment Two

Projected Population for WUGs in Multiple Counties or Regions

ATTACHMENT 2 – PROJECTED POPULATION FOR WUGS IN MULTIPLE COUNTIES OR REGIONS

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
C	KAUFMAN	ABLES SPRINGS SUD	5,944	6,183	7,218	8,131	9,208	9,669
D	HUNT	ABLES SPRINGS SUD	619	670	715	753	792	830
D	VAN ZANDT	ABLES SPRINGS SUD	35	37	39	42	44	46
		ABLES SPRINGS SUD TOTAL	**6,598**	**6,890**	**7,972**	**8,926**	**10,044**	**10,545**
C	DALLAS	AMC CREEKSIDE	544	673	742	782	828	879
C	DENTON	AMC CREEKSIDE	2,140	2,686	3,261	3,846	4,490	5,199
		AMC CREEKSIDE TOTAL	**2,684**	**3,359**	**4,003**	**4,628**	**5,318**	**6,078**
C	HENDERSON	ATHENS	12,998	15,700	20,673	24,945	30,100	33,252
I	HENDERSON	ATHENS	210	213	211	211	211	211
		ATHENS TOTAL	**13,208**	**15,913**	**20,884**	**25,156**	**30,311**	**33,463**
C	PARKER	AZLE	3,347	4,258	5,287	6,382	7,584	8,906
C	TARRANT	AZLE	12,981	14,517	15,787	16,787	17,888	19,099
		AZLE TOTAL	**16,328**	**18,775**	**21,074**	**23,169**	**25,472**	**28,005**
C	HENDERSON	B B S WSC	17	17	17	17	17	17
I	ANDERSON	B B S WSC	1,064	1,061	1,048	1,035	1,021	1,008
		B B S WSC TOTAL	**1,081**	**1,078**	**1,065**	**1,052**	**1,038**	**1,025**
C	COLLIN	BEAR CREEK SUD	25,815	45,451	51,976	56,600	62,043	62,043
C	ROCKWALL	BEAR CREEK SUD	1,967	3,266	3,728	4,060	4,458	4,458
		BEAR CREEK SUD TOTAL	**27,782**	**48,717**	**55,704**	**60,660**	**66,501**	**66,501**
C	HENDERSON	BETHEL ASH WSC	3,053	3,205	3,238	3,316	3,403	3,499
I	HENDERSON	BETHEL ASH WSC	2,752	2,773	2,885	2,932	2,978	3,022
D	VAN ZANDT	BETHEL ASH WSC	1,706	1,877	2,041	2,206	2,373	2,543
		BETHEL ASH WSC TOTAL	**7,511**	**7,855**	**8,164**	**8,454**	**8,754**	**9,064**
C	TARRANT	BETHESDA WSC	349	386	417	441	467	496
G	JOHNSON	BETHESDA WSC	34,818	40,277	45,753	50,713	56,282	62,536
		BETHESDA WSC TOTAL	**35,167**	**40,663**	**46,170**	**51,154**	**56,749**	**63,032**

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
C	FANNIN	BOIS D ARC MUD	3,031	3,180	3,269	3,325	3,386	3,453
D	LAMAR	BOIS D ARC MUD	16	16	16	16	16	16
		BOIS D ARC MUD TOTAL	**3,047**	**3,196**	**3,285**	**3,341**	**3,402**	**3,469**
C	COOKE	BOLIVAR WSC	1,869	2,045	2,112	2,154	2,196	2,244
C	DENTON	BOLIVAR WSC	9,399	11,786	14,299	16,855	20,524	25,205
C	WISE	BOLIVAR WSC	952	1,047	1,133	1,199	1,272	1,351
		BOLIVAR WSC TOTAL	**12,220**	**14,878**	**17,544**	**20,208**	**23,992**	**28,800**
C	NAVARRO	BRANDON IRENE WSC	76	90	100	111	122	135
G	HILL	BRANDON IRENE WSC	1,923	1,979	2,018	2,057	2,100	2,151
		BRANDON IRENE WSC TOTAL	**1,999**	**2,069**	**2,118**	**2,168**	**2,222**	**2,286**
C	HENDERSON	BRUSHY CREEK WSC	681	702	719	733	750	768
I	HENDERSON	BRUSHY CREEK WSC	30	31	30	30	30	30
I	ANDERSON	BRUSHY CREEK WSC	2,812	2,808	2,771	2,736	2,701	2,666
		BRUSHY CREEK WSC TOTAL	**3,493**	**3,510**	**3,490**	**3,469**	**3,451**	**3,434**
C	TARRANT	BURLESON	9,765	10,956	11,941	12,718	13,573	14,513
G	JOHNSON	BURLESON	42,201	49,590	57,011	63,777	71,371	79,894
		BURLESON TOTAL	**51,966**	**60,546**	**68,952**	**76,495**	**84,944**	**94,407**
C	COLLIN	CADDO BASIN SUD	2,289	11,747	18,804	21,710	24,225	25,047
D	HUNT	CADDO BASIN SUD	15,886	14,328	16,734	17,259	17,109	18,651
		CADDO BASIN SUD TOTAL	**18,175**	**26,075**	**35,538**	**38,969**	**41,334**	**43,698**
C	DALLAS	CARROLLTON	55,007	58,186	61,664	65,328	69,216	69,480
C	DENTON	CARROLLTON	86,261	91,375	96,677	102,308	108,261	108,673
		CARROLLTON TOTAL	**141,268**	**149,561**	**158,341**	**167,636**	**177,477**	**178,153**
C	ROCKWALL	CASH SUD	2,977	3,950	5,128	6,367	7,730	9,229
D	HOPKINS	CASH SUD	212	246	273	336	351	419
D	HUNT	CASH SUD	19,404	22,046	24,600	26,370	26,351	27,704

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
D	RAINS	CASH SUD	917	1,010	1,196	1,472	1,707	1,978
		CASH SUD TOTAL	**23,510**	**27,252**	**31,197**	**34,545**	**36,139**	**39,330**
C	COLLIN	CELINA	65,403	114,328	190,491	198,744	245,262	296,640
C	DENTON	CELINA	1,265	2,170	3,739	3,970	5,005	6,054
		CELINA TOTAL	**66,668**	**116,498**	**194,230**	**202,714**	**250,267**	**302,694**
C	DALLAS	COMBINE WSC	769	823	853	870	888	908
C	KAUFMAN	COMBINE WSC	2,835	3,271	3,825	4,439	5,121	5,876
		COMBINE WSC TOTAL	**3,604**	**4,094**	**4,678**	**5,309**	**6,009**	**6,784**
C	PARKER	COMMUNITY WSC	39	60	82	107	135	165
C	TARRANT	COMMUNITY WSC	4,084	4,570	4,972	5,289	5,638	6,021
		COMMUNITY WSC TOTAL	**4,123**	**4,630**	**5,054**	**5,396**	**5,773**	**6,186**
C	DALLAS	COPPELL	42,352	42,256	42,339	42,405	42,500	42,500
C	DENTON	COPPELL	1,425	1,376	1,418	1,452	1,500	1,500
		COPPELL TOTAL	**43,777**	**43,632**	**43,757**	**43,857**	**44,000**	**44,000**
C	TARRANT	CROWLEY	22,194	26,367	29,831	32,630	35,703	39,078
G	JOHNSON	CROWLEY	178	262	349	429	520	622
		CROWLEY TOTAL	**22,372**	**26,629**	**30,180**	**33,059**	**36,223**	**39,700**
C	COLLIN	DALLAS	53,145	59,190	65,922	73,420	81,771	91,072
C	DALLAS	DALLAS	1,254,601	1,302,256	1,351,721	1,403,065	1,456,359	1,511,677
C	DENTON	DALLAS	34,543	42,657	53,054	64,065	76,324	89,553
		DALLAS TOTAL	**1,342,289**	**1,404,103**	**1,470,697**	**1,540,550**	**1,614,454**	**1,692,302**
C	FANNIN	DELTA COUNTY MUD	72	84	90	96	102	109
D	DELTA	DELTA COUNTY MUD	1,901	1,927	1,953	1,979	2,006	2,033
		DELTA COUNTY MUD TOTAL	**1,973**	**2,011**	**2,043**	**2,075**	**2,108**	**2,142**
C	COLLIN	DESERT WSC	365	401	440	480	524	572
C	FANNIN	DESERT WSC	798	905	957	1,006	1,059	1,119
C	GRAYSON	DESERT WSC	701	765	818	864	915	972

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
		DESERT WSC TOTAL	**1,864**	**2,071**	**2,215**	**2,350**	**2,498**	**2,663**
C	COLLIN	EAST FORK SUD	17,422	20,787	24,665	28,063	30,999	34,243
C	DALLAS	EAST FORK SUD	4,577	5,461	6,479	7,372	8,143	8,995
C	ROCKWALL	EAST FORK SUD	2,737	3,267	3,877	4,411	4,873	5,383
		EAST FORK SUD TOTAL	**24,736**	**29,515**	**35,021**	**39,846**	**44,015**	**48,621**
C	ELLIS	FILES VALLEY WSC	848	1,024	1,214	1,406	1,617	1,850
G	HILL	FILES VALLEY WSC	2,494	2,568	2,616	2,665	2,721	2,784
		FILES VALLEY WSC TOTAL	**3,342**	**3,592**	**3,830**	**4,071**	**4,338**	**4,634**
C	FREESTONE	FLO COMMUNITY WSC	150	150	150	150	150	150
H	LEON	FLO COMMUNITY WSC	3,009	2,801	2,595	2,405	2,194	1,956
		FLO COMMUNITY WSC TOTAL	**3,159**	**2,951**	**2,745**	**2,555**	**2,344**	**2,106**
C	DENTON	FLOWER MOUND	94,783	118,816	144,099	144,099	144,099	144,099
C	TARRANT	FLOWER MOUND	907	1,060	1,321	1,382	1,456	1,456
		FLOWER MOUND TOTAL	**95,690**	**119,876**	**145,420**	**145,481**	**145,555**	**145,555**
C	DENTON	FORT WORTH	26,302	39,396	48,326	60,243	73,369	87,826
G	JOHNSON	FORT WORTH	0	0	5,081	8,066	10,001	9,917
C	PARKER	FORT WORTH	3,751	4,321	4,438	4,856	5,321	5,835
C	TARRANT	FORT WORTH	1,091,983	1,287,121	1,310,518	1,401,360	1,501,256	1,611,117
C	WISE	FORT WORTH	2,480	2,862	2,948	3,243	3,567	3,924
		FORT WORTH TOTAL	**1,124,516**	**1,333,700**	**1,371,311**	**1,477,768**	**1,593,514**	**1,718,619**
C	COLLIN	FRISCO	183,058	221,642	222,104	222,104	222,104	222,104
C	DENTON	FRISCO	136,967	166,055	167,552	167,552	167,552	167,552
		FRISCO TOTAL	**320,025**	**387,697**	**389,656**	**389,656**	**389,656**	**389,656**
C	COLLIN	FROGNOT WSC	2,077	2,593	3,181	3,772	4,422	5,138
C	FANNIN	FROGNOT WSC	30	42	48	53	60	67
D	HUNT	FROGNOT WSC	23	29	34	40	45	52
		FROGNOT WSC TOTAL	**2,130**	**2,664**	**3,263**	**3,865**	**4,527**	**5,257**

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
C	DALLAS	GLENN HEIGHTS	13,834	15,160	15,864	16,278	16,732	17,233
C	ELLIS	GLENN HEIGHTS	8,344	10,749	13,364	16,019	18,936	22,144
		GLENN HEIGHTS TOTAL	**22,178**	**25,909**	**29,228**	**32,297**	**35,668**	**39,377**
C	DALLAS	GRAND PRAIRIE	146,304	166,714	188,910	194,371	201,657	201,657
C	TARRANT	GRAND PRAIRIE	77,247	83,733	92,502	95,043	98,744	98,744
		GRAND PRAIRIE TOTAL	**223,551**	**250,447**	**281,412**	**289,414**	**300,401**	**300,401**
C	KAUFMAN	HEATH	193	271	379	388	388	388
C	ROCKWALL	HEATH	11,635	15,447	20,471	20,975	20,975	20,975
		HEATH TOTAL	**11,828**	**15,718**	**20,850**	**21,363**	**21,363**	**21,363**
C	COLLIN	HICKORY CREEK SUD	99	128	161	194	230	271
C	FANNIN	HICKORY CREEK SUD	274	252	245	232	217	202
D	HUNT	HICKORY CREEK SUD	3,454	3,960	4,540	5,205	5,968	6,842
		HICKORY CREEK SUD TOTAL	**3,827**	**4,340**	**4,946**	**5,631**	**6,415**	**7,315**
C	KAUFMAN	HIGH POINT WSC	19,458	30,077	43,664	59,266	76,390	95,209
C	ROCKWALL	HIGH POINT WSC	1,853	2,687	3,698	4,768	5,943	7,235
		HIGH POINT WSC TOTAL	**21,311**	**32,764**	**47,362**	**64,034**	**82,333**	**102,444**
C	ELLIS	HILCO UNITED SERVICES	605	651	701	748	801	860
G	BOSQUE	HILCO UNITED SERVICES	1,295	1,390	1,492	1,601	1,718	1,844
G	HILL	HILCO UNITED SERVICES	4,589	4,726	4,812	4,904	5,007	5,122
		HILCO UNITED SERVICES TOTAL	**6,489**	**6,767**	**7,005**	**7,253**	**7,526**	**7,826**
C	TARRANT	JOHNSON COUNTY SUD	2,706	3,147	3,266	3,386	3,511	3,642
G	JOHNSON	JOHNSON COUNTY SUD	69,832	88,295	98,435	107,461	117,620	129,052
		JOHNSON COUNTY SUD TOTAL	**72,538**	**91,442**	**101,701**	**110,847**	**121,131**	**132,694**
C	COLLIN	JOSEPHINE	5,389	11,989	17,424	19,491	21,800	21,800
D	HUNT	JOSEPHINE	155	180	204	225	245	267

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
		JOSEPHINE TOTAL	**5,544**	**12,169**	**17,628**	**19,716**	**22,045**	**22,067**
C	DALLAS	LEWISVILLE	1,046	1,053	1,126	1,141	1,163	1,163
C	DENTON	LEWISVILLE	114,210	114,924	122,855	124,518	126,942	126,942
		LEWISVILLE TOTAL	**115,256**	**115,977**	**123,981**	**125,659**	**128,105**	**128,105**
C	HENDERSON	MABANK	3,474	3,826	3,737	3,863	4,004	4,161
C	KAUFMAN	MABANK	6,335	6,398	6,461	6,467	6,498	6,549
D	VAN ZANDT	MABANK	328	368	407	448	490	531
		MABANK TOTAL	**10,137**	**10,592**	**10,605**	**10,778**	**10,992**	**11,241**
C	KAUFMAN	MACBEE SUD	276	336	412	498	592	696
D	HUNT	MACBEE SUD	312	326	337	345	353	361
D	VAN ZANDT	MACBEE SUD	8,316	10,289	12,731	15,752	19,490	24,115
		MACBEE SUD TOTAL	**8,904**	**10,951**	**13,480**	**16,595**	**20,435**	**25,172**
C	ELLIS	MANSFIELD	581	698	824	951	1,091	1,245
C	TARRANT	MANSFIELD	102,621	108,197	131,234	185,294	185,154	185,000
G	JOHNSON	MANSFIELD	6,512	9,258	12,029	14,640	17,563	20,835
		MANSFIELD TOTAL	**109,714**	**118,153**	**144,087**	**200,885**	**203,808**	**207,080**
C	PARKER	MINERAL WELLS	1,801	1,900	1,999	2,099	2,099	2,099
G	PALO PINTO	MINERAL WELLS	16,926	17,863	18,795	19,737	19,737	19,737
		MINERAL WELLS TOTAL	**18,727**	**19,763**	**20,794**	**21,836**	**21,836**	**21,836**
C	ELLIS	MOUNTAIN PEAK SUD	21,088	28,150	35,829	43,651	52,242	61,684
G	JOHNSON	MOUNTAIN PEAK SUD	4,710	5,852	7,271	9,035	11,226	13,949
		MOUNTAIN PEAK SUD TOTAL	**25,798**	**34,002**	**43,100**	**52,686**	**63,468**	**75,633**
C	COOKE	MOUNTAIN SPRINGS WSC	1,933	1,942	1,952	1,940	1,927	1,913
C	DENTON	MOUNTAIN SPRINGS WSC	68	86	103	122	142	164

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
		MOUNTAIN SPRINGS WSC TOTAL	**2,001**	**2,028**	**2,055**	**2,062**	**2,069**	**2,077**
C	DENTON	MUSTANG SUD	105,046	149,073	199,398	249,230	289,198	323,398
C	COLLIN	MUSTANG SUD	3,517	5,124	6,520	7,970	9,133	10,213
C	GRAYSON	MUSTANG SUD	2,344	3,424	4,396	5,368	6,088	6,808
		MUSTANG SUD TOTAL	**110,907**	**157,621**	**210,314**	**262,568**	**304,419**	**340,419**
C	NAVARRO	NAVARRO MILLS WSC	2,814	3,021	3,193	3,343	3,507	3,689
G	Hill	NAVARRO MILLS WSC	17	19	18	19	19	20
		NAVARRO MILLS WSC TOTAL	**2,831**	**3,040**	**3,211**	**3,362**	**3,526**	**3,709**
C	COLLIN	NEVADA SUD	5,579	7,080	10,527	22,206	39,638	53,270
C	ROCKWALL	NEVADA SUD	226	284	430	921	1,652	2,220
		NEVADA SUD TOTAL	**5,805**	**7,364**	**10,957**	**23,127**	**41,290**	**55,490**
C	FANNIN	NORTH HUNT SUD	107	112	116	117	119	122
D	DELTA	NORTH HUNT SUD	203	202	200	199	195	192
D	HUNT	NORTH HUNT SUD	2,320	2,277	2,244	2,180	2,117	2,055
		NORTH HUNT SUD TOTAL	**2,630**	**2,591**	**2,560**	**2,496**	**2,431**	**2,369**
C	PARKER	NORTH RURAL WSC	1,391	1,684	2,015	2,364	2,747	3,170
G	PALO PINTO	NORTH RURAL WSC	1,636	1,638	1,621	1,612	1,602	1,591
		NORTH RURAL WSC TOTAL	**3,027**	**3,322**	**3,636**	**3,976**	**4,349**	**4,761**
C	DALLAS	OVILLA	464	504	547	594	645	701
C	ELLIS	OVILLA	4,974	6,323	7,790	9,277	10,911	12,710
		OVILLA TOTAL	**5,438**	**6,827**	**8,337**	**9,871**	**11,556**	**13,411**
C	DENTON	PILOT POINT	6,229	8,047	13,854	19,888	21,454	21,454
C	GRAYSON	PILOT POINT	125	153	283	394	438	438
		PILOT POINT TOTAL	**6,354**	**8,200**	**14,137**	**20,282**	**21,892**	**21,892**
C	COLLIN	PLANO	277,913	279,472	307,762	316,996	316,996	316,996
C	DENTON	PLANO	8,311	8,643	9,518	9,804	9,804	9,804

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
		PLANO TOTAL	**286,224**	**288,115**	**317,280**	**326,800**	**326,800**	**326,800**
C	FREESTONE	PLEASANT GROVE WSC	1,323	1,430	1,574	1,530	1,482	1,429
C	NAVARRO	PLEASANT GROVE WSC	122	130	137	144	151	159
		PLEASANT GROVE WSC TOTAL	**1,445**	**1,560**	**1,711**	**1,674**	**1,633**	**1,588**
C	KAUFMAN	POETRY WSC	1,856	2,392	3,856	6,149	9,670	11,584
D	HUNT	POETRY WSC	2,011	2,306	2,547	2,719	2,267	2,281
		POETRY WSC TOTAL	**3,867**	**4,698**	**6,403**	**8,868**	**11,937**	**13,865**
C	FREESTONE	POINT ENTERPRISE WSC	842	834	823	823	823	823
G	LIMESTONE	POINT ENTERPRISE WSC	469	455	435	418	400	380
		POINT ENTERPRISE WSC TOTAL	**1,311**	**1,289**	**1,258**	**1,241**	**1,223**	**1,203**
C	NAVARRO	POST OAK SUD	505	472	445	408	367	325
G	HILL	POST OAK SUD	866	892	908	925	944	966
G	LIMESTONE	POST OAK SUD	124	117	109	100	90	80
		POST OAK SUD TOTAL	**1,495**	**1,481**	**1,462**	**1,433**	**1,401**	**1,371**
C	COLLIN	PROSPER	39,104	45,350	54,280	56,527	59,802	59,802
C	DENTON	PROSPER	16,171	19,746	23,468	24,348	25,630	25,630
		PROSPER TOTAL	**55,275**	**65,096**	**77,748**	**80,875**	**85,432**	**85,432**
C	GRAYSON	RED RIVER AUTHORITY OF TEXAS	1,052	1,265	1,443	1,621	1,814	2,024
A	CHILDRESS	RED RIVER AUTHORITY OF TEXAS	1,579	1,474	1,419	1,414	1,407	1,399
A	COLLINGSWORTH	RED RIVER AUTHORITY OF TEXAS	352	313	270	235	200	165
A	DONLEY	RED RIVER AUTHORITY OF TEXAS	333	303	271	248	226	203
A	HALL	RED RIVER AUTHORITY OF TEXAS	203	181	157	134	111	88

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
B	CLAY	RED RIVER AUTHORITY OF TEXAS	667	612	562	516	474	435
B	COTTLE	RED RIVER AUTHORITY OF TEXAS	74	79	92	92	92	92
B	FOARD	RED RIVER AUTHORITY OF TEXAS	107	107	106	106	106	106
B	HARDEMAN	RED RIVER AUTHORITY OF TEXAS	546	481	424	379	335	295
B	KING	RED RIVER AUTHORITY OF TEXAS	167	160	168	172	177	181
B	MONTAGUE	RED RIVER AUTHORITY OF TEXAS	88	82	102	104	106	106
B	WILBARGER	RED RIVER AUTHORITY OF TEXAS	2,674	2,590	2,508	2,429	2,352	2,278
G	KNOX	RED RIVER AUTHORITY OF TEXAS	53	49	41	36	30	23
O	MOTLEY	RED RIVER AUTHORITY OF TEXAS	8	6	6	6	6	6
O	DICKENS	RED RIVER AUTHORITY OF TEXAS	5	5	5	4	3	2
		RED RIVER AUTHORITY OF TEXAS TOTAL	**7,908**	**7,707**	**7,574**	**7,496**	**7,439**	**7,403**
C	PARKER	RENO (PARKER)	4,194	5,107	6,138	7,226	8,424	9,741
C	TARRANT	RENO (PARKER)	79	88	95	101	106	113
		RENO (PARKER) TOTAL	**4,273**	**5,195**	**6,233**	**7,327**	**8,530**	**9,854**
C	ELLIS	RICE WATER SUPPLY AND SEWER SERVICE	5,565	6,678	7,888	9,106	10,446	11,922
C	NAVARRO	RICE WATER SUPPLY AND SEWER SERVICE	3,953	4,697	5,581	6,632	7,881	9,365
		RICE WATER SUPPLY AND SEWER SERVICE TOTAL	**9,518**	**11,375**	**13,469**	**15,738**	**18,327**	**21,287**

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
C	COLLIN	RICHARDSON	63,141	66,547	72,087	74,250	74,250	74,250
C	DALLAS	RICHARDSON	54,374	56,289	58,980	60,750	60,750	60,750
		RICHARDSON TOTAL	**117,515**	**122,836**	**131,067**	**135,000**	**135,000**	**135,000**
C	DALLAS	ROCKETT SUD	755	836	912	938	966	976
C	ELLIS	ROCKETT SUD	37,615	44,938	53,859	62,009	74,775	85,142
		ROCKETT SUD TOTAL	**38,370**	**45,774**	**54,771**	**62,947**	**75,741**	**86,118**
C	DALLAS	ROWLETT	65,945	69,670	80,411	84,929	88,280	88,280
C	ROCKWALL	ROWLETT	11,930	12,265	14,770	15,942	16,815	16,815
		ROWLETT TOTAL	**77,875**	**81,935**	**95,181**	**100,871**	**105,095**	**105,095**
C	COLLIN	ROYSE CITY	8,394	15,496	22,376	24,692	27,747	27,747
C	ROCKWALL	ROYSE CITY	26,943	53,046	68,545	74,175	82,398	80,859
D	HUNT	ROYSE CITY	4,136	5,910	7,450	8,967	10,495	12,034
		ROYSE CITY TOTAL	**39,473**	**74,452**	**98,371**	**107,834**	**120,640**	**120,640**
C	COLLIN	SACHSE	9,745	10,386	11,796	12,331	12,692	12,692
C	DALLAS	SACHSE	19,762	21,212	24,032	25,085	25,770	25,770
		SACHSE TOTAL	**29,507**	**31,598**	**35,828**	**37,416**	**38,462**	**38,462**
C	PARKER	SANTO SUD	155	186	219	256	297	340
G	HOOD	SANTO SUD	10	7	5	4	3	2
G	PALO PINTO	SANTO SUD	1,972	1,973	1,954	1,943	1,931	1,917
		SANTO SUD TOTAL	**2,137**	**2,166**	**2,178**	**2,203**	**2,231**	**2,259**
C	ELLIS	SOUTH ELLIS COUNTY WSC	1,458	1,750	2,067	2,386	2,737	3,124
C	NAVARRO	SOUTH ELLIS COUNTY WSC	68	83	94	106	118	132
		SOUTH ELLIS COUNTY WSC TOTAL	**1,526**	**1,833**	**2,161**	**2,492**	**2,855**	**3,256**
C	COLLIN	SOUTH GRAYSON SUD	1,269	1,671	2,128	2,586	3,092	3,649
C	GRAYSON	SOUTH GRAYSON SUD	4,034	4,496	4,882	5,240	5,631	6,061
		SOUTH GRAYSON SUD TOTAL	**5,303**	**6,167**	**7,010**	**7,826**	**8,723**	**9,710**

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
C	FREESTONE	SOUTHERN OAKS WATER SUPPLY	675	856	1,099	1,073	1,043	1,009
C	NAVARRO	SOUTHERN OAKS WATER SUPPLY	163	221	269	320	375	435
		SOUTHERN OAKS WATER SUPPLY TOTAL	**838**	**1,077**	**1,368**	**1,393**	**1,418**	**1,444**
C	DENTON	SOUTHLAKE	699	648	582	513	440	367
C	TARRANT	SOUTHLAKE	35,117	39,471	42,199	44,631	47,071	49,365
		SOUTHLAKE TOTAL	**35,816**	**40,119**	**42,781**	**45,144**	**47,511**	**49,732**
C	FANNIN	SOUTHWEST FANNIN COUNTY SUD	6,879	7,606	7,967	8,289	8,643	9,030
C	GRAYSON	SOUTHWEST FANNIN COUNTY SUD	1,534	1,673	1,788	1,891	2,003	2,127
		SOUTHWEST FANNIN COUNTY SUD TOTAL	**8,413**	**9,279**	**9,755**	**10,180**	**10,646**	**11,157**
C	PARKER	STURDIVANT PROGRESS WSC	23	21	19	16	13	10
G	PALO PINTO	STURDIVANT PROGRESS WSC	2,259	2,262	2,238	2,226	2,212	2,197
		STURDIVANT PROGRESS WSC TOTAL	**2,282**	**2,283**	**2,257**	**2,242**	**2,225**	**2,207**
C	TARRANT	TROPHY CLUB MUD 1	995	1,282	1,521	1,717	1,933	2,169
C	DENTON	TROPHY CLUB MUD 1	13,252	13,252	13,252	13,252	13,252	13,252
		TROPHY CLUB MUD 1 TOTAL	**14,247**	**14,534**	**14,773**	**14,969**	**15,185**	**15,421**
C	COOKE	TWO WAY SUD	43	43	50	51	54	55
C	GRAYSON	TWO WAY SUD	6,004	6,357	7,569	8,275	9,187	9,756
		TWO WAY SUD TOTAL	**6,047**	**6,400**	**7,619**	**8,326**	**9,241**	**9,811**
C	HENDERSON	VIRGINIA HILL WSC	1,547	1,594	1,633	1,667	1,704	1,744
I	HENDERSON	VIRGINIA HILL WSC	1,693	1,752	1,788	1,827	1,865	1,903

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL 2026 REGION C POPULATION					
			2030	2040	2050	2060	2070	2080
		VIRGINIA HILL WSC TOTAL	**3,240**	**3,346**	**3,421**	**3,494**	**3,569**	**3,647**
C	PARKER	WALNUT CREEK SUD	20,927	22,831	31,740	47,518	66,114	84,631
C	WISE	WALNUT CREEK SUD	3,707	3,965	5,477	8,249	11,667	14,935
		WALNUT CREEK SUD TOTAL	**24,634**	**26,796**	**37,217**	**55,767**	**77,781**	**99,566**
C	HENDERSON	WEST CEDAR CREEK MUD	4,847	4,501	4,969	4,973	4,973	4,968
C	KAUFMAN	WEST CEDAR CREEK MUD	227	276	339	410	488	575
		WEST CEDAR CREEK MUD TOTAL	**5,074**	**4,777**	**5,308**	**5,383**	**5,461**	**5,543**
C	COLLIN	WEST LEONARD WSC	337	422	518	614	720	837
C	FANNIN	WEST LEONARD WSC	1,914	2,301	2,478	2,661	2,862	3,082
D	HUNT	WEST LEONARD WSC	36	41	46	52	56	60
		WEST LEONARD WSC TOTAL	**2,287**	**2,764**	**3,042**	**3,327**	**3,638**	**3,979**
C	COLLIN	WESTMINSTER SUD	2,138	2,674	3,283	3,894	4,567	5,309
C	GRAYSON	WESTMINSTER SUD	30	36	41	46	53	58
		WESTMINSTER SUD TOTAL	**2,168**	**2,710**	**3,324**	**3,940**	**4,620**	**5,367**
C	FANNIN	WHITEWRIGHT	78	98	107	117	127	139
C	GRAYSON	WHITEWRIGHT	2,220	2,421	2,588	2,737	2,899	3,079
		WHITEWRIGHT TOTAL	**2,298**	**2,519**	**2,695**	**2,854**	**3,026**	**3,218**
C	FANNIN	WOLFE CITY	49	38	30	24	19	15
D	HUNT	WOLFE CITY	1,589	1,619	1,647	1,657	1,666	1,677
		WOLFE CITY TOTAL	**1,638**	**1,657**	**1,677**	**1,681**	**1,685**	**1,692**
C	COOKE	WOODBINE WSC	6,857	7,116	7,230	7,260	7,292	7,328
C	GRAYSON	WOODBINE WSC	87	96	103	110	117	125
		WOODBINE WSC TOTAL	**6,944**	**7,212**	**7,333**	**7,370**	**7,409**	**7,453**

Attachment Three

Region C Projected Municipal Demand by WUG, by County

ATTACHMENT 3 – REGION C PROJECTED MUNICIPAL DEMAND BY WUG, BY COUNTY

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	COLLIN	ALLEN	25,556	28,533	28,533	28,533	28,533	28,533
	COLLIN	ANNA	6,639	10,722	13,577	16,162	18,686	20,034
Yes	COLLIN	BEAR CREEK SUD	2,980	5,223	5,973	6,504	7,130	7,130
	COLLIN	BLUE RIDGE	278	362	459	556	663	781
Yes	COLLIN	CADDO BASIN SUD	287	1,464	2,344	2,706	3,020	3,122
Yes	COLLIN	CELINA	13,445	23,452	39,076	40,769	50,311	60,850
	COLLIN	COPEVILLE WSC	931	1,466	2,155	2,365	2,641	2,918
	COLLIN	COUNTY-OTHER	571	754	939	1,125	1,311	1,497
	COLLIN	CULLEOKA WSC	1,316	1,503	1,812	2,054	2,312	2,554
Yes	COLLIN	DALLAS	11,730	13,022	14,503	16,153	17,990	20,037
Yes	COLLIN	DESERT WSC	59	64	70	77	84	91
Yes	COLLIN	EAST FORK SUD	2,071	2,459	2,918	3,320	3,667	4,051
	COLLIN	FAIRVIEW	4,646	5,863	7,199	7,199	7,199	7,199
	COLLIN	FARMERSVILLE	659	1,618	3,206	3,648	4,130	4,562
Yes	COLLIN	FRISCO	43,641	52,705	52,815	52,815	52,815	52,815
Yes	COLLIN	FROGNOT WSC	208	259	318	377	441	513
Yes	COLLIN	HICKORY CREEK SUD	16	21	26	31	37	44
Yes	COLLIN	JOSEPHINE	1,136	2,523	3,667	4,101	4,587	4,587
	COLLIN	LUCAS	3,226	3,681	3,771	3,771	3,771	3,771
	COLLIN	MCKINNEY	48,864	57,687	73,839	92,883	92,883	92,883
	COLLIN	MELISSA	9,505	14,123	18,969	23,555	25,761	25,761
	COLLIN	MILLIGAN WSC	387	404	474	553	641	714
	COLLIN	MURPHY	4,832	4,914	5,428	6,017	6,658	7,128

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
Yes	COLLIN	MUSTANG SUD	518	753	959	1,172	1,343	1,502
Yes	COLLIN	NEVADA SUD	537	678	1,007	2,125	3,793	5,098
	COLLIN	NORTH COLLIN SUD	1,080	1,216	1,485	1,783	2,078	2,422
	COLLIN	NORTH FARMERSVILLE WSC	99	117	152	177	200	211
	COLLIN	PARKER	2,913	3,714	5,126	5,958	5,958	5,958
Yes	COLLIN	PLANO	70,410	70,627	77,776	80,110	80,110	80,110
	COLLIN	PRINCETON	5,085	10,783	14,621	16,324	17,769	17,769
Yes	COLLIN	PROSPER	10,137	11,731	14,041	14,623	15,470	15,470
Yes	COLLIN	RICHARDSON	15,573	16,366	17,729	18,261	18,261	18,261
Yes	COLLIN	ROYSE CITY	1,257	2,311	3,337	3,683	4,138	4,138
Yes	COLLIN	SACHSE	1,734	1,840	2,090	2,185	2,249	2,249
	COLLIN	SEIS LAGOS UD	656	633	665	691	707	709
Yes	COLLIN	SOUTH GRAYSON SUD	151	197	251	305	365	431
	COLLIN	VERONA SUD	442	555	685	816	961	1,120
Yes	COLLIN	WEST LEONARD WSC	44	55	67	79	93	108
Yes	COLLIN	WESTMINSTER SUD	404	504	618	733	860	1,000
	COLLIN	WYLIE	6,935	6,830	7,157	7,372	7,372	7,372
	COLLIN	WYLIE NORTHEAST SUD	1,851	2,278	2,807	3,006	3,086	3,086
	COLLIN TOTAL		**302,809**	**364,010**	**432,644**	**474,677**	**500,084**	**518,589**
Yes	COOKE	BOLIVAR WSC	255	278	287	293	299	305
	COOKE	CALLISBURG WSC	141	146	149	150	151	152

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	COOKE	COUNTY-OTHER	763	785	809	833	864	889
	COOKE	GAINESVILLE	2,741	2,812	2,851	2,981	3,217	3,450
	COOKE	LAKE KIOWA SUD	942	993	1,015	1,024	1,035	1,046
	COOKE	LINDSAY	216	220	223	223	223	223
Yes	COOKE	MOUNTAIN SPRINGS WSC	317	317	319	317	315	312
	COOKE	MUENSTER	357	355	355	355	355	355
Yes	COOKE	TWO WAY SUD	6	6	6	7	7	7
Yes	COOKE	WOODBINE WSC	703	725	737	740	743	747
	COOKE TOTAL		**6,441**	**6,637**	**6,751**	**6,923**	**7,209**	**7,486**
	DALLAS	ADDISON	8,324	9,360	9,922	10,255	10,622	11,025
Yes	DALLAS	AMC CREEKSIDE	37	45	50	53	56	59
	DALLAS	BALCH SPRINGS	2,854	3,033	3,316	3,614	3,993	4,191
Yes	DALLAS	CARROLLTON	9,995	10,527	11,157	11,820	12,523	12,571
	DALLAS	CEDAR HILL	10,544	11,467	12,517	13,527	14,619	15,799
	DALLAS	COCKRELL HILL	525	489	471	460	447	433
Yes	DALLAS	COMBINE WSC	70	75	78	79	81	83
Yes	DALLAS	COPPELL	11,021	10,958	10,980	10,997	11,021	11,021
	DALLAS	COUNTY-OTHER	2,037	2,851	3,665	4,479	5,294	6,108
Yes	DALLAS	DALLAS	276,907	286,506	297,389	308,685	320,410	332,580
	DALLAS	DESOTO	10,093	10,729	11,088	11,295	11,523	11,775
	DALLAS	DUNCANVILLE	6,037	6,319	6,487	6,507	6,507	6,507
Yes	DALLAS	EAST FORK SUD	544	646	766	872	963	1,064
	DALLAS	FARMERS BRANCH	10,602	11,536	12,050	12,352	12,683	13,049
	DALLAS	GARLAND	40,812	43,884	45,816	47,228	47,510	47,510

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
Yes	DALLAS	GLENN HEIGHTS	1,486	1,620	1,695	1,740	1,788	1,842
Yes	DALLAS	GRAND PRAIRIE	23,012	26,086	29,559	30,414	31,554	31,554
	DALLAS	HIGHLAND PARK	4,144	4,139	4,139	4,139	4,139	4,139
	DALLAS	HUTCHINS	1,841	2,037	2,148	2,214	2,286	2,365
	DALLAS	IRVING	60,093	63,617	63,666	63,715	63,766	63,766
	DALLAS	LANCASTER	7,427	7,847	8,088	8,226	8,379	8,547
	DALLAS	LANCASTER MUD 1	275	341	376	398	421	447
Yes	DALLAS	LEWISVILLE	176	177	189	191	195	195
	DALLAS	MESQUITE	24,067	24,950	27,685	31,178	35,084	38,413
Yes	DALLAS	OVILLA	109	118	128	139	151	165
Yes	DALLAS	RICHARDSON	13,410	13,844	14,505	14,941	14,941	14,941
Yes	DALLAS	ROCKETT SUD	86	95	103	106	110	111
Yes	DALLAS	ROWLETT	9,781	10,287	11,872	12,539	13,034	13,034
Yes	DALLAS	SACHSE	3,516	3,759	4,258	4,445	4,566	4,566
	DALLAS	SEAGOVILLE	2,217	2,416	2,529	2,596	2,669	2,749
	DALLAS	SUNNYVALE	3,010	3,782	4,488	4,680	4,750	4,750
	DALLAS	UNIVERSITY PARK	7,518	7,502	7,502	7,502	7,502	7,502
	DALLAS	WILMER	814	913	969	1,003	1,039	1,079
	DALLAS TOTAL		**553,384**	**581,955**	**609,651**	**632,389**	**654,626**	**673,940**
Yes	DENTON	AMC CREEKSIDE	144	181	219	258	302	349
	DENTON	ARGYLE WSC	2,674	3,458	4,583	5,664	6,458	7,041
	DENTON	AUBREY	949	1,650	2,833	3,853	4,634	4,634
	DENTON	BLACK ROCK WSC	374	469	569	671	783	907
Yes	DENTON	BOLIVAR WSC	1,285	1,604	1,946	2,294	2,793	3,430
Yes	DENTON	CARROLLTON	15,674	16,532	17,491	18,510	19,587	19,662

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
Yes	DENTON	CELINA	260	445	767	814	1,027	1,242
Yes	DENTON	COPPELL	371	357	368	377	389	389
	DENTON	CORINTH	4,884	5,255	6,543	6,732	7,008	7,008
	DENTON	COUNTY-OTHER	6,119	9,640	13,184	16,727	22,043	25,586
	DENTON	CROSS TIMBERS WSC	2,103	2,634	3,198	3,771	4,451	5,436
Yes	DENTON	DALLAS	7,624	9,385	11,672	14,095	16,792	19,702
	DENTON	DENTON	31,573	40,291	49,891	59,284	70,931	82,318
	DENTON	DENTON COUNTY FWSD 10	1,158	1,155	1,155	1,155	1,155	1,155
	DENTON	DENTON COUNTY FWSD 11-C	363	569	786	1,006	1,248	1,515
	DENTON	DENTON COUNTY FWSD 1-A	3,979	5,348	5,717	5,794	5,907	5,907
	DENTON	DENTON COUNTY FWSD 7	3,194	3,367	3,367	3,367	3,367	3,367
Yes	DENTON	FLOWER MOUND	23,525	29,430	35,693	35,693	35,693	35,693
Yes	DENTON	FORT WORTH	5,081	7,584	9,304	11,598	14,125	16,908
Yes	DENTON	FRISCO	32,653	39,487	39,843	39,843	39,843	39,843
	DENTON	HACKBERRY	1,435	2,025	2,648	3,282	3,981	4,750
	DENTON	HIGHLAND VILLAGE	3,667	3,914	3,957	3,957	3,957	3,957
	DENTON	JUSTIN	1,196	1,671	2,342	3,284	4,603	6,452
	DENTON	KRUM	1,559	2,074	2,767	3,691	4,923	6,567
	DENTON	LAKE CITIES MUNICIPAL UTILITY AUTHORITY	2,411	2,913	3,050	3,082	3,102	3,102
Yes	DENTON	LEWISVILLE	19,229	19,269	20,598	20,877	21,283	21,283

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	DENTON	LITTLE ELM	5,915	5,620	5,934	6,195	6,366	6,366
Yes	DENTON	MOUNTAIN SPRINGS WSC	11	14	17	20	23	27
Yes	DENTON	MUSTANG SUD	15,484	21,922	29,322	36,650	42,527	47,556
	DENTON	NORTHLAKE	5,222	5,783	7,177	8,431	9,701	10,645
	DENTON	PALOMA CREEK NORTH	1,198	1,194	1,194	1,194	1,194	1,194
	DENTON	PALOMA CREEK SOUTH	1,841	1,835	1,835	1,835	1,835	1,835
Yes	DENTON	PILOT POINT	827	1,065	1,834	2,632	2,839	2,839
Yes	DENTON	PLANO	2,106	2,184	2,405	2,478	2,478	2,478
	DENTON	PONDER	692	921	1,164	1,411	1,683	1,982
Yes	DENTON	PROSPER	4,192	5,108	6,071	6,298	6,630	6,630
	DENTON	PROVIDENCE VILLAGE WCID	909	904	904	904	904	904
	DENTON	ROANOKE	3,915	3,810	3,892	3,957	4,052	4,052
	DENTON	SANGER	1,505	1,882	2,285	2,972	3,754	4,740
Yes	DENTON	SOUTHLAKE	286	265	238	210	180	150
	DENTON	TERRA SOUTHWEST	235	297	364	432	507	589
	DENTON	THE COLONY	7,638	8,939	9,988	9,988	9,988	9,988
Yes	DENTON	TROPHY CLUB MUD 1	5,006	4,998	4,998	4,998	4,998	4,998
	DENTON TOTAL		**230,466**	**277,448**	**324,113**	**360,284**	**400,044**	**435,176**
	ELLIS	AVALON WATER SUPPLY & SEWER SERVICE	122	136	151	166	183	202

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	ELLIS	BUENA VISTA-BETHEL SUD	1,961	2,382	2,842	3,307	3,818	4,381
	ELLIS	COUNTY-OTHER	772	823	877	931	986	1,040
	ELLIS	EAST GARRETT WSC	291	369	454	540	635	740
	ELLIS	ENNIS	3,721	3,892	4,092	4,272	4,476	4,704
	ELLIS	FERRIS	474	501	531	559	591	626
Yes	ELLIS	FILES VALLEY WSC	166	200	237	275	316	362
Yes	ELLIS	GLENN HEIGHTS	896	1,149	1,428	1,712	2,024	2,367
Yes	ELLIS	HILCO UNITED SERVICES	124	133	143	152	163	175
	ELLIS	ITALY	249	248	248	247	246	245
Yes	ELLIS	MANSFIELD	157	188	221	256	293	335
	ELLIS	MIDLOTHIAN	7,672	8,752	10,446	12,038	13,700	15,005
Yes	ELLIS	MOUNTAIN PEAK SUD	6,543	8,720	11,099	13,522	16,183	19,108
	ELLIS	NASH FORRESTON WSC	230	274	324	374	429	489
Yes	ELLIS	OVILLA	1,169	1,484	1,828	2,177	2,561	2,983
	ELLIS	PALMER	276	329	389	449	515	588
	ELLIS	RED OAK	1,753	2,177	2,645	3,119	3,640	4,213
Yes	ELLIS	RICE WATER SUPPLY AND SEWER SERVICE	647	773	913	1,054	1,209	1,379
Yes	ELLIS	ROCKETT SUD	4,285	5,094	6,105	7,029	8,476	9,652
	ELLIS	SARDIS LONE ELM WSC	5,534	6,825	8,242	8,610	8,610	8,610
Yes	ELLIS	SOUTH ELLIS COUNTY WSC	542	649	767	885	1,016	1,159

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	ELLIS	WAXAHACHIE	8,654	10,663	12,873	15,107	17,564	20,267
	ELLIS TOTAL		**46,238**	**55,761**	**66,855**	**76,781**	**87,634**	**98,630**
	FANNIN	ARLEDGE RIDGE WSC	230	248	257	265	274	283
Yes	FANNIN	BOIS D ARC MUD	341	356	366	372	379	387
	FANNIN	BONHAM	1,944	2,362	3,353	4,422	5,855	7,120
	FANNIN	COUNTY-OTHER	404	406	430	458	503	529
Yes	FANNIN	DELTA COUNTY MUD	7	8	9	10	10	11
Yes	FANNIN	DESERT WSC	128	145	153	161	169	179
Yes	FANNIN	FROGNOT WSC	3	4	5	5	6	7
Yes	FANNIN	HICKORY CREEK SUD	44	41	40	37	35	33
	FANNIN	HONEY GROVE	278	284	284	284	284	284
	FANNIN	LADONIA	117	144	207	305	377	377
	FANNIN	LEONARD	383	412	488	571	682	819
Yes	FANNIN	NORTH HUNT SUD	16	16	17	17	17	18
	FANNIN	SAVOY	94	93	93	92	91	89
Yes	FANNIN	SOUTHWEST FANNIN COUNTY SUD	669	735	770	801	835	872
	FANNIN	TRENTON	144	154	160	164	169	174
Yes	FANNIN	WEST LEONARD WSC	248	297	320	344	370	398
	FANNIN	WHITE SHED WSC	245	256	263	267	272	277
Yes	FANNIN	WHITEWRIGHT	14	18	19	21	23	25
Yes	FANNIN	WOLFE CITY	5	4	3	2	2	2

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	FANNIN TOTAL		**5,314**	**5,983**	**7,237**	**8,598**	**10,353**	**11,884**
	FREESTONE	BUTLER WSC	180	177	175	170	164	158
	FREESTONE	COUNTY-OTHER	326	297	254	258	259	257
	FREESTONE	FAIRFIELD	1,007	973	944	883	822	762
Yes	FREESTONE	FLO COMMUNITY WSC	18	18	18	18	18	18
Yes	FREESTONE	PLEASANT GROVE WSC	126	136	149	145	141	136
Yes	FREESTONE	POINT ENTERPRISE WSC	116	115	113	113	113	113
	FREESTONE	SOUTH FREESTONE COUNTY WSC	250	260	275	267	258	249
Yes	FREESTONE	SOUTHERN OAKS WATER SUPPLY	121	154	197	192	187	181
	FREESTONE	TEAGUE	575	524	457	441	424	406
	FREESTONE	WORTHAM	128	116	100	96	92	89
	FREESTONE TOTAL		**2,847**	**2,770**	**2,682**	**2,583**	**2,478**	**2,369**
	GRAYSON	BELLS	179	194	207	219	232	246
	GRAYSON	COLLINSVILLE	280	306	329	351	374	399
	GRAYSON	COUNTY-OTHER	1,372	1,282	1,355	1,428	1,565	1,589
	GRAYSON	DENISON	11,860	15,077	17,969	20,896	24,712	26,830
Yes	GRAYSON	DESERT WSC	113	122	131	138	146	155
	GRAYSON	DORCHESTER	222	228	232	234	237	240
	GRAYSON	GUNTER	305	354	395	436	480	528
	GRAYSON	HOWE	438	522	595	667	745	830
	GRAYSON	KENTUCKYTOWN WSC	345	376	404	428	456	485

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	GRAYSON	LUELLA SUD	275	274	274	274	274	274
Yes	GRAYSON	MUSTANG SUD	346	504	646	789	895	1,001
	GRAYSON	NORTHWEST GRAYSON COUNTY WCID 1	199	221	240	257	277	298
	GRAYSON	OAK RIDGE SOUTH GALE WSC	236	239	244	245	247	249
Yes	GRAYSON	PILOT POINT	17	20	37	52	58	58
	GRAYSON	PINK HILL WSC	246	272	294	314	336	361
	GRAYSON	POTTSBORO	596	647	692	732	775	823
Yes	GRAYSON	RED RIVER AUTHORITY OF TEXAS	254	304	347	390	436	486
	GRAYSON	SHERMAN	11,274	12,225	13,046	13,766	14,560	15,434
Yes	GRAYSON	SOUTH GRAYSON SUD	479	531	577	619	665	716
	GRAYSON	SOUTHMAYD	103	106	108	109	111	112
Yes	GRAYSON	SOUTHWEST FANNIN COUNTY SUD	149	162	173	183	194	205
	GRAYSON	STARR WSC	230	249	266	281	298	316
	GRAYSON	TIOGA	236	279	316	353	392	435
	GRAYSON	TOM BEAN	205	204	204	204	204	204
Yes	GRAYSON	TWO WAY SUD	783	825	983	1,074	1,193	1,267
	GRAYSON	VAN ALSTYNE	946	1,825	2,905	3,567	4,674	5,494
Yes	GRAYSON	WESTMINSTER SUD	6	7	8	9	10	11
	GRAYSON	WHITESBORO	571	619	661	699	740	785

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
Yes	GRAYSON	WHITEWRIGHT	399	433	463	490	519	551
Yes	GRAYSON	WOODBINE WSC	9	10	10	11	12	13
	GRAYSON TOTAL		**32,673**	**38,417**	**44,111**	**49,215**	**55,817**	**60,395**
Yes	HENDERSON	ATHENS	2,591	3,119	4,108	4,956	5,981	6,607
Yes	HENDERSON	B B S WSC	2	2	2	2	2	2
Yes	HENDERSON	BETHEL ASH WSC	299	312	315	323	331	340
Yes	HENDERSON	BRUSHY CREEK WSC	104	107	109	112	114	117
	HENDERSON	COUNTY-OTHER	437	521	608	695	782	869
	HENDERSON	CRESCENT HEIGHTS WSC	150	154	171	174	177	180
	HENDERSON	DOGWOOD ESTATES WATER	175	170	181	183	185	187
	HENDERSON	EAST CEDAR CREEK FWSD	3,591	3,799	3,829	3,914	4,007	4,111
	HENDERSON	EUSTACE	322	351	344	356	368	382
	HENDERSON	LOG CABIN	114	114	119	121	123	125
Yes	HENDERSON	MABANK	677	743	725	750	777	808
	HENDERSON	MALAKOFF	270	285	299	303	308	312
	HENDERSON	TRINIDAD	159	161	167	170	173	177
Yes	HENDERSON	VIRGINIA HILL WSC	184	189	194	198	202	207
Yes	HENDERSON	WEST CEDAR CREEK MUD	1,037	963	1,063	1,064	1,064	1,063
	HENDERSON TOTAL		**10,112**	**10,990**	**12,234**	**13,321**	**14,594**	**15,487**
	JACK	COUNTY-OTHER	486	461	429	408	386	365
	JACK	JACKSBORO	790	776	800	836	903	931

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	JACK TOTAL		**1,276**	**1,237**	**1,229**	**1,244**	**1,289**	**1,296**
Yes	KAUFMAN	ABLES SPRINGS SUD	399	416	485	546	619	650
	KAUFMAN	BECKER JIBA WSC	390	611	828	978	1,145	1,329
	KAUFMAN	COLLEGE MOUND SUD	1,291	1,435	1,941	3,002	4,095	5,187
Yes	KAUFMAN	COMBINE WSC	260	298	348	404	467	535
	KAUFMAN	COUNTY-OTHER	1,460	1,685	2,254	2,639	3,391	3,869
	KAUFMAN	CRANDALL	992	2,121	3,548	5,153	7,277	8,725
	KAUFMAN	ELMO WSC	190	221	263	309	360	416
	KAUFMAN	FORNEY	4,304	5,511	6,823	8,056	8,956	8,956
	KAUFMAN	FORNEY LAKE WSC	3,061	3,512	3,655	3,972	4,052	4,131
	KAUFMAN	GASTONIA SCURRY SUD	1,430	1,666	2,235	3,763	5,570	6,838
Yes	KAUFMAN	HEATH	62	87	122	125	125	125
Yes	KAUFMAN	HIGH POINT WSC	1,707	2,627	3,814	5,177	6,673	8,316
	KAUFMAN	KAUFMAN	1,252	1,408	2,024	2,558	3,057	3,565
	KAUFMAN	KAUFMAN COUNTY DEVELOPMENT DISTRICT 1	905	959	1,484	2,300	3,412	3,945
	KAUFMAN	KAUFMAN COUNTY MUD 11	720	853	1,096	1,385	1,698	1,882
	KAUFMAN	KAUFMAN COUNTY MUD 14	1,714	1,712	1,712	1,712	1,712	1,712
	KAUFMAN	KEMP	281	290	303	315	329	345
Yes	KAUFMAN	MABANK	1,234	1,242	1,254	1,255	1,261	1,271
Yes	KAUFMAN	MACBEE SUD	32	39	48	58	69	81

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	KAUFMAN	MARKOUT WSC	504	597	833	1,200	1,602	2,137
	KAUFMAN	NORTH KAUFMAN WSC	232	305	398	504	620	749
Yes	KAUFMAN	POETRY WSC	217	279	450	717	1,128	1,351
	KAUFMAN	ROSE HILL SUD	410	492	581	668	738	815
	KAUFMAN	TALTY SUD	1,946	2,166	3,192	4,583	6,321	7,433
	KAUFMAN	TERRELL	4,128	4,698	5,760	6,695	7,929	8,893
Yes	KAUFMAN	WEST CEDAR CREEK MUD	49	59	73	88	104	123
	KAUFMAN TOTAL		**29,170**	**35,289**	**45,524**	**58,162**	**72,710**	**83,379**
	NAVARRO	B AND B WSC	307	337	363	387	413	442
	NAVARRO	BLOOMING GROVE	170	176	191	204	221	239
Yes	NAVARRO	BRANDON IRENE WSC	21	25	27	30	33	37
	NAVARRO	CHATFIELD WSC	344	368	389	408	429	452
	NAVARRO	CORBET WSC	211	225	238	249	261	275
	NAVARRO	CORSICANA	6,265	6,688	7,053	7,368	7,716	8,098
	NAVARRO	COUNTY-OTHER	756	787	843	910	1,019	1,084
	NAVARRO	DAWSON	134	135	137	136	136	135
	NAVARRO	KERENS	169	155	143	133	123	114
	NAVARRO	M E N WSC	512	589	654	718	789	866
Yes	NAVARRO	NAVARRO MILLS WSC	288	308	325	341	357	376
Yes	NAVARRO	PLEASANT GROVE WSC	12	12	13	14	14	15
Yes	NAVARRO	POST OAK SUD	113	106	100	91	82	73

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
Yes	NAVARRO	RICE WATER SUPPLY AND SEWER SERVICE	459	543	646	767	912	1,084
Yes	NAVARRO	SOUTH ELLIS COUNTY WSC	25	31	35	39	44	49
Yes	NAVARRO	SOUTHERN OAKS WATER SUPPLY	29	40	48	57	67	78
	NAVARRO TOTAL		**9,815**	**10,525**	**11,205**	**11,852**	**12,616**	**13,417**
	PARKER	ALEDO	1,410	1,515	1,858	2,121	2,417	2,596
	PARKER	ANNETTA	445	531	619	707	795	883
Yes	PARKER	AZLE	512	649	805	972	1,155	1,357
Yes	PARKER	COMMUNITY WSC	6	9	12	16	20	24
	PARKER	COUNTY-OTHER	8,769	13,957	20,602	28,108	37,463	44,628
Yes	PARKER	FORT WORTH	725	832	854	935	1,024	1,123
	PARKER	HORSESHOE BEND WATER SYSTEM	179	201	255	335	456	597
	PARKER	HUDSON OAKS	1,872	1,934	1,987	2,053	2,140	2,208
Yes	PARKER	MINERAL WELLS	353	372	391	410	410	410
Yes	PARKER	NORTH RURAL WSC	149	179	214	252	292	337
	PARKER	PARKER COUNTY SUD	937	1,271	1,722	2,316	3,167	4,285
Yes	PARKER	RENO (PARKER)	282	343	413	486	566	655
Yes	PARKER	SANTO SUD	21	25	29	34	40	46
	PARKER	SPRINGTOWN	1,182	1,572	2,177	2,653	3,079	3,401
Yes	PARKER	STURDIVANT PROGRESS WSC	2	2	2	2	1	1

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
Yes	PARKER	WALNUT CREEK SUD	3,228	3,511	4,880	7,306	10,166	13,013
	PARKER	WEATHERFORD	8,205	9,760	11,548	13,424	15,491	17,767
	PARKER	WILLOW PARK	1,228	1,471	1,750	2,044	2,368	2,724
	PARKER TOTAL		**29,505**	**38,134**	**50,118**	**64,174**	**81,050**	**96,055**
Yes	ROCKWALL	BEAR CREEK SUD	227	375	428	467	512	512
	ROCKWALL	BLACKLAND WSC	916	950	1,024	1,188	1,279	1,376
Yes	ROCKWALL	CASH SUD	376	496	644	800	971	1,159
	ROCKWALL	COUNTY-OTHER	415	342	510	588	912	1,139
Yes	ROCKWALL	EAST FORK SUD	325	386	459	522	576	637
	ROCKWALL	FATE	4,426	6,376	8,752	11,265	14,025	17,061
Yes	ROCKWALL	HEATH	3,751	4,971	6,587	6,749	6,749	6,749
Yes	ROCKWALL	HIGH POINT WSC	163	235	323	416	519	632
	ROCKWALL	MOUNT ZION WSC	403	415	430	443	458	476
Yes	ROCKWALL	NEVADA SUD	22	27	41	88	158	212
	ROCKWALL	R C H WSC	1,179	1,336	1,705	2,275	2,775	3,384
	ROCKWALL	ROCKWALL	10,089	12,332	16,427	21,919	22,762	22,762
Yes	ROCKWALL	ROWLETT	1,769	1,811	2,181	2,354	2,483	2,483
Yes	ROCKWALL	ROYSE CITY	4,035	7,912	10,223	11,063	12,289	12,060
	ROCKWALL TOTAL		**28,096**	**37,964**	**49,734**	**60,137**	**66,468**	**70,642**
	TARRANT	ARLINGTON	74,649	80,933	86,223	90,489	96,329	99,192
Yes	TARRANT	AZLE	1,985	2,211	2,405	2,557	2,725	2,909
	TARRANT	BEDFORD	9,733	10,445	10,614	11,153	11,153	11,153
	TARRANT	BENBROOK WATER AUTHORITY	6,152	6,633	7,124	7,615	8,106	8,597
Yes	TARRANT	BETHESDA WSC	72	79	86	90	96	102

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	TARRANT	BLUE MOUND	195	214	231	244	258	275
Yes	TARRANT	BURLESON	1,516	1,695	1,847	1,967	2,099	2,245
	TARRANT	COLLEYVILLE	10,775	10,758	10,758	10,758	10,758	10,758
Yes	TARRANT	COMMUNITY WSC	602	671	730	776	828	884
	TARRANT	COUNTY-OTHER	6,760	9,888	13,034	16,180	19,326	22,472
Yes	TARRANT	CROWLEY	3,202	3,788	4,286	4,688	5,130	5,615
	TARRANT	DALWORTHINGTON GARDENS	901	908	915	915	917	919
	TARRANT	EDGECLIFF	636	634	634	634	634	634
	TARRANT	EULESS	9,840	9,801	9,801	9,801	9,801	9,801
	TARRANT	EVERMAN	544	540	540	540	540	540
Yes	TARRANT	FLOWER MOUND	225	263	327	342	361	361
	TARRANT	FOREST HILL	1,595	1,755	1,895	2,004	2,124	2,256
Yes	TARRANT	FORT WORTH	210,962	247,795	252,300	269,789	289,020	310,171
Yes	TARRANT	GRAND PRAIRIE	12,150	13,102	14,474	14,872	15,451	15,451
	TARRANT	GRAPEVINE	18,743	18,691	18,691	18,691	18,691	18,691
	TARRANT	HALTOM CITY	5,335	5,303	5,303	5,303	5,303	5,303
	TARRANT	HASLET	2,574	3,513	4,629	5,037	5,490	5,490
	TARRANT	HURST	6,792	6,748	6,761	6,771	6,787	6,787
Yes	TARRANT	JOHNSON COUNTY SUD	360	417	433	449	465	482
	TARRANT	KELLER	12,863	13,043	13,043	13,043	13,043	13,043
	TARRANT	KENNEDALE	1,852	2,503	3,277	4,093	4,925	5,690
	TARRANT	LAKE WORTH	1,259	1,372	1,457	1,529	1,599	1,662
	TARRANT	LAKESIDE	583	582	582	582	582	582
Yes	TARRANT	MANSFIELD	27,654	29,081	35,273	49,803	49,765	49,724

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
	TARRANT	NORTH RICHLAND HILLS	13,934	14,841	15,086	15,280	15,562	15,562
	TARRANT	PANTEGO	673	671	671	671	671	671
	TARRANT	PELICAN BAY	199	267	358	479	643	862
Yes	TARRANT	RENO (PARKER)	5	6	6	7	7	8
	TARRANT	RICHLAND HILLS	1,273	1,400	1,509	1,701	1,873	2,063
	TARRANT	RIVER OAKS	882	874	880	885	891	891
	TARRANT	SAGINAW	3,974	4,344	4,382	4,412	4,456	4,456
	TARRANT	SANSOM PARK	646	711	767	811	860	914
Yes	TARRANT	SOUTHLAKE	14,382	16,137	17,253	18,247	19,245	20,182
Yes	TARRANT	TROPHY CLUB MUD 1	376	484	574	648	729	818
	TARRANT	WATAUGA	2,730	2,716	2,716	2,716	2,716	2,716
	TARRANT	WESTLAKE	3,519	4,611	5,521	6,271	7,090	7,990
	TARRANT	WESTOVER HILLS	919	916	920	922	927	927
	TARRANT	WESTWORTH VILLAGE	442	451	479	504	528	550
	TARRANT	WHITE SETTLEMENT	2,400	2,636	2,841	3,001	3,177	3,371
	TARRANT TOTAL		**476,863**	**534,431**	**561,636**	**607,270**	**641,681**	**673,770**
	WISE	ALVORD	412	509	596	666	742	827
Yes	WISE	BOLIVAR WSC	130	142	154	163	173	184
	WISE	BOYD	240	305	417	519	616	681
	WISE	BRIDGEPORT	986	1,006	1,029	1,041	1,055	1,070
	WISE	CHICO	396	395	395	395	395	395
	WISE	COUNTY-OTHER	6,075	9,274	13,903	19,206	26,208	31,172
	WISE	DECATUR	2,890	3,426	4,621	5,697	7,212	8,361

IN MULTIPLE COUNTIES OR REGIONS?	COUNTY	WATER USER GROUP (WUG)	REGION C FINAL MUNICIPAL DEMAND (ACRE FEET PER YEAR)					
			2030	2040	2050	2060	2070	2080
Yes	WISE	FORT WORTH	479	551	568	624	687	755
	WISE	NEWARK	131	166	240	351	522	666
	WISE	RHOME	385	495	731	1,061	1,562	2,083
	WISE	RUNAWAY BAY	676	829	1,016	1,247	1,529	1,876
Yes	WISE	WALNUT CREEK SUD	572	610	842	1,268	1,794	2,296
	WISE	WEST WISE SUD	481	525	566	598	632	670
	WISE TOTAL		**13,853**	**18,233**	**25,078**	**32,836**	**43,127**	**51,036**
	REGION C TOTAL		***1,778,862***	***2,019,784***	***2,250,802***	***2,460,446***	***2,651,780***	***2,813,551***

Attachment Four

Municipal Demand for WUGs in Multiple Counties or Regions

ATTACHMENT 4- PROJECTED MUNICIPAL DEMAND FOR WUGS IN MULTIPLE COUNTIES OR REGIONS

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
C	KAUFMAN	ABLES SPRINGS SUD	399	416	485	546	619	650
D	HUNT	ABLES SPRINGS SUD	42	45	48	51	53	56
D	VAN ZANDT	ABLES SPRINGS SUD	2	2	3	3	3	3
		ABLES SPRINGS SUD TOTAL	**443**	**463**	**536**	**600**	**675**	**709**
C	DALLAS	AMC CREEKSIDE	37	45	50	53	56	59
C	DENTON	AMC CREEKSIDE	144	181	219	258	302	349
		AMC CREEKSIDE TOTAL	**181**	**226**	**269**	**311**	**358**	**408**
C	HENDERSON	ATHENS	2,591	3,119	4,108	4,956	5,981	6,607
I	HENDERSON	ATHENS	42	42	42	42	42	42
		ATHENS TOTAL	**2,633**	**3,161**	**4,150**	**4,998**	**6,023**	**6,649**
C	PARKER	AZLE	512	649	805	972	1,155	1,357
C	TARRANT	AZLE	1,985	2,211	2,405	2,557	2,725	2,909
		AZLE TOTAL	**2,497**	**2,860**	**3,210**	**3,529**	**3,880**	**4,266**
C	HENDERSON	B B S WSC	2	2	2	2	2	2
I	ANDERSON	B B S WSC	138	137	135	133	132	130
		B B S WSC TOTAL	**140**	**139**	**137**	**135**	**134**	**132**
C	COLLIN	BEAR CREEK SUD	2,980	5,223	5,973	6,504	7,130	7,130
C	ROCKWALL	BEAR CREEK SUD	227	375	428	467	512	512
		BEAR CREEK SUD TOTAL	**3,207**	**5,598**	**6,401**	**6,971**	**7,642**	**7,642**
C	HENDERSON	BETHEL ASH WSC	299	312	315	323	331	340
I	HENDERSON	BETHEL ASH WSC	269	270	281	285	290	294
D	VAN ZANDT	BETHEL ASH WSC	168	184	200	216	233	249
		BETHEL ASH WSC TOTAL	**736**	**766**	**796**	**824**	**854**	**883**
C	TARRANT	BETHESDA WSC	72	79	86	90	96	102
G	JOHNSON	BETHESDA WSC	7,272	8,384	9,523	10,556	11,715	13,017
		BETHESDA WSC TOTAL	**7,344**	**8,463**	**9,609**	**10,646**	**11,811**	**13,119**
C	FANNIN	BOIS D ARC MUD	341	356	366	372	379	387

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
D	LAMAR	BOIS D ARC MUD	2	2	2	2	2	2
		BOIS D ARC MUD TOTAL	**343**	**358**	**368**	**374**	**381**	**389**
C	COOKE	BOLIVAR WSC	255	278	287	293	299	305
C	DENTON	BOLIVAR WSC	1,285	1,604	1,946	2,294	2,793	3,430
C	WISE	BOLIVAR WSC	130	142	154	163	173	184
		BOLIVAR WSC TOTAL	**1,670**	**2,024**	**2,387**	**2,750**	**3,265**	**3,919**
C	NAVARRO	BRANDON IRENE WSC	21	25	27	30	33	37
G	HILL	BRANDON IRENE WSC	532	546	557	568	580	594
		BRANDON IRENE WSC TOTAL	**553**	**571**	**584**	**598**	**613**	**631**
C	HENDERSON	BRUSHY CREEK WSC	104	107	109	112	114	117
I	HENDERSON	BRUSHY CREEK WSC	5	5	5	5	5	5
I	ANDERSON	BRUSHY CREEK WSC	430	427	422	416	411	406
		BRUSHY CREEK WSC TOTAL	**539**	**539**	**536**	**533**	**530**	**528**
C	TARRANT	BURLESON	1,516	1,695	1,847	1,967	2,099	2,245
G	JOHNSON	BURLESON	6,647	7,781	8,946	10,007	11,199	12,536
		BURLESON TOTAL	**8,163**	**9,476**	**10,793**	**11,974**	**13,298**	**14,781**
C	COLLIN	CADDO BASIN SUD	287	1,464	2,344	2,706	3,020	3,122
D	HUNT	CADDO BASIN SUD	1,989	1,786	2,086	2,152	2,133	2,325
		CADDO BASIN SUD TOTAL	**2,276**	**3,250**	**4,430**	**4,858**	**5,153**	**5,447**
C	DALLAS	CARROLLTON	9,995	10,527	11,157	11,820	12,523	12,571
C	DENTON	CARROLLTON	15,674	16,532	17,491	18,510	19,587	19,662
		CARROLLTON TOTAL	**25,669**	**27,059**	**28,648**	**30,330**	**32,110**	**32,233**
C	ROCKWALL	CASH SUD	376	496	644	800	971	1,159
D	HOPKINS	CASH SUD	27	31	34	42	44	53
D	HUNT	CASH SUD	2,448	2,769	3,090	3,312	3,310	3,480
D	RAINS	CASH SUD	116	127	150	185	214	248
		CASH SUD TOTAL	**2,967**	**3,423**	**3,918**	**4,339**	**4,539**	**4,940**
C	COLLIN	CELINA	13,445	23,452	39,076	40,769	50,311	60,850

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
C	DENTON	CELINA	260	445	767	814	1,027	1,242
		CELINA TOTAL	**13,705**	**23,897**	**39,843**	**41,583**	**51,338**	**62,092**
C	DALLAS	COMBINE WSC	70	75	78	79	81	83
C	KAUFMAN	COMBINE WSC	260	298	348	404	467	535
		COMBINE WSC TOTAL	**330**	**373**	**426**	**483**	**548**	**618**
C	PARKER	COMMUNITY WSC	6	9	12	16	20	24
C	TARRANT	COMMUNITY WSC	602	671	730	776	828	884
		COMMUNITY WSC TOTAL	**608**	**680**	**742**	**792**	**848**	**908**
C	DALLAS	COPPELL	11,021	10,958	10,980	10,997	11,021	11,021
C	DENTON	COPPELL	371	357	368	377	389	389
		COPPELL TOTAL	**11,392**	**11,315**	**11,348**	**11,374**	**11,410**	**11,410**
C	TARRANT	CROWLEY	3,202	3,788	4,286	4,688	5,130	5,615
G	JOHNSON	CROWLEY	26	38	50	62	75	89
		CROWLEY TOTAL	**3,228**	**3,826**	**4,336**	**4,750**	**5,205**	**5,704**
C	COLLIN	DALLAS	11,730	13,022	14,503	16,153	17,990	20,037
C	DALLAS	DALLAS	276,907	286,506	297,389	308,685	320,410	332,580
C	DENTON	DALLAS	7,624	9,385	11,672	14,095	16,792	19,702
		DALLAS TOTAL	**296,261**	**308,913**	**323,564**	**338,933**	**355,192**	**372,319**
C	FANNIN	DELTA COUNTY MUD	7	8	9	10	10	11
D	DELTA	DELTA COUNTY MUD	191	194	196	199	201	204
		DELTA COUNTY MUD TOTAL	**198**	**202**	**205**	**209**	**211**	**215**
C	COLLIN	DESERT WSC	59	64	70	77	84	91
C	FANNIN	DESERT WSC	128	145	153	161	169	179
C	GRAYSON	DESERT WSC	113	122	131	138	146	155
		DESERT WSC TOTAL	**300**	**331**	**354**	**376**	**399**	**425**
C	COLLIN	EAST FORK SUD	2,071	2,459	2,918	3,320	3,667	4,051
C	DALLAS	EAST FORK SUD	544	646	766	872	963	1,064

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
C	ROCKWALL	EAST FORK SUD	325	386	459	522	576	637
		EAST FORK SUD TOTAL	**2,940**	**3,491**	**4,143**	**4,714**	**5,206**	**5,752**
C	ELLIS	FILES VALLEY WSC	166	200	237	275	316	362
G	HILL	FILES VALLEY WSC	706	725	738	752	768	785
		FILES VALLEY WSC TOTAL	**872**	**925**	**975**	**1,027**	**1,084**	**1,147**
C	FREESTONE	FLO COMMUNITY WSC	18	18	18	18	18	18
H	LEON	FLO COMMUNITY WSC	377	362	349	340	331	322
		FLO COMMUNITY WSC TOTAL	**395**	**380**	**367**	**358**	**349**	**340**
C	DENTON	FLOWER MOUND	23,525	29,430	35,693	35,693	35,693	35,693
C	TARRANT	FLOWER MOUND	225	263	327	342	361	361
		FLOWER MOUND TOTAL	**23,750**	**29,693**	**36,020**	**36,035**	**36,054**	**36,054**
C	DENTON	FORT WORTH	5,081	7,584	9,304	11,598	14,125	16,908
G	JOHNSON	FORT WORTH	0	0	978	1,553	1,925	1,909
C	PARKER	FORT WORTH	725	832	854	935	1,024	1,123
C	TARRANT	FORT WORTH	210,962	247,795	252,300	269,789	289,020	310,171
C	WISE	FORT WORTH	479	551	568	624	687	755
		FORT WORTH TOTAL	**217,247**	**256,762**	**264,004**	**284,499**	**306,781**	**330,866**
C	COLLIN	FRISCO	43,641	52,705	52,815	52,815	52,815	52,815
C	DENTON	FRISCO	32,653	39,487	39,843	39,843	39,843	39,843
		FRISCO TOTAL	**76,294**	**92,192**	**92,658**	**92,658**	**92,658**	**92,658**
C	COLLIN	FROGNOT WSC	208	259	318	377	441	513
C	FANNIN	FROGNOT WSC	3	4	5	5	6	7
D	HUNT	FROGNOT WSC	2	3	3	4	4	5
		FROGNOT WSC TOTAL	**213**	**266**	**326**	**386**	**451**	**525**
C	DALLAS	GLENN HEIGHTS	1,486	1,620	1,695	1,740	1,788	1,842
C	ELLIS	GLENN HEIGHTS	896	1,149	1,428	1,712	2,024	2,367
		GLENN HEIGHTS TOTAL	**2,382**	**2,769**	**3,123**	**3,452**	**3,812**	**4,209**

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
C	DALLAS	GRAND PRAIRIE	23,012	26,086	29,559	30,414	31,554	31,554
C	TARRANT	GRAND PRAIRIE	12,150	13,102	14,474	14,872	15,451	15,451
		GRAND PRAIRIE TOTAL	**35,162**	**39,188**	**44,033**	**45,286**	**47,005**	**47,005**
C	KAUFMAN	HEATH	62	87	122	125	125	125
C	ROCKWALL	HEATH	3,751	4,971	6,587	6,749	6,749	6,749
		HEATH TOTAL	**3,813**	**5,058**	**6,709**	**6,874**	**6,874**	**6,874**
C	COLLIN	HICKORY CREEK SUD	16	21	26	31	37	44
C	FANNIN	HICKORY CREEK SUD	44	41	40	37	35	33
D	HUNT	HICKORY CREEK SUD	566	647	742	851	975	1,118
		HICKORY CREEK SUD TOTAL	**626**	**709**	**808**	**919**	**1,047**	**1,195**
C	KAUFMAN	HIGH POINT WSC	1,707	2,627	3,814	5,177	6,673	8,316
C	ROCKWALL	HIGH POINT WSC	163	235	323	416	519	632
		HIGH POINT WSC TOTAL	**1,870**	**2,862**	**4,137**	**5,593**	**7,192**	**8,948**
C	ELLIS	HILCO UNITED SERVICES	124	133	143	152	163	175
G	BOSQUE	HILCO UNITED SERVICES	267	286	307	330	354	380
G	HILL	HILCO UNITED SERVICES	950	976	994	1,013	1,034	1,058
		HILCO UNITED SERVICES TOTAL	**1,341**	**1,395**	**1,444**	**1,495**	**1,551**	**1,613**
C	TARRANT	JOHNSON COUNTY SUD	360	417	433	449	465	482
G	JOHNSON	JOHNSON COUNTY SUD	9,290	11,697	13,041	14,236	15,582	17,097
		JOHNSON COUNTY SUD TOTAL	**9,650**	**12,114**	**13,474**	**14,685**	**16,047**	**17,579**
C	COLLIN	JOSEPHINE	1,136	2,523	3,667	4,101	4,587	4,587
D	HUNT	JOSEPHINE	33	38	43	47	52	56
		JOSEPHINE TOTAL	**1,169**	**2,561**	**3,710**	**4,148**	**4,639**	**4,643**
C	DALLAS	LEWISVILLE	176	177	189	191	195	195
C	DENTON	LEWISVILLE	19,229	19,269	20,598	20,877	21,283	21,283
		LEWISVILLE TOTAL	**19,405**	**19,446**	**20,787**	**21,068**	**21,478**	**21,478**

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
C	HENDERSON	MABANK	677	743	725	750	777	808
C	KAUFMAN	MABANK	1,234	1,242	1,254	1,255	1,261	1,271
D	VAN ZANDT	MABANK	64	72	80	88	96	104
		MABANK TOTAL	**1,975**	**2,057**	**2,059**	**2,093**	**2,134**	**2,183**
C	KAUFMAN	MACBEE SUD	32	39	48	58	69	81
D	HUNT	MACBEE SUD	37	38	40	41	42	43
D	VAN ZANDT	MACBEE SUD	976	1,208	1,495	1,849	2,288	2,831
		MACBEE SUD TOTAL	**1,045**	**1,285**	**1,583**	**1,948**	**2,399**	**2,955**
C	ELLIS	MANSFIELD	157	188	221	256	293	335
C	TARRANT	MANSFIELD	27,654	29,081	35,273	49,803	49,765	49,724
G	JOHNSON	MANSFIELD	1,755	2,488	3,233	3,935	4,721	5,600
		MANSFIELD TOTAL	**29,566**	**31,757**	**38,727**	**53,994**	**54,779**	**55,659**
C	PARKER	MINERAL WELLS	353	372	391	410	410	410
G	PALO PINTO	MINERAL WELLS	3,321	3,493	3,675	3,860	3,860	3,860
		MINERAL WELLS TOTAL	**3,674**	**3,865**	**4,066**	**4,270**	**4,270**	**4,270**
C	ELLIS	MOUNTAIN PEAK SUD	6,543	8,720	11,099	13,522	16,183	19,108
G	JOHNSON	MOUNTAIN PEAK SUD	1,461	1,813	2,252	2,799	3,477	4,321
		MOUNTAIN PEAK SUD TOTAL	**8,004**	**10,533**	**13,351**	**16,321**	**19,660**	**23,429**
C	COOKE	MOUNTAIN SPRINGS WSC	317	317	319	317	315	312
C	DENTON	MOUNTAIN SPRINGS WSC	11	14	17	20	23	27
		MOUNTAIN SPRINGS WSC TOTAL	**328**	**331**	**336**	**337**	**338**	**339**
C	DENTON	MUSTANG SUD	15,484	21,922	29,322	36,650	42,527	47,556
C	COLLIN	MUSTANG SUD	518	753	959	1,172	1,343	1,502
C	GRAYSON	MUSTANG SUD	346	504	646	789	895	1,001
		MUSTANG SUD TOTAL	**16,348**	**23,179**	**30,927**	**38,611**	**44,765**	**50,059**
C	NAVARRO	NAVARRO MILLS WSC	288	308	325	341	357	376
G	Hill	NAVARRO MILLS WSC	2	2	2	2	2	2

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
		NAVARRO MILLS WSC TOTAL	**290**	**310**	**327**	**343**	**359**	**378**
C	COLLIN	NEVADA SUD	537	678	1,007	2,125	3,793	5,098
C	ROCKWALL	NEVADA SUD	22	27	41	88	158	212
		NEVADA SUD TOTAL	**559**	**705**	**1,048**	**2,213**	**3,951**	**5,310**
C	FANNIN	NORTH HUNT SUD	16	16	17	17	17	18
D	DELTA	NORTH HUNT SUD	30	30	29	29	29	28
D	HUNT	NORTH HUNT SUD	342	336	331	322	312	303
		NORTH HUNT SUD TOTAL	**388**	**382**	**377**	**368**	**358**	**349**
C	PARKER	NORTH RURAL WSC	149	179	214	252	292	337
G	PALO PINTO	NORTH RURAL WSC	177	176	174	173	172	171
		NORTH RURAL WSC TOTAL	**326**	**355**	**388**	**425**	**464**	**508**
C	DALLAS	OVILLA	109	118	128	139	151	165
C	ELLIS	OVILLA	1,169	1,484	1,828	2,177	2,561	2,983
		OVILLA TOTAL	**1,278**	**1,602**	**1,956**	**2,316**	**2,712**	**3,148**
C	DENTON	PILOT POINT	827	1,065	1,834	2,632	2,839	2,839
C	GRAYSON	PILOT POINT	17	20	37	52	58	58
		PILOT POINT TOTAL	**844**	**1,085**	**1,871**	**2,684**	**2,897**	**2,897**
C	COLLIN	PLANO	70,410	70,627	77,776	80,110	80,110	80,110
C	DENTON	PLANO	2,106	2,184	2,405	2,478	2,478	2,478
		PLANO TOTAL	**72,516**	**72,811**	**80,181**	**82,588**	**82,588**	**82,588**
C	FREESTONE	PLEASANT GROVE WSC	126	136	149	145	141	136
C	NAVARRO	PLEASANT GROVE WSC	12	12	13	14	14	15
		PLEASANT GROVE WSC TOTAL	**138**	**148**	**162**	**159**	**155**	**151**
C	KAUFMAN	POETRY WSC	217	279	450	717	1,128	1,351
D	HUNT	POETRY WSC	236	269	297	317	264	266
		POETRY WSC TOTAL	**453**	**548**	**747**	**1,034**	**1,392**	**1,617**
C	FREESTONE	POINT ENTERPRISE WSC	116	115	113	113	113	113

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
G	LIMESTONE	POINT ENTERPRISE WSC	65	63	60	58	55	52
		POINT ENTERPRISE WSC TOTAL	**181**	**178**	**173**	**171**	**168**	**165**
C	NAVARRO	POST OAK SUD	113	106	100	91	82	73
G	HILL	POST OAK SUD	197	202	206	210	214	219
G	LIMESTONE	POST OAK SUD	29	28	27	26	24	24
		POST OAK SUD TOTAL	**339**	**336**	**333**	**327**	**320**	**316**
C	COLLIN	PROSPER	10,137	11,731	14,041	14,623	15,470	15,470
C	DENTON	PROSPER	4,192	5,108	6,071	6,298	6,630	6,630
		PROSPER TOTAL	**14,329**	**16,839**	**20,112**	**20,921**	**22,100**	**22,100**
C	GRAYSON	RED RIVER AUTHORITY OF TEXAS	254	304	347	390	436	486
A	CHILDRESS	RED RIVER AUTHORITY OF TEXAS	382	358	352	361	369	378
A	COLLINGSWORTH	RED RIVER AUTHORITY OF TEXAS	90	88	83	79	75	72
A	DONLEY	RED RIVER AUTHORITY OF TEXAS	82	76	70	67	64	60
A	HALL	RED RIVER AUTHORITY OF TEXAS	51	48	45	42	39	36
B	CLAY	RED RIVER AUTHORITY OF TEXAS	402	372	340	314	289	264
B	COTTLE	RED RIVER AUTHORITY OF TEXAS	24	23	22	23	23	23
B	FOARD	RED RIVER AUTHORITY OF TEXAS	56	51	49	47	45	44
B	HARDEMAN	RED RIVER AUTHORITY OF TEXAS	160	150	142	134	127	121
B	KING	RED RIVER AUTHORITY OF TEXAS	50	50	51	53	55	56
B	MONTAGUE	RED RIVER AUTHORITY OF TEXAS	35	36	36	37	38	38

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
B	WILBARGER	RED RIVER AUTHORITY OF TEXAS	272	264	254	242	232	222
G	KNOX	RED RIVER AUTHORITY OF TEXAS	13	13	12	11	10	8
O	MOTLEY	RED RIVER AUTHORITY OF TEXAS	2	1	1	1	1	1
O	DICKENS	RED RIVER AUTHORITY OF TEXAS	1	1	1	1	1	0
		RED RIVER AUTHORITY OF TEXAS TOTAL	**1,874**	**1,835**	**1,805**	**1,802**	**1,804**	**1,809**
C	PARKER	RENO (PARKER)	282	343	413	486	566	655
C	TARRANT	RENO (PARKER)	5	6	6	7	7	8
		RENO (PARKER) TOTAL	**287**	**349**	**419**	**493**	**573**	**663**
C	ELLIS	RICE WATER SUPPLY AND SEWER SERVICE	647	773	913	1,054	1,209	1,379
C	NAVARRO	RICE WATER SUPPLY AND SEWER SERVICE	459	543	646	767	912	1,084
		RICE WATER SUPPLY AND SEWER SERVICE TOTAL	**1,106**	**1,316**	**1,559**	**1,821**	**2,121**	**2,463**
C	COLLIN	RICHARDSON	15,573	16,366	17,729	18,261	18,261	18,261
C	DALLAS	RICHARDSON	13,410	13,844	14,505	14,941	14,941	14,941
		RICHARDSON TOTAL	**28,983**	**30,210**	**32,234**	**33,202**	**33,202**	**33,202**
C	DALLAS	ROCKETT SUD	86	95	103	106	110	111
C	ELLIS	ROCKETT SUD	4,285	5,094	6,105	7,029	8,476	9,652
		ROCKETT SUD TOTAL	**4,371**	**5,189**	**6,208**	**7,135**	**8,586**	**9,763**
C	DALLAS	ROWLETT	9,781	10,287	11,872	12,539	13,034	13,034
C	ROCKWALL	ROWLETT	1,769	1,811	2,181	2,354	2,483	2,483
		ROWLETT TOTAL	**11,550**	**12,098**	**14,053**	**14,893**	**15,517**	**15,517**
C	COLLIN	ROYSE CITY	1,257	2,311	3,337	3,683	4,138	4,138
C	ROCKWALL	ROYSE CITY	4,035	7,912	10,223	11,063	12,289	12,060

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
D	HUNT	ROYSE CITY	619	881	1,111	1,337	1,565	1,795
		ROYSE CITY TOTAL	**5,911**	**11,104**	**14,671**	**16,083**	**17,992**	**17,993**
C	COLLIN	SACHSE	1,734	1,840	2,090	2,185	2,249	2,249
C	DALLAS	SACHSE	3,516	3,759	4,258	4,445	4,566	4,566
		SACHSE TOTAL	**5,250**	**5,599**	**6,348**	**6,630**	**6,815**	**6,815**
C	PARKER	SANTO SUD	21	25	29	34	40	46
G	HOOD	SANTO SUD	1	1	1	1	0	0
G	PALO PINTO	SANTO SUD	269	268	265	264	262	260
		SANTO SUD TOTAL	**291**	**294**	**295**	**299**	**302**	**306**
C	ELLIS	SOUTH ELLIS COUNTY WSC	542	649	767	885	1,016	1,159
C	NAVARRO	SOUTH ELLIS COUNTY WSC	25	31	35	39	44	49
		SOUTH ELLIS COUNTY WSC TOTAL	**567**	**680**	**802**	**924**	**1,060**	**1,208**
C	COLLIN	SOUTH GRAYSON SUD	151	197	251	305	365	431
C	GRAYSON	SOUTH GRAYSON SUD	479	531	577	619	665	716
		SOUTH GRAYSON SUD TOTAL	**630**	**728**	**828**	**924**	**1,030**	**1,147**
C	FREESTONE	SOUTHERN OAKS WATER SUPPLY	121	154	197	192	187	181
C	NAVARRO	SOUTHERN OAKS WATER SUPPLY	29	40	48	57	67	78
		SOUTHERN OAKS WATER SUPPLY TOTAL	**150**	**194**	**245**	**249**	**254**	**259**
C	DENTON	SOUTHLAKE	286	265	238	210	180	150
C	TARRANT	SOUTHLAKE	14,382	16,137	17,253	18,247	19,245	20,182
		SOUTHLAKE TOTAL	**14,668**	**16,402**	**17,491**	**18,457**	**19,425**	**20,332**
C	FANNIN	SOUTHWEST FANNIN COUNTY SUD	669	735	770	801	835	872
C	GRAYSON	SOUTHWEST FANNIN COUNTY SUD	149	162	173	183	194	205

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
		SOUTHWEST FANNIN COUNTY SUD TOTAL	**818**	**897**	**943**	**984**	**1,029**	**1,077**
C	PARKER	STURDIVANT PROGRESS WSC	2	2	2	2	1	1
G	PALO PINTO	STURDIVANT PROGRESS WSC	237	236	234	232	231	229
		STURDIVANT PROGRESS WSC TOTAL	**239**	**238**	**236**	**234**	**232**	**230**
C	TARRANT	TROPHY CLUB MUD 1	376	484	574	648	729	818
C	DENTON	TROPHY CLUB MUD 1	5,006	4,998	4,998	4,998	4,998	4,998
		TROPHY CLUB MUD 1 TOTAL	**5,382**	**5,482**	**5,572**	**5,646**	**5,727**	**5,816**
C	COOKE	TWO WAY SUD	6	6	6	7	7	7
C	GRAYSON	TWO WAY SUD	783	825	983	1,074	1,193	1,267
		TWO WAY SUD TOTAL	**789**	**831**	**989**	**1,081**	**1,200**	**1,274**
C	HENDERSON	VIRGINIA HILL WSC	184	189	194	198	202	207
I	HENDERSON	VIRGINIA HILL WSC	202	208	212	217	221	226
		VIRGINIA HILL WSC TOTAL	**386**	**397**	**406**	**415**	**423**	**433**
C	PARKER	WALNUT CREEK SUD	3,228	3,511	4,880	7,306	10,166	13,013
C	WISE	WALNUT CREEK SUD	572	610	842	1,268	1,794	2,296
		WALNUT CREEK SUD TOTAL	**3,800**	**4,121**	**5,722**	**8,574**	**11,960**	**15,309**
C	HENDERSON	WEST CEDAR CREEK MUD	1,037	963	1,063	1,064	1,064	1,063
C	KAUFMAN	WEST CEDAR CREEK MUD	49	59	73	88	104	123
		WEST CEDAR CREEK MUD TOTAL	**1,086**	**1,022**	**1,136**	**1,152**	**1,168**	**1,186**
C	COLLIN	WEST LEONARD WSC	44	55	67	79	93	108
C	FANNIN	WEST LEONARD WSC	248	297	320	344	370	398
D	HUNT	WEST LEONARD WSC	5	5	6	7	7	8
		WEST LEONARD WSC TOTAL	**297**	**357**	**393**	**430**	**470**	**514**
C	COLLIN	WESTMINSTER SUD	404	504	618	733	860	1,000
C	GRAYSON	WESTMINSTER SUD	6	7	8	9	10	11

REGION	COUNTY	WATER USER GROUP (WUG)	FINAL DEMAND FOR 2026 REGION C PLAN					
			2030	2040	2050	2060	2070	2080
		WESTMINSTER SUD TOTAL	**410**	**511**	**626**	**742**	**870**	**1,011**
C	FANNIN	WHITEWRIGHT	14	18	19	21	23	25
C	GRAYSON	WHITEWRIGHT	399	433	463	490	519	551
		WHITEWRIGHT TOTAL	**413**	**451**	**482**	**511**	**542**	**576**
C	FANNIN	WOLFE CITY	5	4	3	2	2	2
D	HUNT	WOLFE CITY	163	165	168	169	170	171
		WOLFE CITY TOTAL	**168**	**169**	**171**	**171**	**172**	**173**
C	COOKE	WOODBINE WSC	703	725	737	740	743	747
C	GRAYSON	WOODBINE WSC	9	10	10	11	12	13
		WOODBINE WSC TOTAL	**712**	**735**	**747**	**751**	**755**	**760**

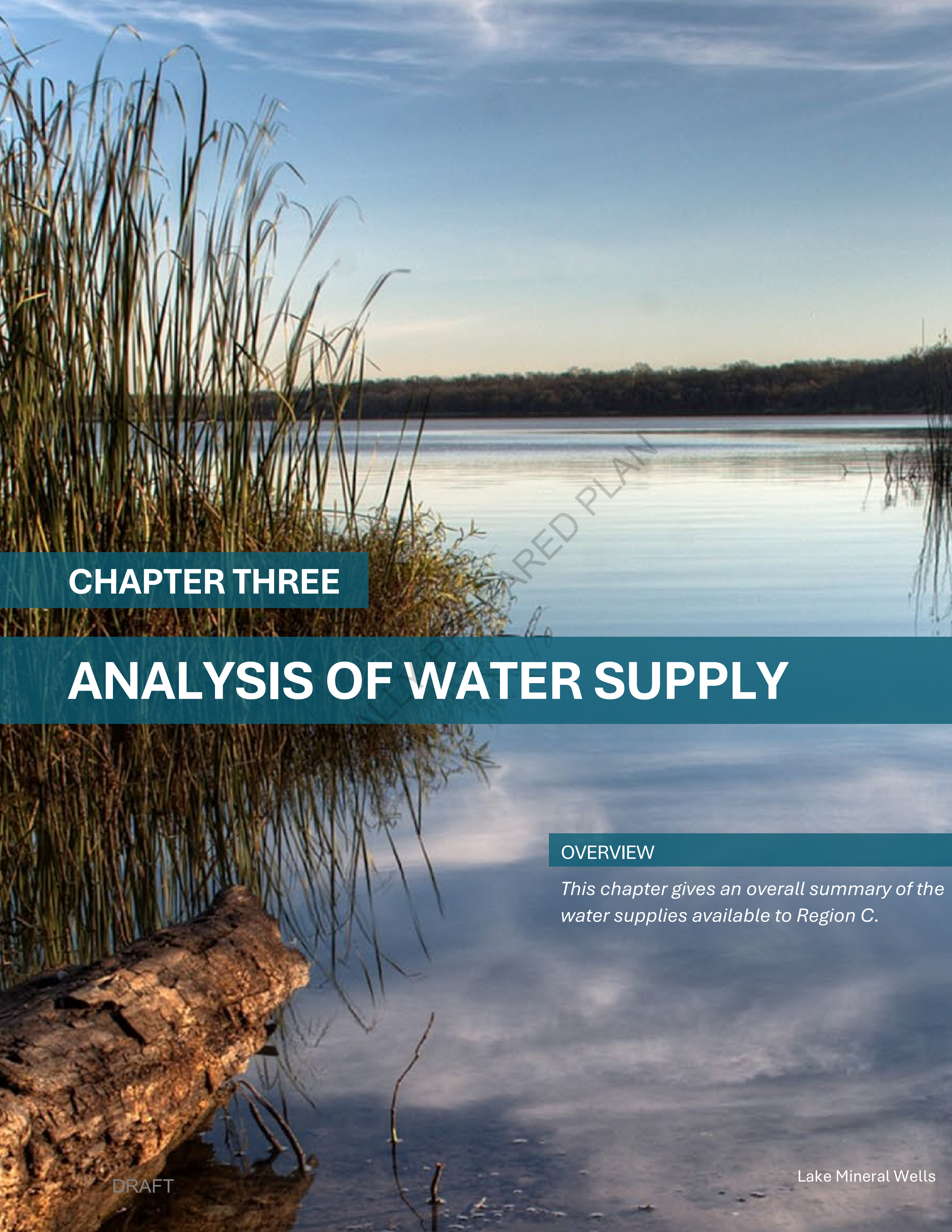
Attachment Five

Projected Dry-Year Water Demand for Major Water Providers by Use Category

ATTACHMENT 5– PROJECTED DRY-YEAR WATER DEMAND FOR MAJOR WATER PROVIDERS

MAJOR WATER PROVIDER/USE CATEGOTY	POPULATION & PROJECTED DRY YEAR DEMAND INCLUDING CUSTOMERS (DEMAND IN ACRE FEET PER YEAR)					
	2030	2040	2050	2060	2070	2080
Dallas (Dallas Water Utilities)						
Municipal Demand	520,970	564,194	606,776	637,126	670,403	700,448
Manufacturing Demand	15,558	16,133	16,730	17,348	17,990	18,656
Irrigation Demand	5,086	4,921	4,756	4,569	4,383	4,196
Steam Electric Power Demand	1,000	1,000	1,000	1,000	1,000	1,000
TOTAL DWU DEMAND	***542,614***	***586,248***	***629,262***	***660,043***	***693,776***	***724,300***
Fort Worth						
Municipal Demand	324,401	372,932	392,109	422,485	456,857	488,945
Manufacturing Demand	9,831	10,205	10,593	10,994	11,411	11,842
Irrigation Demand	2,178	2,178	2,178	2,178	2,178	2,178
TOTAL FORT WORTH DEMAND	**336,410**	**385,315**	**404,880**	**435,657**	**470,446**	**502,965**
North Texas Municipal Water District						
Municipal Demand	504,046	589,864	680,737	755,320	800,846	829,232
Manufacturing Demand	12,544	13,005	13,486	13,982	14,497	15,083
Irrigation Demand	2,312	1,640	1,640	1,640	1,640	1,640
Steam Electric Power Demand	1,217	1,217	1,217	1,217	1,217	1,217
TOTAL NTMWD DEMAND	**520,119**	**605,726**	**697,080**	**772,159**	**818,200**	**847,172**
Tarrant Regional Water District						
Municipal Demand	547,736	631,964	695,979	776,685	849,677	918,880
Manufacturing Demand	12,305	13,134	13,894	14,601	15,302	16,090
Irrigation Demand	1,395	1,395	1,395	1,395	1,395	1,395
Steam Electric Power Demand	11,664	16,649	16,655	16,658	16,661	16,665
Mining Demand	995	985	1,561	2,157	3,104	4,574
TOTAL TRWD DEMAND	**574,095**	**664,127**	**729,484**	**811,496**	**886,139**	**957,604**
Trinity River Authority						
Municipal Demand	75,364	74,468	73,084	72,063	70,501	68,940
Irrigation Demand	300	300	300	300	300	300
Reuse Demand	131,145	151,048	162,548	174,048	174,048	174,048
TOTAL TRA DEMAND	**206,809**	**225,816**	**235,932**	**246,411**	**244,849**	**243,288**
Upper Trinity Regional Water District						
Municipal Demand	76,599	107,233	141,695	158,444	178,926	196,768

MAJOR WATER PROVIDER/USE CATEGOTY	POPULATION & PROJECTED DRY YEAR DEMAND INCLUDING CUSTOMERS (DEMAND IN ACRE FEET PER YEAR)					
	2030	2040	2050	2060	2070	2080
Manufacturing Demand	32	33	35	36	37	38
Irrigation Demand	1,457	2,018	3,137	3,137	3,137	3,137
TOTAL UTRWD DEMAND	**78,088**	**109,284**	**144,867**	**161,617**	**182,100**	**199,943**



CHAPTER THREE

ANALYSIS OF WATER SUPPLY

OVERVIEW

This chapter gives an overall summary of the water supplies available to Region C.

Lake Mineral Wells

3 ANALYSIS OF WATER SUPPLY

CHAPTER OUTLINE	
Section 3.1	Overall Water Supply Availability
Section 3.2	Surface Water Availability
Section 3.3	Groundwater Availability
Section 3.4	Currently Available Water Supplies
Section 3.5	Water Availability by Major Water Provider (MWP)
Section 3.6	Water Availability by Water User Group (WUG)
Section 3.7	Summary of Current Water Supplies in Region C
RELATED APPENDICES	
Appendix D	DB22 Reports
Appendix E	Water Supply Available

This chapter gives an overall summary of the water supplies available to Region C. **Appendix E** includes further details on the development of this information. Under the Texas Water Development Board (TWDB) regional water planning guidelines (1), each region is to identify currently available water supplies to the region by source and user. The supplies available by source are based on the supply available during drought of record conditions.

For surface water reservoirs, available supply is generally the equivalent of firm yield supply or permitted amount (whichever is lower). However, several providers in Region C have chosen to use alternative yields such as safe yields and yields that consider droughts worse than the drought of record as the available supply. The alternative yields are less than the firm yield and are discussed in more detail in **Section 3.2** and **Appendix E**. For irrigation and mining run-of-the-river supplies, available supply is the minimum annual supply available over the historical record. For municipalities with run-of-river supplies as their sole source and manufacturing and steam electric users, an individual firm yield analysis was performed. Livestock and mining local supplies are based on the maximum historical use from 2015-2019 and projected demands (6,7).

Available groundwater supplies are defined by county and aquifer. Generally, groundwater supply is the supply available with acceptable long-term impacts as defined by the Desired Future Conditions adopted by the Groundwater Management Areas (GMAs). Modeled Available Groundwater (MAG) numbers have been developed by the TWDB to define the long-term available groundwater supply (2). Updated MAG numbers were not available for "Other aquifer." These supply amounts were based on historical pumping data obtained from the TWDB (3) and were assumed to be the same as the amounts used in the *2021 Region C Water Plan* (4). MAG numbers were also not available for the Cross Timbers aquifer and Nacatoch aquifer, and the availability for these aquifers was assumed to be the same as the amounts used in the *2021 Region C Water Plan* (4).

Currently available water supplies are those water supplies that have been permitted or contracted and that have infrastructure in place to transport and treat the water. This is the supply that is distributed to water users and used to assess water needs.

Some water supplies that are permitted or contracted for use do not yet have the infrastructure in place. Connecting such supplies is considered a water management strategy, and water management strategies are discussed in **Chapter 5** of this report.

3.1 Overall Water Supply Availability

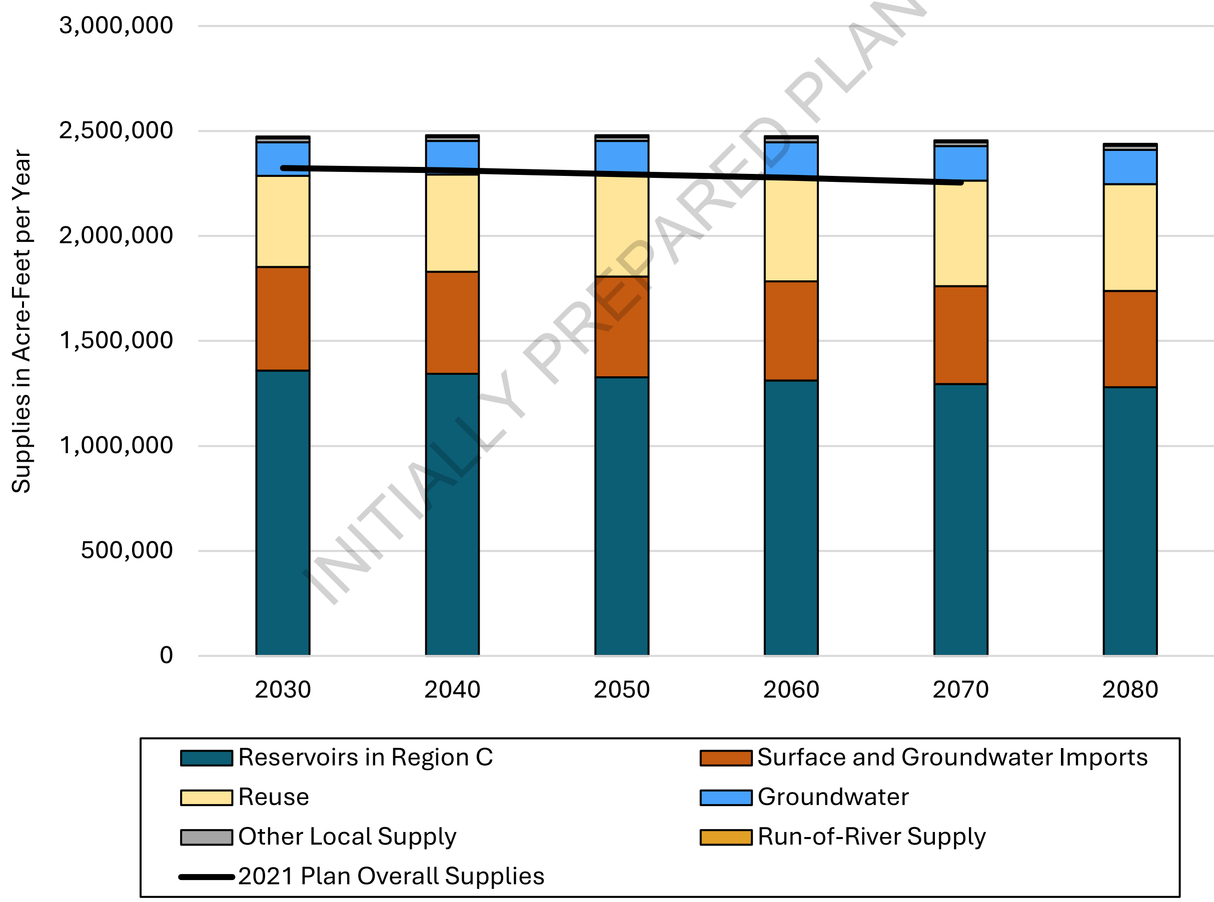
Table 3.1 and **Figure 3.1** summarize the overall water supply availability in Region C, including both connected and unconnected water sources. Some observations include:

- About 57 percent of the water supply available to Region C is from in-region reservoirs in 2030.
- Groundwater is approximately 6 percent of the overall supply available to Region C.
- Local supplies (limited, individual supplies such as stock tanks) and run-of-river supplies are about 1 percent of the overall supply available to Region C.
- Authorized reuse in 2030 is about 18 percent of the overall supply available to Region C. A complete list of the recommended reuse strategies is included in **Chapter 5B**. Available reuse quantities are dependent on return flows over time, which can increase as water demands increase due to growth but can also decrease if conservation strategies reduce return flows.
- Importation of water from reservoirs and groundwater in other regions is approximately 18 percent of the water available to Region C in 2030.
- **Section 3.4** discuses currently available water supplies which are supplies that can be used with currently existing water rights, contracts, and facilities. Currently available supplies are less than overall water supplies because the facilities needed to use some supplies have not been developed yet.
- The sources of information in **Table 3.1** and **Figure 3.1** (overall water supply availability not limited to infrastructure constraints) are discussed in greater detail in the following section.

TABLE 3.1 OVERALL WATER SUPPLY AVAILABLITY IN REGION C

SOURCE	VALUES IN ACRE FEET PER YEAR					
	2030	2040	2050	2060	2070	2080
Reservoirs in Region C	1,359,066	1,343,176	1,327,280	1,311,410	1,294,751	1,279,105
Run-of-River Supply	9,197	9,197	9,197	9,197	9,197	9,197
Other Local Supply	18,151	18,351	18,824	19,192	19,192	19,192
Groundwater	159,525	160,586	161,649	162,712	163,670	163,670
Reuse	434,791	462,811	483,877	499,185	503,578	508,503
Surface and Groundwater Imports	492,581	486,089	479,649	472,889	465,571	458,747
REGION C TOTAL	**2,473,311**	**2,480,210**	**2,480,476**	**2,474,585**	**2,455,959**	**2,438,414**

FIGURE 3.1 OVERALL WATER SUPPLY AVAILABILITY IN REGION C



3.2 Surface Water Availability

3.2.1 Reservoirs

For surface water reservoirs, the available supply is generally the equivalent of firm yield supply or permitted amount, whichever is lower. However, several providers in Region C have chosen to use alternative yields rather than firm yield for planning purposes. Tarrant Regional Water District (TRWD) and Dallas Water Utilities (DWU) have elected to use safe yields for their sources (which is less than the firm yield and leaves a reserve at the end of the drought of record) as the available supply. Additionally, the Texas Legislature authorized the regional water planning groups to consider droughts worse than the drought of record in its planning efforts, which can reflect expected climatic uncertainties and trends in water availability. North Texas Municipal Water District (NTMWD) requested the use of the results of this type of analysis for the allocation and distribution of surface water supplies [(5)].

In the guidelines for Regional Water Planning [(1)], the TWDB requires that water availability for reservoirs be based on results of the TCEQ-approved Water Availability Models (WAMs). In Region C, most of the in-region reservoirs are located in the Trinity River Basin. Region C also uses water supplies originating in the Neches, Red, Sabine, Brazos, and Sulphur River Basins.

The WAM models were developed for the purpose of reviewing and granting new surface water right permits. The assumptions in the WAM models are based on the legal interpretation of water rights, and in some cases do not accurately reflect current operations. For planning purposes, adjustments were made to the WAMs to better reflect current and future surface water conditions in the region. These adjustments were approved by the Executive Administrator (EA) of the Texas Water Development Board in a letter to the Chairman of the Region C Water Planning Group, dated October 26, 2023. This letter and the requested hydrologic variances are included in **Appendix E, Attachment E-1**.

Generally, changes made to WAM models for Region C included:

- Assessment of reservoir sedimentation rates and calculation of area-capacity conditions for current and future conditions.
- Inclusion of subordination agreements.
- Inclusion of system operations where appropriate.
- Use of minimum storage elevations for U.S. Army Corps of Engineers reservoirs, where appropriate.
- Other specific corrections by river basin, as appropriate.

Table 3.2 lists the reservoir water supplies available for use in Region C (not limited by infrastructure constraints). Note that some of the supplies in Table 3.2 do not have facilities for transmission and treatment and thus are not currently available water supplies under TWDB rules More detail on the determination of available supplies from reservoirs is included in **Appendix E**.

TABLE 3.2 SURFACE WATER SOURCE AVAILABILITY TO REGION C (NOT LIMITED BY INFRASTRUCTURE)

RESERVOIR	PERMITTED DIVERSION/ CONTRACTED AMOUNT	AVAILABLE SUPPLIES IN ACRE FEET PER YEAR					
		2030	2040	2050	2060	2070	2080
Systems in Region C							
Lost Creek/Jacksboro System	1,397	1,397	1,397	1,397	1,397	1,397	1,397
West Fork (includes Bridgeport Local)[a]	265,888	96,161	95,561	94,961	94,428	93,894	93,361
Elm Fork/Lewisville/Ray Roberts/Grapevine (Dallas)[a]	1,246,429	174,899	174,109	173,319	172,059	170,799	169,539
Subtotal of Systems in Region C	**1,513,714**	**272,457**	**271,067**	**269,677**	**267,884**	**266,090**	**264,297**
Reservoirs in Region C							
Cedar Creek [a]	175,000	157,150	155,340	153,530	151,797	150,063	148,330
Richland-Chambers (TRWD) [a]	210,000	190,000	188,266	186,531	184,781	183,030	181,280
Richland-Chambers (Corsicana) and Halbert	17,653	13,843	13,833	13,823	13,803	13,783	13,763
Moss	7,740	4,900	4,800	4,700	4,633	4,567	4,500
Texoma (Texas' Share - NTMWD)	197,000	197,000	197,000	197,000	197,000	197,000	197,000
Texoma (Texas' Share - GTUA)	83,200	83,200	83,200	83,200	83,200	83,200	83,200
Texoma (Texas' Share - Denison)	24,400	24,400	24,400	24,400	24,400	24,400	24,400
Texoma (Texas' Share - Luminant)	16,400	16,400	16,400	16,400	16,400	16,400	16,400
Texoma (Texas' Share - RRA)	2,250	2,250	2,250	2,250	2,250	2,250	2,250
Randell	5,280	1,600	1,600	1,600	1,600	1,600	1,600
Valley	16,400	2,800	2,800	2,800	2,800	2,800	2,800
Bonham	5,340	3,800	3,700	3,600	3,533	3,467	3,400
Ray Roberts (Denton)	207,896	18,600	18,480	18,360	18,207	18,053	17,900
Lewisville (Denton)	58,424	5,200	5,075	4,950	4,800	4,650	4,500
Benbrook [a]	6,833	3,371	3,371	3,371	3,371	3,371	3,371
Weatherford	5,220	2,860	2,810	2,760	2,717	2,673	2,630
Grapevine (DCPCM)	50,000	17,300	17,125	16,950	16,750	16,550	16,350
Grapevine (Grapevine)	26,250	2,050	2,025	2,000	1,960	1,920	1,880
Arlington [a]	22,720	7,500	7,385	7,270	7,157	7,043	6,930
Joe Pool	17,000	14,050	13,725	13,400	13,133	12,867	12,600

RESERVOIR	PERMITTED DIVERSION/ CONTRACTED AMOUNT	AVAILABLE SUPPLIES IN ACRE FEET PER YEAR					
		2030	2040	2050	2060	2070	2080
Mountain Creek	6,400	6,400	6,400	6,400	6,400	6,400	6,400
North	1,000	70	70	70	70	70	70
Ray Hubbard (Dallas) [a]	208,067	46,239	45,450	44,660	43,927	43,194	42,461
White Rock [a]	8,703	2,540	2,375	2,210	2,023	1,837	1,650
Terrell	5,800	2,410	2,395	2,380	2,370	2,360	2,350
Clark	450	210	210	210	210	210	210
Bardwell	9,600	9,410	9,010	8,610	8,287	7,963	7,640
Waxahachie	3,570	2,980	2,910	2,840	2,773	2,707	2,640
Forest Grove	9,500	650	328	5	3	2	-
Trinidad	4,000	2,950	2,950	2,950	2,950	2,950	2,950
Navarro Mills	19,400	17,000	15,975	14,950	13,817	12,683	11,550
Fairfield	14,150	6,395	6,163	5,930	5,725	5,520	5,315
Bryson	90	-	-	-	-	-	-
Mineral Wells	2,520	2,495	2,483	2,470	2,458	2,445	2,433
Teague City	605	189	189	189	189	189	189
Lavon [c]	118,670	88,111	83,963	79,927	75,892	70,959	67,148
Bois d'Arc [c]	175,000	89,456	86,878	84,187	81,497	78,918	76,228
Muenster	500	250	250	250	250	250	250
Ralph Hall	45,000	40,580	40,525	40,470	40,393	40,317	40,240
Subtotal of Reservoirs in Region C	**1,788,031**	**1,086,609**	**1,072,109**	**1,057,603**	**1,043,526**	**1,028,661**	**1,014,808**
Imports							
Chapman (NTMWD) [b, c]	57,214	39,700	37,600	35,500	33,500	31,100	29,200
Chapman (Irving)	54,000	38,644	37,725	36,805	35,886	34,967	34,048
Chapman (Upper Trinity MWD)	16,106	11,522	11,248	10,974	10,700	10,425	10,151
Tawakoni (Dallas)	190,480	180,991	179,634	178,278	176,922	175,565	174,208
Fork (Dallas)	120,000	107,473	106,299	105,124	103,948	102,773	101,599
Upper Sabine (NTMWD)	11,210	10,582	10,499	10,416	10,333	10,251	10,168
Palestine (Dallas)	114,337	96,204	95,086	93,967	92,874	91,778	90,673
Lake Athens (Athens)[d]	5,477	665	1,187	1,807	1,964	1,967	1,969
Brazos River Authority [e]	-	3,352	3,354	3,313	3,274	3,236	3,201

RESERVOIR	PERMITTED DIVERSION/ CONTRACTED AMOUNT	AVAILABLE SUPPLIES IN ACRE FEET PER YEAR					
		2030	2040	2050	2060	2070	2080
Parker County (from Lake Palo Pinto)	-	1,566	1,583	1,604	1,629	1,653	1,676
Subtotal of Imports	**568,824**	**490,699**	**484,215**	**477,788**	**471,030**	**463,715**	**456,893**
TOTAL	***3,870,569***	***1,849,765***	***1,827,391***	***1,805,068***	***1,782,440***	***1,758,466***	***1,735,998***

[a]Amounts reported are safe yields.
[b]Although this Reservoir is physically located in another region, this source has been combined with other NTWMD supplies into a system in DB27 and is now included in the DB27 reports for Region C sources.
[c]Amounts reported consider droughts worse than the drought of record.
[d] Not entire yield. This is the amount available to Region C which increases over time.
[e]Includes supplies from Lake Aquilla and Lake Granbury.

3.2.2 Other Local Supplies

Other local supplies include run-of-the-river supplies associated with water rights and used for irrigation, manufacturing, mining, municipal, and steam electric power generation. They also include local surface water supplies used for livestock and mining. For irrigation and mining, the reliable supply from run-of-the-river diversions was calculated using the minimum annual diversion from WAM Run 3 for the permitted water rights. For municipalities with run-of-river supplies as their sole source and manufacturing and steam electric users, an individual firm yield analysis was performed. For livestock and mining local supplies, the available supplies were revised considering the TWDB maximum historical use from 2015-2019 [6,7] and projected demands. For purposes of regional water planning, these supplies are considered firm supplies during a repeat of the drought of record. **Table 3.3** lists the run-of-river diversions and other local supplies currently available for use in Region C in 2030.

TABLE 3.3 RUN-OF-THE-RIVER AND OTHER LOCAL WATER SUPPLIES IN 2030

COUNTY	VALUES IN ACRE FEET PER YEAR						
	RUN OF THE RIVER SUPPLY					OTHER LOCAL SUPPLY	
	IRRIGATION	MANUFACTURING	MINING	MUNICIAL	STEAM ELECTRIC	LIVE STOCK	MINING
Collin	265	0	0	0	0	801	0
Cooke	0	0	0	0	0	1,339	0
Dallas	309	0	0	0	1,423	51	0
Denton	0	0	0	0	0	618	764
Ellis	1	0	0	0	0	931	0
Fannin	2,295	0	75	45	0	141	1,800
Freestone	91	0	0	41	0	1,335	32
Grayson	768	0	3	0	0	933	0
Henderson	1,246	0	0	0	0	430	0
Jack	0	0	0	0	0	598	0
Kaufman	83	0	0	0	0	1,426	1,162
Navarro	535	0	0	252	0	1,492	800
Parker	134	0	0	0	0	1,381	20
Rockwall	0	0	0	0	0	136	0
Tarrant	513	0	0	0	1,079	351	400
Wise	0	0	39	0	0	1,210	0
TOTAL	***6,240***	***0***	***117***	***338***	***2,502***	***13,173***	***4,978***

3.2.3 Reuse

The reuse supply available to the region is from existing projects considers current permits, authorizations, and facilities. The available reuse supplies are limited to the supply available during drought of record conditions. Categories of reuse include currently permitted and operating indirect reuse projects, in which water is reused after being returned to the stream and existing direct reuse projects (including recycled water for mining use and purple pipe) for which facilities are already developed. The specific reuse projects and source methodology are discussed in **Appendix E**.

Indirect reuse project sponsors in Region C include NTMWD, Trinity River Authority (TRA), TRWD, Upper Trinity Regional Water District (UTRWD), DWU, Denton, Ennis, Dallas County Park Cities MUD, Waxahachie, and Weatherford. Indirect reuse supplies are based on a percentage of the water used (demands) and do not exceed permitted amounts or available infrastructure. In addition, there are a number of existing direct reuse projects for landscape irrigation, golf course irrigation, cooling water, park irrigation, and natural gas industry use in Region C. The amounts for these facilities were provided by the sponsors.

It is anticipated that reuse will increase in Region C over the next 50 years, but proposed and potential reuse projects are not included as currently available supplies. There are a number of reuse projects considered as potentially feasible management strategies as part of this planning process. Recommended water management strategies for reuse are discussed in **Chapter 5B** of this report. **Table 3.4** summarizes the currently permitted reuse supplies by county in Region C. Note that in some cases, currently available reuse supplies are expected to increase over time with increasing return flows.

TABLE 3.4 CURRENTLY PERMITTED REUSE SUPPLIES BY COUNTY

COUNTY	VALUES IN ACRE FEET PER YEAR					
	2030	2040	2050	2060	2070	2080
Collin	74,537	78,143	78,143	78,143	78,143	78,143
Cooke	4	4	4	4	4	4
Dallas	62,771	74,271	85,771	97,271	97,271	97,271
Denton	55,620	64,403	73,814	77,553	81,964	86,907
Ellis	17,682	22,277	22,277	22,277	22,277	22,277
Fannin	0	0	0	0	0	0
Freestone	0	0	0	0	0	0
Grayson	0	0	0	0	0	0
Henderson	32	32	32	32	32	32
Jack	25	25	25	25	25	25
Kaufman	112,668	112,755	112,755	112,755	112,755	112,755
Navarro	100,465	100,465	100,465	100,465	100,465	100,465
Parker	3,814	3,944	4,099	4,168	4,150	4,132
Rockwall	672	0	0	0	0	0
Tarrant	6,501	6,492	6,492	6,492	6,492	6,492
Wise	0	0	0	0	0	0
TOTAL	***434,791***	***462,811***	***483,877***	***499,185***	***503,578***	***508,503***

3.3 Groundwater Availability

Groundwater supplies in Region C are obtained from two major aquifers (Carrizo-Wilcox and Trinity), four minor aquifers (Woodbine, Nacatoch, Cross Timbers, and Queen City), and locally undifferentiated formations, referred to as "Other aquifer."

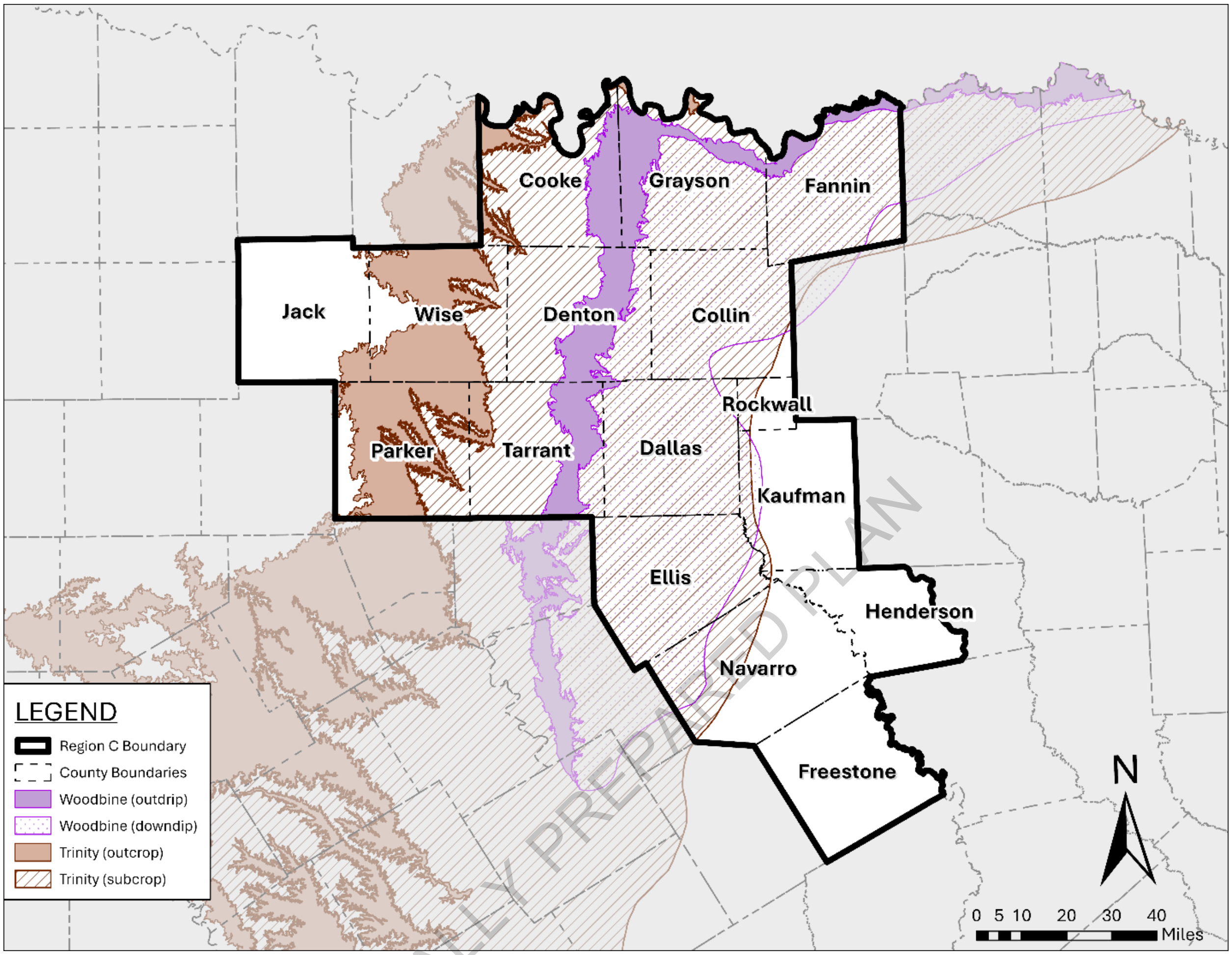
The TWDB guidelines [(1)] state that Modeled Available Groundwater (MAG) estimates [(2)] provided by the TWDB are to be used to determine available groundwater supplies. MAG estimates are developed by the TWDB using Desired Future Conditions (DFCs) submitted by Groundwater Management Areas (GMAs). The TWDB created sixteen GMAs in Texas. There are four GMAs that cover portions of Region C. GMA 8 covers most of Region C except for Henderson County, Jack County, and small portions of Navarro, Parker, and Wise County. GMA 6 covers most of Jack County and small portions of Wise and Parker County. GMA 11 covers Henderson County and GMA 12 covers a small portion of Navarro County. The GMAs are responsible for developing DFCs for aquifers within their respective areas. The TWDB quantifies MAG estimates based on the DFCs provided by the GMAs.

3.3.1 Trinity and Woodbine Aquifers

The Trinity aquifer is the most heavily used aquifer in Region C and supplies most of the groundwater used in the region. The Trinity aquifer is in Collin, Cooke, Dallas, Denton, Ellis, Fannin, Grayson, Jack, Kaufman, Navarro, Parker, Rockwall, Tarrant, and Wise Counties in Region C. The Trinity aquifer is sometimes called the Trinity Sands and includes the Paluxy, Glen Rose, Twin Mountains, Travis Peak, Hensell, Hosston, and Antlers formations. Most of the pumping from the Trinity aquifer in Region C is from three layers: Paluxy, Hensel, and Hosston.

The Woodbine aquifer overlies the Trinity aquifer in the area shown in **Figure 3.2**.The Woodbine aquifer is the second most used aquifer in Region C. The Woodbine aquifer is in Collin, Cooke, Dallas, Denton, Ellis, Fannin, Grayson, Kaufman, Navarro, Rockwall, and Tarrant Counties in Region C. MAG estimates provided by the TWDB were used to determine groundwater availability from the Trinity and Woodbine aquifers. These availability numbers are shown in **Table 3.5**.

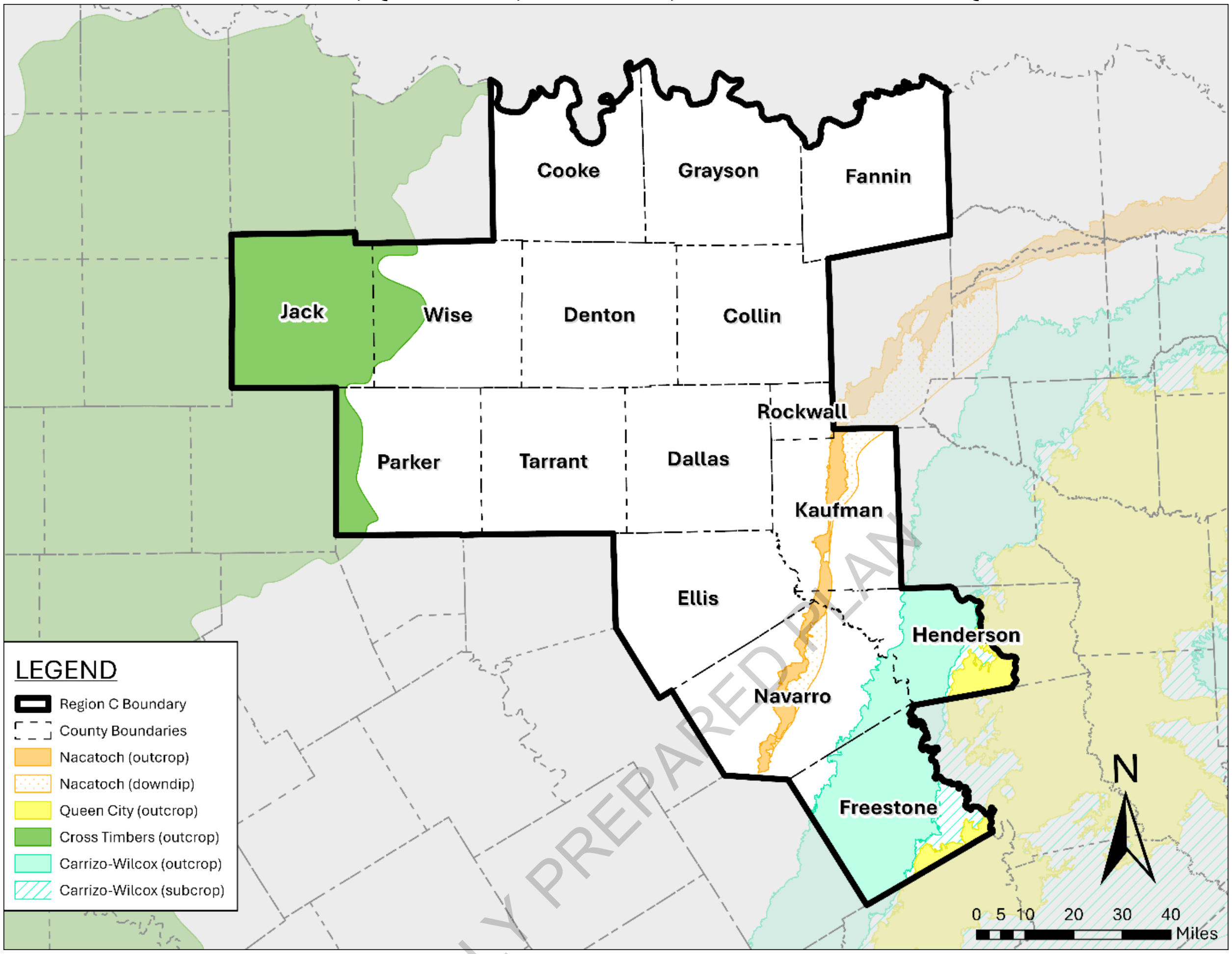
FIGURE 3.2 TRINITY AND WOODBINE AQUIFERS



3.3.2 Carrizo-Wilcox, Queen City, Nacatoch, and Cross Timbers Aquifers

Figure 3.3 shows the Carrizo-Wilcox, Queen City, Nacatoch, and Cross Timbers Aquifers. Supplies from the Carrizo-Wilcox aquifer are available in Freestone, Henderson, and Navarro Counties in Region C. Supplies from the Queen City aquifer are available in Freestone and Henderson County in Region C. The Nacatoch aquifer underlies Ellis, Kaufman, Navarro, and Rockwall Counties in Region C. MAG estimates provided by the TWDB were used to determine groundwater availability from the Carrizo-Wilcox and Queen City aquifers. GMA 8 and GMA 11 deemed the Nacatoch aquifer “non-relevant”, and new water availability estimates for this aquifer were not included in the MAGs developed by TWDB. Therefore, availability for this aquifer was assumed to be the same as the amounts used in the *2021 Region C Water Plan* [(4)]. The Cross Timbers aquifer was designated as a new minor aquifer in 2017. No desired future conditions have been established by the groundwater conservation district for this aquifer, therefore no MAG amounts are available. For this reason, the availability from this aquifer is assumed to be the same amounts used in the *2021 Region C Water Plan* [(4)].

FIGURE 3.3 CARRIZO-WILCOX, QUEEN CITY, NACATOCH, AND CROSS TIMBERS AQUIFERS



3.3.3 Other Aquifers

There are several locally undifferentiated formations in Region C, referred to as "Other aquifer." "Other aquifer" supplies are used in Fannin, Kaufman, and Navarro Counties in Region C. Available supplies from these undifferentiated formations are not included in the MAG numbers. Other aquifer available supply amounts are based on historical use and are assumed to be the same as the amounts used in the *2021 Region C Water Plan* [(4)]. In the historical pumping data obtained from the TWDB [(3)], there are significant amounts of groundwater classified as "Other aquifer" or "Unknown aquifer." In many cases, it is believed the "Other aquifer" use should have been classified as part of a differentiated formation but was not. In these cases, other aquifer supplies were not shown to be available despite the "availability" shown in the historical data.

Table 3.5 shows the groundwater availability by county to Region C from these aquifers. As with reservoirs, this number represents the amount of water available from the aquifer, without considering limitations imposed by, or current availability due to, the capacity of wells and other facilities. The amount of groundwater currently available in Region C is discussed in **Section 3.4.**

TABLE 3.5 GROUNDWATER AVAILABILITY IN REGION C

AQUIFER	COUNTY	VALUES IN ACRE FEET PER YEAR					
		2030	2040	2050	2060	2070	2080
Carrizo-Wilcox	Freestone	7,203	8,255	9,307	10,359	11,304	11,304
Carrizo-Wilcox	Henderson	3,226	3,226	3,226	3,226	3,226	3,226
Carrizo-Wilcox	Navarro	105	114	125	136	149	149
Carrizo-Wilcox Subtotal		**10,534**	**11,595**	**12,658**	**13,721**	**14,679**	**14,679**
Trinity	Collin	5,795	5,795	5,795	5,795	5,795	5,795
Trinity	Cooke	10,521	10,521	10,521	10,521	10,521	10,521
Trinity	Dallas	3,691	3,691	3,691	3,691	3,691	3,691
Trinity	Denton	30,091	30,091	30,091	30,091	30,091	30,091
Trinity	Ellis	6,168	6,168	6,168	6,168	6,168	6,168
Trinity	Fannin	2,088	2,088	2,088	2,088	2,088	2,088
Trinity	Grayson	10,716	10,716	10,716	10,716	10,716	10,716
Trinity	Jack	637	637	637	637	637	637
Trinity	Kaufman	-	-	-	-	-	-
Trinity	Navarro	-	-	-	-	-	-
Trinity	Parker	14,449	14,449	14,449	14,449	14,449	14,449
Trinity	Rockwall	-	-	-	-	-	-
Trinity	Tarrant	17,926	17,926	17,926	17,926	17,926	17,926
Trinity	Wise	11,452	11,452	11,452	11,452	11,452	11,452
Trinity Subtotal		**113,534**	**113,534**	**113,534**	**113,534**	**113,534**	**113,534**
Woodbine	Collin	4,254	4,254	4,254	4,254	4,254	4,254
Woodbine	Cooke	801	801	801	801	801	801
Woodbine	Dallas	2,798	2,798	2,798	2,798	2,798	2,798
Woodbine	Denton	3,609	3,609	3,609	3,609	3,609	3,609
Woodbine	Ellis	2,074	2,074	2,074	2,074	2,074	2,074
Woodbine	Fannin	4,924	4,924	4,924	4,924	4,924	4,924
Woodbine	Grayson	7,526	7,526	7,526	7,526	7,526	7,526
Woodbine	Kaufman	-	-	-	-	-	-
Woodbine	Navarro	68	68	68	68	68	68
Woodbine	Rockwall	-	-	-	-	-	-
Woodbine	Tarrant	1,139	1,139	1,139	1,139	1,139	1,139
Woodbine Subtotal		**27,193**	**27,193**	**27,193**	**27,193**	**27,193**	**27,193**
Cross Timbers	Jack	934	934	934	934	934	934
Cross Timbers	Parker	50	50	50	50	50	50
Nacatoch	Ellis	20	20	20	20	20	20
Nacatoch	Kaufman	926	926	926	926	926	926
Nacatoch	Navarro	980	980	980	980	980	980
Nacatoch	Rockwall	13	13	13	13	13	13
Queen City	Freestone	77	77	77	77	77	77
Queen City	Henderson	154	154	154	154	154	154
Other	Fannin	2,919	2,919	2,919	2,919	2,919	2,919

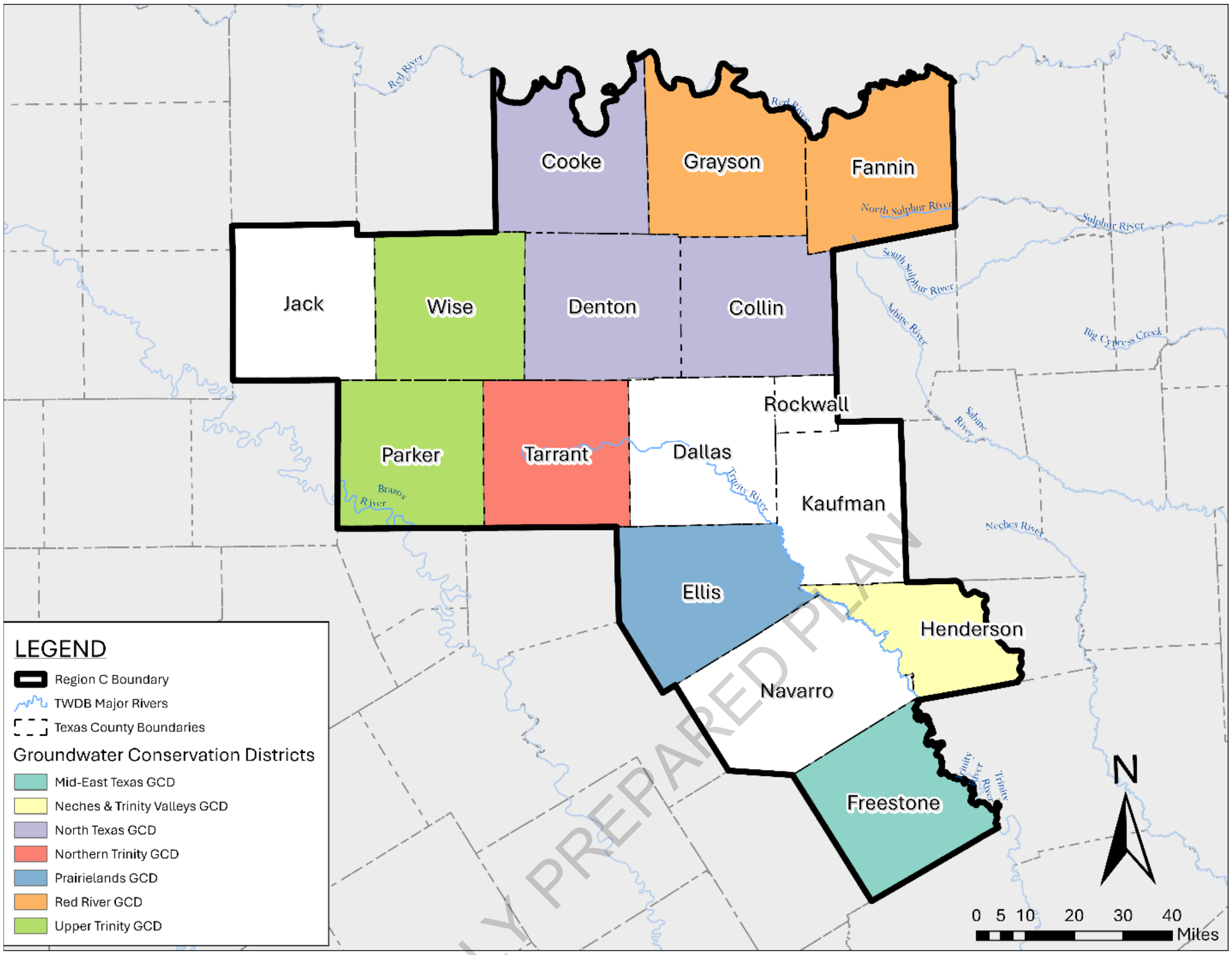
AQUIFER	COUNTY	VALUES IN ACRE FEET PER YEAR					
		2030	2040	2050	2060	2070	2080
Other	Kaufman	1,756	1,756	1,756	1,756	1,756	1,756
Other	Navarro	435	435	435	435	435	435
Minor and Other Subtotal		**8,264**	**8,264**	**8,264**	**8,264**	**8,264**	**8,264**
TOTAL		***159,525***	***160,586***	***161,649***	***162,712***	***163,670***	***163,670***

3.3.4 Groundwater Conservation Districts

There are currently seven Groundwater Conservation Districts (GCDs) that include one or more Region C counties. These GCDs are listed below and shown in **Figure 3.4**.

- Upper Trinity GCD (Wise and Parker Counties)
- Northern Trinity GCD (Tarrant County)
- Neches and Trinity Valleys GCD (includes Henderson County)
- Mid-East Texas GCD (includes Freestone County)
- Prairielands GCD (includes Ellis County)
- North Texas GCD (Collin, Cooke, and Denton Counties)
- Red River GCD (Grayson and Fannin Counties)

FIGURE 3.4 GROUNDWATER CONSERVATION DISTRICTS IN REGION C



3.3.5 Summary

In Region C, new MAG estimates for the Trinity, Woodbine, Carrizo-Wilcox, and Queen City aquifers were available for this cycle of regional water planning. New MAG estimates were not available for the Nacatoch aquifer and the availability for this aquifer was assumed to be the same as the amounts used in the 2021 Region C Water Plan (4). No MAG amounts were available for the Cross Timbers aquifer and the availability was assumed to be the same amounts used in the 2021 Region C Water Plan (4). MAG estimates were not available for "Other aquifer", and groundwater supplies were based on historical use and are assumed to be the same amounts used in the 2021 Region C Water Plan (4). The total available supply from groundwater in Region C is 159,525 acre-feet per year in 2030, changing to 163,670 acre-feet per year in 2080. About 71 percent of the available groundwater in Region C is from the Trinity aquifer, 17 percent from the Woodbine aquifer, 7 percent from the Carrizo-Wilcox aquifer, and 5 percent from minor and undesignated aquifers. More detail on the determination of available supplies from groundwater is included in Appendix E.

3.4 Currently Available Water Supplies

Table 3.6 and **Figure 3.5** show the currently available water supplies in Region C by different source types. Figure 3.5 also shows that there is considerably more supply in Region C than there was in 2021, thanks to on-going water supply development efforts. **Table 3.7** shows the currently available supplies for water user groups by county. Currently available supplies are supplies that can be used with currently existing water rights, contracts, and facilities. They are less than the overall supplies available to the region because the facilities needed to use some supplies have not yet been developed. Common constraints limiting currently available supplies include the availability and capacity of transmission systems, treatment plants, and wells.

The difference between currently available supply and that which is available to users is due primarily to transmission and treatment plant capacity limitations. In 2080, approximately one-third of the Region C total supplies are not currently connected to water supply systems. The connection of these supplies will be considered as water management strategies and is discussed in more detail in **Chapter 5**.

TABLE 3.6 WATER SUPPLIES CURRENTLY AVAILABLE TO WATER USERS BY SOURCE TYPE

CATEGORY	VALUES IN ACRE FEET PER YEAR					
	2030	2040	2050	2060	2070	2080
Reservoirs in Region C	1,039,994	1,018,857	993,283	970,955	955,191	941,163
Run-of-River Supply	7,170	7,170	7,170	7,170	7,170	7,170
Other Local Supply	17,721	17,921	18,394	18,762	18,762	18,762
Groundwater	93,791	94,211	95,109	95,908	96,614	97,527
Reuse	289,312	304,988	316,417	322,742	329,616	336,541
Surface Water and Groundwater Imports	287,666	286,221	285,243	284,301	283,209	282,099
REGION C TOTAL	**1,735,654**	**1,729,368**	**1,715,616**	**1,699,838**	**1,690,562**	**1,683,262**

FIGURE 3.5 CURRENTLY AVAILABLE SUPPLIES FOR REGION C WATER USERS

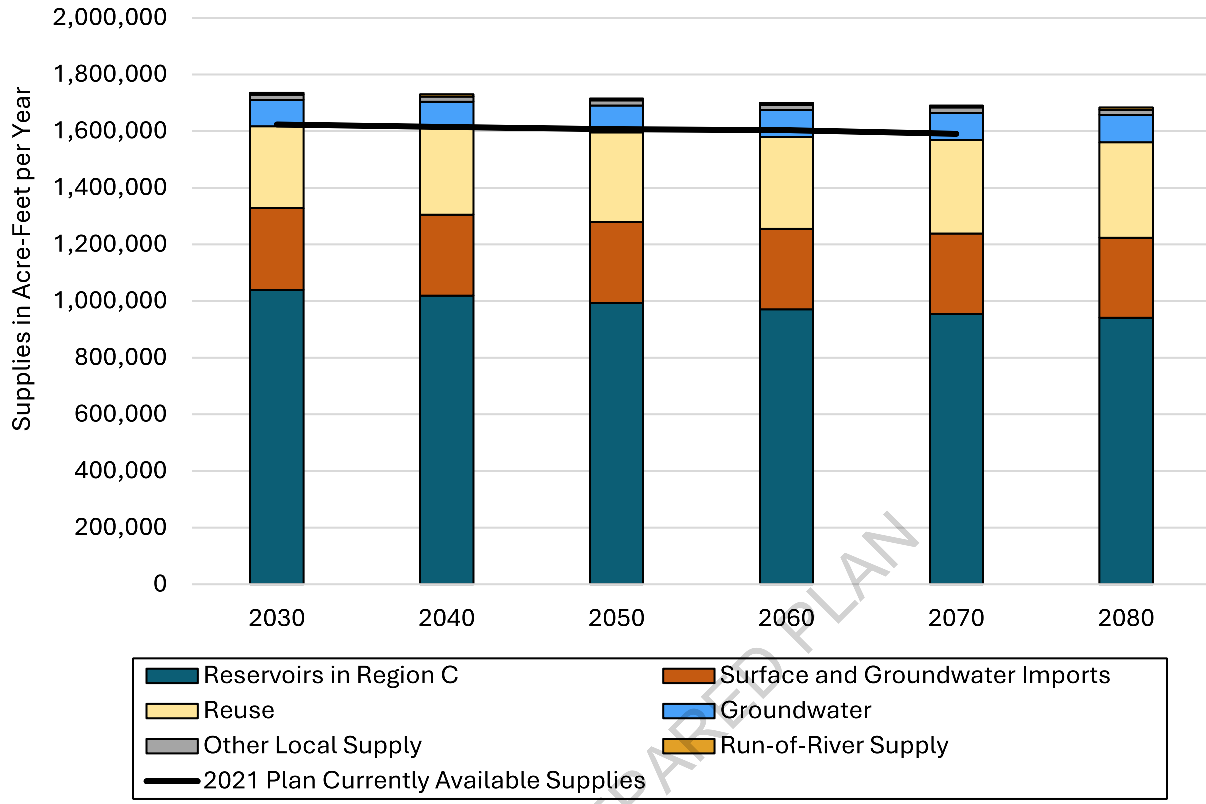


TABLE 3.7 CURRENTLY AVAILABLE SUPPLIES BY COUNTY

COUNTY	VALUES IN ACRE FEET PER YEAR					
	2030	2040	2050	2060	2070	2080
Collin	285,572	286,275	284,755	277,286	266,877	258,996
Cooke	9,080	9,217	9,294	9,445	9,706	9,885
Dallas	537,327	525,659	515,814	508,503	503,596	500,912
Denton	214,801	215,070	211,051	211,885	213,299	214,817
Ellis	48,684	51,815	56,054	58,800	60,898	62,491
Fannin	15,141	15,771	16,892	16,918	16,709	16,498
Freestone	16,795	17,428	16,751	16,026	15,399	14,843
Grayson	43,056	43,305	43,440	43,621	43,786	44,171
Henderson	9,159	9,553	10,208	10,306	10,280	10,277
Jack	5,955	5,541	5,304	5,049	4,848	4,689
Kaufman	40,962	41,742	44,285	47,847	52,773	55,757
Navarro	15,794	16,451	16,596	16,913	16,877	16,860
Parker	30,603	30,979	31,753	32,152	32,560	32,909
Rockwall	26,978	30,141	33,600	35,952	36,702	36,929
Tarrant	417,643	412,716	401,253	390,076	386,175	382,062
Wise	18,011	17,612	18,464	18,960	19,970	21,056
Subtotal	**1,735,561**	**1,729,275**	**1,715,514**	**1,699,739**	**1,690,455**	**1,683,152**
Region C Supplies to Other Regions	22,269	23,030	24,129	24,037	24,420	25,095
TOTAL	***1,757,830***	***1,752,305***	***1,739,643***	***1,723,776***	***1,714,875***	***1,708,247***

3.5 Water Availability by Major Water Provider (MWP)

As part of the Senate Bill One planning process, the Texas Water Development Board requires development of water availability for each designated major water provider. The major water provider (MWP) is defined as "a water user group or a wholesale water provider of particular significance to the region's water supply as determined by the regional water planning group." The designated entities can include public or private entities from any water use category. The MWP designation does not replace the wholesale water provider (WWP) designation used in previous rounds of planning but is intended to serve as a way to summarize the demands, sales, and WMS data related to WUGs and WWPs. The Region C Water Planning Group designated six entities as MWPs. These MWPs are DWU, City of Fort Worth, NTMWD, TRWD, TRA, and UTRWD. These entities were included as MWPs because of the large number of people served and the large quantities of water provided. The Region C Water Planning Group also designated two entities as Regional Water Providers (RWP), City of Corsicana and Greater Texoma Utility Authority (GTUA). These six MWPs and two RWPs comprise 90% of total water sales in Region C. **Table 3.8** gives a summary of the supplies currently available to major water providers. As discussed in **Section 3.4,** currently available supplies are limited by existing physical facilities. It should be noted that supplies in **Table 3.8** may be counted more than once, as one major or regional water provider often supplies another.

TABLE 3.8 CURRENTLY AVILABLE SUPPLIES TO REGION C MAJOR AND REGIONAL WATER PROVIDERS

PROVIDER	SOURCE	VALUES IN ACRE FEET PER YEAR					
		2030	2040	2050	2060	2070	2080
Dallas Water Utilities	Elm Fork/Lewisville/ Ray Roberts/Grapevine System[a]	174,899	174,109	173,319	172,059	170,799	169,539
	Lake Ray Hubbard [a]	46,239	45,450	44,660	43,927	43,194	42,461
	Lake Tawakoni	180,991	179,634	178,278	176,922	175,565	174,208
	Lake Fork	43,209	44,566	45,922	47,278	48,635	49,992
	Direct Reuse (Golf courses)	1,121	1,121	1,121	1,121	1,121	1,121
	White Rock Lake (Irrigation Only) [a]	2,540	2,375	2,210	2,023	1,837	1,650
	Indirect Reuse	44,265	51,332	59,790	62,160	64,842	68,097
	DWU TOTAL	***493,264***	***498,587***	***505,300***	***505,490***	***505,993***	***507,068***
City of Fort Worth	TRWD Supplies	285,947	288,339	281,618	276,291	276,768	277,808
	Direct Reuse	2,846	2,846	2,846	2,846	2,846	2,846
	FORT WORTH TOTAL	***288,793***	***291,185***	***284,464***	***279,137***	***279,614***	***280,654***
North Texas Municipal Water District	Bois d'Arc Lake [b]	89,456	86,878	84,187	81,497	78,918	76,228
	Lake Lavon [b]	88,111	83,963	79,927	75,892	70,959	67,148
	Lake Texoma [b]	68,464	68,076	67,185	66,253	65,034	64,032
	Chapman Lake [b]	39,700	37,600	35,500	33,500	31,100	29,200
	Lavon Watershed Reuse	69,402	73,008	73,008	73,008	73,008	73,008
	Lake Bonham [c]	1,949	2,367	3,358	3,533	3,467	3,400

PROVIDER	SOURCE	VALUES IN ACRE FEET PER YEAR					
		2030	2040	2050	2060	2070	2080
	East Fork Reuse	102,000	102,000	102,000	102,000	102,000	102,000
	Upper Sabine Basin	10,582	10,499	10,416	10,333	10,251	10,168
	Direct Reuse	5,350	4,678	4,678	4,678	4,678	4,678
	NTMWD TOTAL	***475,014***	***469,069***	***460,259***	***450,694***	***439,415***	***429,862***
Tarrant Regional Water District	West Fork System [a]	96,161	95,561	94,961	94,428	93,894	93,361
	Lake Benbrook [a]	3,371	3,371	3,371	3,371	3,371	3,371
	Lake Arlington [a]	7,500	7,385	7,270	7,157	7,043	6,930
	Cedar Creek Lake [a]	157,150	155,340	153,530	151,797	150,063	148,330
	Richland-Chambers Reservoir [a]	190,000	188,266	186,531	184,781	183,030	181,280
	Richland-Chambers Reuse	30,148	33,774	35,510	37,261	39,013	40,764
	TRWD TOTAL	***484,330***	***483,697***	***481,173***	***478,795***	***476,414***	***474,036***
Trinity River Authority	Joe Pool Lake						
	Midlothian	5,506	5,379	5,251	5,147	5,043	4,938
	Grand Prairie Raw	300	300	300	300	300	300
	Navarro Mills Lake	17,000	15,975	14,950	13,817	12,683	11,550
	Bardwell Lake	9,410	9,010	8,610	8,287	7,963	7,640
	Reuse (Region C)	128,011	143,208	154,708	166,208	166,208	166,208
	Subtotal	**160,227**	**173,872**	**183,819**	**193,759**	**192,197**	**190,636**
	TRWD	37,482	33,509	31,243	28,822	26,706	25,071
	TRA TOTAL IN REGION C	***197,709***	***207,381***	***215,062***	***222,581***	***218,903***	***215,707***
Upper Trinity Regional Water District	Chapman Lake	11,292	11,023	10,755	10,486	10,217	9,948
	DWU Contract	44,665	50,622	56,172	55,174	54,001	52,631
	Chapman Reuse	3,388	4,409	5,378	5,243	5,109	4,974
	Direct Reuse	897	897	897	897	897	897
	Ralph Hall	40,580	40,525	40,470	40,393	40,317	40,240
	UTRWD TOTAL	***100,822***	***107,476***	***113,672***	***112,193***	***110,541***	***108,690***
Corsicana	Lake Halbert and Richland-Chambers System	2,242	2,242	2,242	2,242	2,242	2,242
	Navarro Mills Reservoir	11,210	11,210	11,210	11,210	11,210	11,210
	CORSICANA TOTAL	***13,452***	***13,452***	***13,452***	***13,452***	***13,452***	***13,452***
Greater Texoma Utility Authority	Lake Texoma [d]	83,200	83,200	83,200	83,200	83,200	83,200
	NTMWD (Collin-Grayson MA)	5,400	5,400	5,400	5,400	5,398	5,400
	GTUA TOTAL	***88,600***	***88,600***	***88,600***	***88,600***	***88,598***	***88,600***

[a] *The available supply reported for these sources is the safe yield.*
[b] *The available supply reported for these sources consider droughts worse than the drought of record.*
[c] *The available supply reported for these sources is limited to the connected demands.*
[d] *Additional facilities are required to fully utilize this water.*

3.6 Water Availability by Water User Group (WUG)

As part of the regional water planning process, the TWDB requires development of information on currently available water supplies for each water user group (WUG) by river basin and county. The availability figures by water user group are limited by contracts and existing physical facilities, including transmission facilities, groundwater wells, and water treatment facilities. The supplies available to each WUG are shown in the TWDB database reports linked in **Appendix D**.

As the information on currently available water supply for WUGs was developed, several important points became apparent:

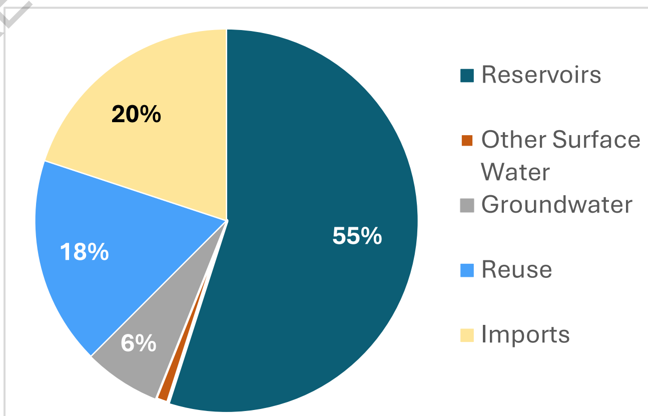
- Most water user groups in Region C will need additional water supplies over the next 50 years to meet growing demands.
- There are some significant water supplies that can be made available by the development of additional water transmission facilities. An example is the full development of DWU's share of Lake Palestine in the Neches Basin.

3.7 Summary of Current Water Supplies in Region C

Region C water suppliers are currently using approximately 70 percent of the reliable supply available from existing sources. The projected overall water supplies available to Region C in 2080 from current sources is over 2.47 million acre-feet per year (not considering supply limitations due to the capacities of current raw water transmission facilities and wells).

The sources of supply for Region C in 2030 include:

- 55% from in-region reservoirs
- 6% from groundwater
- 1% from local supplies including run-or-river
- 18% from reuse
- 20% from imports from other regions



Considering supply limitations due to the capacities of current raw water transmission facilities and wells, the currently available supply for Region C water users in 2030 is approximately 1.74 million acre-feet per year, with an additional 22,000 to 25,000 acre-feet per year available from Region C for water users in other regions. The difference between currently available supply and total available supply is due primarily to transmission and treatment plant capacity limitations.

Most water user groups and wholesale water providers in Region C will have to make improvements to their facilities to meet projected needs. The supply currently available to Region C from existing sources in 2080 (about 1.74 million acre-feet per year) is significantly less than the projected 2080 total water demand, which is nearly 3.03 million acre-feet per year.

3.8 Chapter 3 List of References

(1) Texas Water Development Board: *Exhibit C Second Amended General Guidelines for Development of the 2026 Regional Water Plans* (September, 2023), Austin, [Online] Available URL: https://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2026/projectdocs/2026RWP_ExhibitC.pdf?d=5272, July 1, 2024.

(2) Texas Water Development Board: *RWP 27 Groundwater Data Details*, (July 2023).

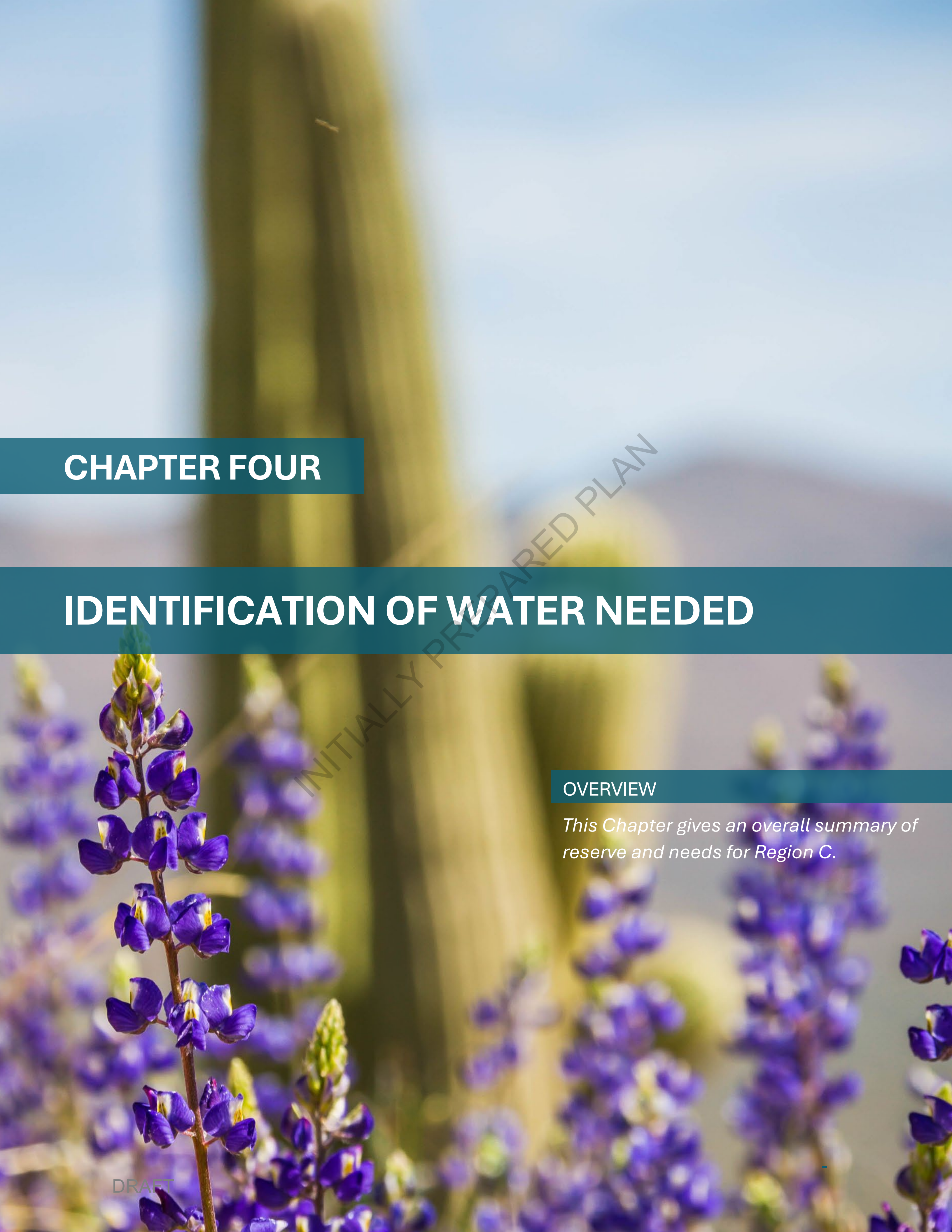
(3) Texas Water Development Board: *Groundwater Pumpage Estimates, Pumpage Detail, 2000 and Later*, Austin, [Online] Available URL: http://www.twdb.texas.gov/waterplanning/waterusesurvey/historical-pumpage.asp, November 2017.

(4) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2021 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, November 2020.

(5) Freese and Nichols, Inc., Advanced Groundwater Solutions, ATMOS Research and Consulting, Alan Plummer Associates, Inc.: *North Texas Municipal Water District Long Range Water Supply Plan,* prepared for North Texas Municipal Water District, August 2024.

(6) Texas Water Development Board: *2010-2019 Historical Water Use Estimates: Non-Surveyed Livestock Water Use Estimates by Region-County* (January 2022).

(7) Texas Water Development Board: *2010-2019 Historical Water Use Estimates: Mining by Region-County*, (August 2022).



CHAPTER FOUR

IDENTIFICATION OF WATER NEEDED

OVERVIEW

This Chapter gives an overall summary of reserve and needs for Region C.

4 IDENTIFICATION OF WATER NEEDED

CHAPTER OUTLINE	
Section 4.1	Regional Comparison of Supply and Demand
Section 4.2	Comparison of Connected Supply and Projected Demand by Major Water Provider
Section 4.3	Comparison of Connected Supply and Projected Demand by Other Water Providers
Section 4.4	Summary of Projected Water Shortages
Section 4.5	Second-Tier Needs Analysis
RELATED APPENDICES	
Appendix D	DB22 Reports

TWDB guidelines require that reserves and needs for additional water supply be determined for each water user group in the region based on the comparison of current water supply and projected demand. The specific reserves and needs shown should be treated with caution because their development is based on certain assumptions:

- TWDB guidelines require that the comparison between supply and demand be based on currently connected supplies, without considering the future connection of already developed supplies [(1)].
- TWDB requires that existing supplies are limited to reliable supplies in a drought of record (i.e. firm yield for reservoirs or MAG). In some cases, users may use more than this amount in a given year.
- The division of existing supplies among users can be made in many ways. For example, the amount of groundwater available in a county on a sustainable basis was divided among users based on historical use and on well capacities. The actual future groundwater use may differ from these assumptions.

The resulting comparison shows the reserves and needs that will exist in Region C if no steps are taken to connect existing water supplies or develop additional water supplies. This comparison is specifically required by TWDB planning guidelines [(1)]. Also included is a summary of these needs by major water provider and other water providers. The second tier needs analysis determines water needs that would remain if recommended conservation and direct reuse strategies were fully implemented.

Development of infrastructure to make existing supplies available to users and development of new supplies are treated as water management strategies, and they will be discussed in **Chapter 5**.

4.1 Regional Comparison of Supply and Demand

Regional water plans must compare projected water demands with existing water supplies to determine whether entities will experience water surpluses or water needs (shortages).**Table 4.1** and **Figure 4.1** provide a comparison of total currently connected water supply and total projected water demand in Region C, considering all water user groups.

TABLE 4.1 COMPARISON OF CONNECTED SUPPLY WITH PROJECTED DEMAND BY DECADE

	2030	2040	2050	2060	2070	2080
Connected Supply	1,744,233	1,737,947	1,724,186	1,708,411	1,699,127	1,691,824
Projected Demand	1,948,387	2,214,056	2,449,165	2,663,622	2,860,536	3,028,785
Total Regional Need (with Surpluses)	***204,154***	***476,109***	***724,979***	***955,211***	***1,161,409***	***1,336,961***
Surpluses	26,295	16,201	14,801	13,916	12,895	12,458
Total Regional Need (without Surpluses)	***230,449***	***492,310***	***739,780***	***969,127***	***1,174,304***	***1,349,419***
Counties with Needs	15	16	16	16	16	16
WUGs with Needs	224	250	257	262	269	272

FIGURE 4.1 COMPARISON OF CONNECTED SUPPLY WITH PROJECTED DEMAND BY DECADE

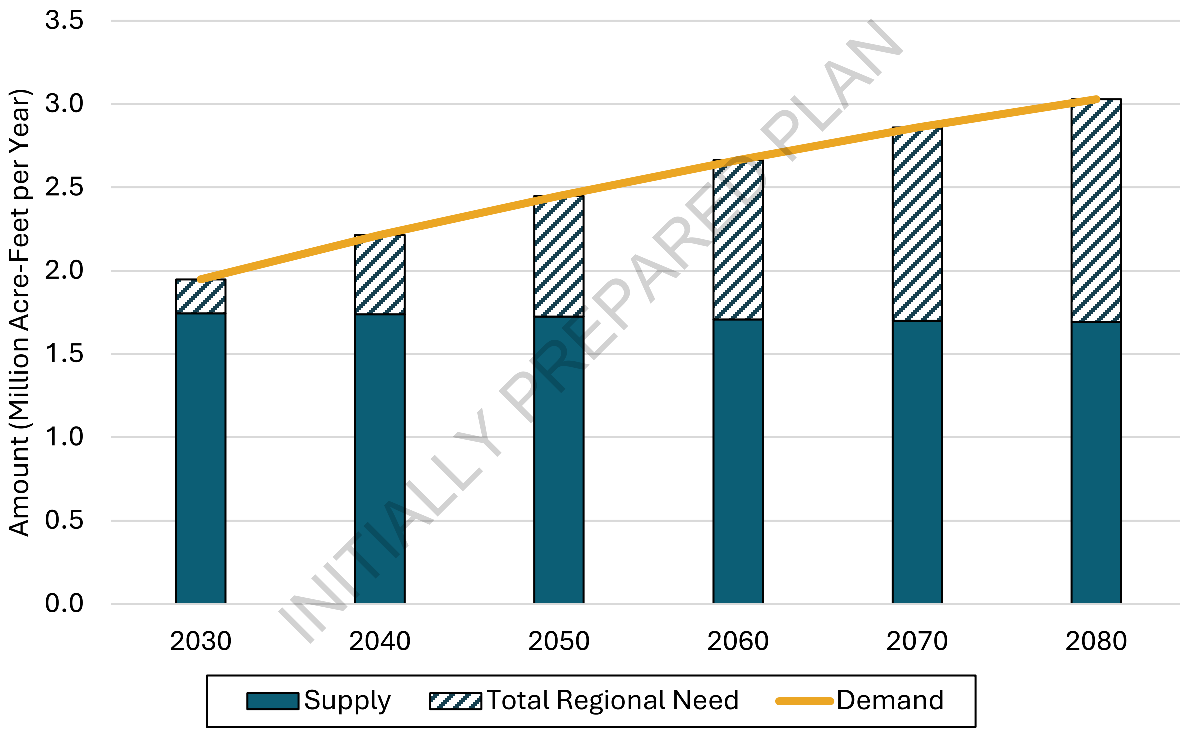


Table 4.2 shows the projected distribution of shortages by water use type. Most of the projected shortages are for municipal users. Many of the shortages shown for 2030 are fully or partially met with expected conservation savings, which is treated as a water management strategy rather than a currently available supply. This is discussed in more detail in **Section 4.5** regarding the second tier needs analysis.

TABLE 4.2 PROJECTED SHORTAGE BY USE TYPE FOR REGION C

CATEGORY	2030	2040	2050	2060	2070	2080
Municipal	219,223	465,388	706,581	929,028	1,127,348	1,295,345
Irrigation	5,501	5,498	5,498	5,507	5,538	5,584
Livestock	0	0	0	0	0	0
Manufacturing	9,142	19,946	24,070	27,767	31,018	33,740
Mining	123	211	890	2,587	5,105	8,473
Steam Electric Power	1,022	5,591	6,845	8,163	9,196	10,034
TOTAL	***235,011***	***496,634***	***743,884***	***973,052***	***1,178,205***	***1,353,176***

Table 4.3 shows the comparison of supply and demands by county. In 2030, 15 counties show a net need for more water. On a regional basis, over 270 water users in Region C are predicted to have a need for additional water by 2080. In general, the largest water needs are in Collin, Dallas, Denton and Tarrant Counties.

TABLE 4.3 NEED BY COUNTY FOR REGION C (ACRE-FEET PER YEAR)

COUNTY	2030	2040	2050	2060	2070	2080
Collin	29,707	90,367	160,812	210,659	246,831	273,587
Cooke	64	128	170	198	229	333
Dallas	59,175	100,001	138,158	168,841	196,654	219,359
Denton	22,580	68,876	119,539	154,875	193,246	226,886
Ellis	9,307	15,678	22,649	29,957	38,859	48,455
Fannin	4,811	5,088	5,532	7,631	10,476	13,080
Freestone	0	2,982	3,575	4,196	4,715	5,162
Grayson	11,189	24,628	30,292	35,324	41,874	46,184
Henderson	3,594	4,090	4,705	5,728	7,076	8,021
Jack	517	906	1,111	1,345	1,524	1,662
Kaufman	3,193	8,647	16,721	26,410	36,765	45,275
Navarro	66	326	1,044	1,739	2,704	4,088
Parker	4,175	12,068	22,898	36,487	53,096	68,062
Rockwall	2,445	8,357	16,518	24,417	29,923	33,811
Tarrant	79,166	144,692	183,781	240,998	279,748	316,422
Wise	5,022	9,800	16,379	24,247	34,485	42,789
TOTAL	***235,011***	***496,634***	***743,884***	***973,052***	***1,178,205***	***1,353,176***

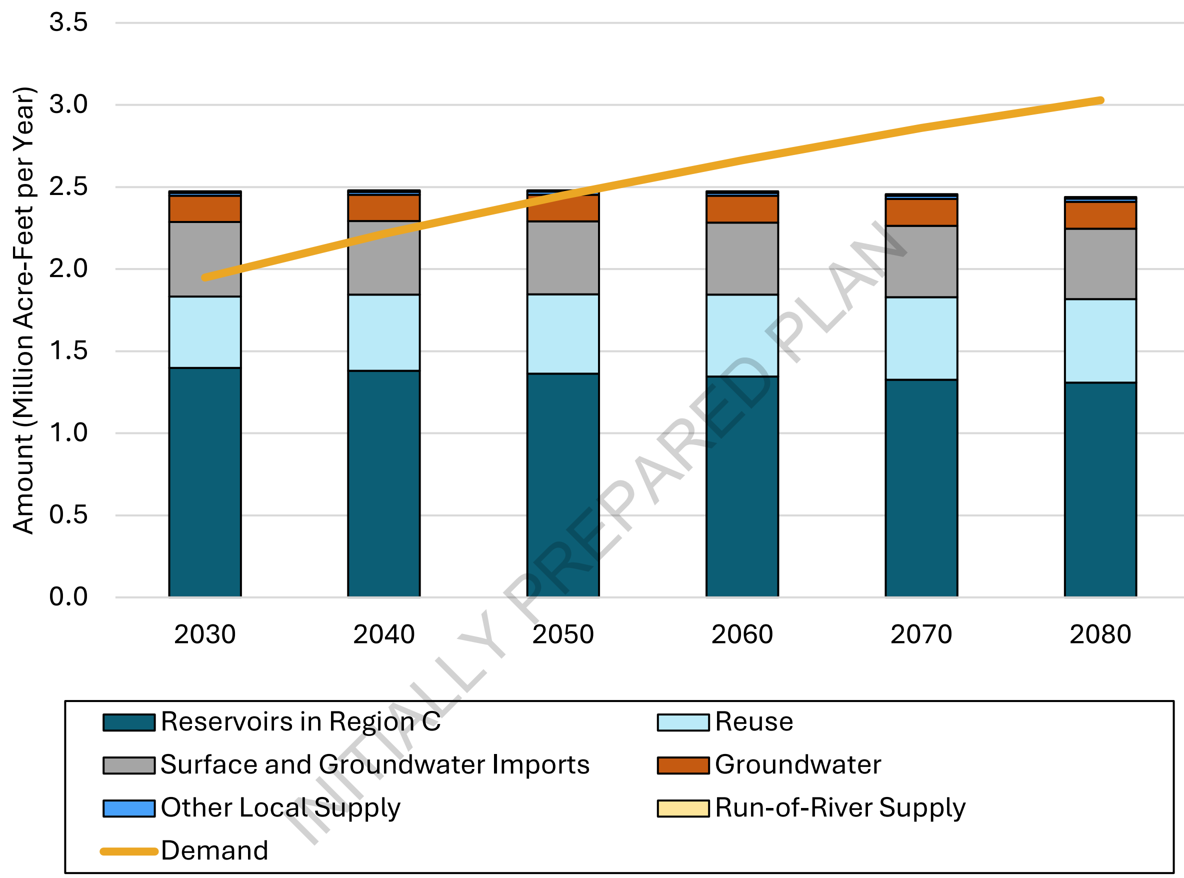
The comparison of supply and demand in **Table 4.2** and **Table 4.3** focuses on currently connected supplies. Existing supplies that are not connected could be made available to the region to meet some of these needs. An unconnected water supply is an existing and permitted supply that is not currently available due to infrastructure limitations, such as treatment or transmission capacity. For groundwater this includes all in-situ groundwater that has not been developed.

Table 4.4 and **Figure 4.2** show the comparison of total supply with demand for Region C, including connected and unconnected supply and surface water imports from other regions. By 2060, the projected demand for Region C exceeds total connected and unconnected supply. However, the needs for some individual water user groups occur sooner.

TABLE 4.4 COMPARISON OF TOTAL EXISTING SUPPLIES WITH DEMAND (ACRE-FEET PER YEAR)

	2030	2040	2050	2060	2070	2080
Total Connected and Unconnected Supply	2,473,236	2,480,132	2,480,395	2,474,502	2,455,873	2,438,325
Demand	1,948,387	2,214,056	2,449,165	2,663,622	2,860,536	3,028,785
Reserve (Need)	524,849	266,076	31,230	(189,120)	(404,663)	(590,460)

FIGURE 4.2 COMPARISON OF TOTAL EXISTING SUPPLIES WITH DEMAND



4.2 Comparison of Connected Supply and Projected Demand by Major Water Provider

Under the planning rules, a major water provider (MWP) is defined as “a water user group or a wholesale water provider of particular significance to the region’s water supply as determined by the regional water planning group.” [(1)]. The Region C Water Planning Group has designated six major water providers for Region C. In addition, two other wholesale water providers are considered “regional” water providers. **Table 4.5** shows the projected reserves or needs for additional supply for each major and regional water provider. Steps to meet these projected needs are discussed in **Chapter 5D**.

TABLE 4.5 RESERVE OR (NEED) BY MAJOR WATER PROVIDER USING ONLY CONNECTED SUPPLIES (ACRE-FEET PER YEAR)

WATER PROVIDER	PROJECTED RESERVE OR (NEED) FOR CURRENT AND FUTURE CUSTOMERS					
	2030	2040	2050	2060	2070	2080
Major Water Providers						
Tarrant Regional Water District	**(89,765)**	**(180,430)**	**(248,311)**	**(332,701)**	**(409,725)**	**(483,568)**
Municipal	(86,136)	(172,696)	(238,441)	(320,270)	(394,983)	(466,503)
Irrigation	(192)	(335)	(411)	(498)	(564)	(614)
Livestock	0	0	0	0	0	0
Manufacturing	(1,689)	(3,156)	(4,089)	(5,212)	(6,184)	(7,088)
Mining	(138)	(236)	(459)	(770)	(1,254)	(2,015)
Steam Electric Power	(1,610)	(4,007)	(4,911)	(5,951)	(6,740)	(7,348)
North Texas Municipal Water District	**(45,106)**	**(136,657)**	**(236,821)**	**(321,464)**	**(378,785)**	**(417,311)**
Municipal	(43,950)	(133,660)	(232,146)	(315,551)	(372,014)	(409,828)
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	(1,053)	(2,738)	(4,282)	(5,432)	(6,240)	(6,917)
Mining	0	0	0	0	0	0
Steam Electric Power	(103)	(259)	(393)	(481)	(531)	(566)
Fort Worth	**(47,617)**	**(94,130)**	**(120,416)**	**(156,520)**	**(190,832)**	**(222,311)**
Municipal	(46,268)	(91,678)	(117,298)	(152,597)	(186,221)	(217,095)
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	(1,349)	(2,452)	(3,118)	(3,923)	(4,611)	(5,216)
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Dallas Water Utilities	**(49,350)**	**(87,661)**	**(123,962)**	**(154,553)**	**(187,783)**	**(217,232)**
Municipal	(47,963)	(85,435)	(120,808)	(150,637)	(183,086)	(211,848)
Irrigation	(110)	(170)	(234)	(283)	(328)	(365)
Livestock	0	0	0	0	0	0
Manufacturing	(1,200)	(1,936)	(2,756)	(3,435)	(4,139)	(4,763)
Mining	0	0	0	0	0	0
Steam Electric Power	(77)	(120)	(164)	(198)	(230)	(256)
Trinity River Authority	**(9,100)**	**(18,435)**	**(20,870)**	**(23,830)**	**(25,946)**	**(27,581)**
Municipal	(9,100)	(18,435)	(20,870)	(23,830)	(25,946)	(27,581)
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0

WATER PROVIDER	PROJECTED RESERVE OR (NEED) FOR CURRENT AND FUTURE CUSTOMERS					
	2030	2040	2050	2060	2070	2080
Upper Trinity Regional Water District	**(4,325)**	**(35,522)**	**(71,105)**	**(87,855)**	**(108,338)**	**(126,181)**
Municipal	(3,765)	(34,392)	(68,849)	(85,597)	(106,077)	(123,919)
Irrigation	(560)	(1,121)	(2,240)	(2,240)	(2,240)	(2,240)
Livestock	0	0	0	0	0	0
Manufacturing	0	(9)	(16)	(18)	(21)	(22)
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Regional Water Providers						
Greater Texoma Utility Authority	**0**	**0**	**(24,290)**	**(28,526)**	**(32,678)**	**(34,979)**
Municipal	0	0	(24,290)	(28,526)	(32,678)	(34,979)
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Corsicana	**0**	**(327)**	**(1,214)**	**(2,070)**	**(3,046)**	**(4,074)**
Municipal	0	(287)	(1,069)	(1,828)	(2,699)	(3,621)
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	(40)	(145)	(242)	(347)	(453)
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0

4.3 Comparison of Connected Supply and Projected Demand by Other Water Providers

Projected supplies, demands, reserves, and shortages are summarized for each wholesale water provider and water user group in **Chapters 5D** and **5E**. As shown on **Table 4.1** there are over 270 Region C water user groups with projected water shortages by 2080.

Chapter 5E of this plan discusses the selection of water management strategies to address the requirements for additional supply. Many water user groups in Region C are served by wholesale water providers, and the needs of these water user groups will be addressed by obtaining additional supplies from the wholesale water providers. Other water user groups will require the development of individual water management strategies to address their needs.

4.4 Summary of Projected Water Shortages

All of the Region C counties, except for Freestone County, have net needs beginning in 2030 and all 16 Region C Counties have net needs by 2040. There are over 220 water user groups that are projected to need more supply in 2030, growing to over 270 water user groups by 2080.

If no new supplies are developed, the total projected overall shortage in Region C is approximately 230,000 acre-feet per year by 2030, growing to over 1.3 million acre-feet per year by 2080. Some of the shortages in 2030 are fully addressed by water conservation measures (including reuse).

Additionally, there are unconnected supplies in Region C that could be made available by completing water transmission facilities. However, the time to implement these strategies can take years. Also, since groundwater is a property right, the ability to fully develop this source is uncertain. Many Region C water suppliers depend on the region's major and regional water providers for all or part of their supplies. Most of the major and regional water providers will need to connect or develop additional supplies by 2030, and all will need additional supplies by 2040.

4.5 Second-Tier Needs Analysis

Regional planning rules require a second-tier needs analysis for all WUGs and MWPs for which conservation and direct reuse are recommended WMSs. The second-tier needs analysis determines water needs that would remain if recommended conservation and direct reuse strategies were fully implemented.

TWDB has provided a second-tier water needs analysis report from DB27. A link to this report is included in **Appendix D** and includes the second-tier water needs analysis by individual WUG.

In addition to the information provided in the DB27 report, **Table 4.6** summarizes the second-tier needs by WUG category, and **Table 4.7** summarizes second-tier needs by major water provider.

TABLE 4.6 SECOND-TIER WATER NEEDS BY WUG CATEGORY

	VALUES IN ACRE FEET PER YEAR					
WUG CATEGORY	2030	2040	2050	2060	2070	2080
Municipal	134,649	306,522	495,979	690,993	863,717	1,008,304
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	9,142	16,807	17,792	21,489	24,740	27,462
Mining	0	0	39	39	39	39
Steam Electric Power	1,022	5,591	6,845	8,163	9,196	10,034
TOTAL	***144,813***	***328,920***	***520,655***	***720,684***	***897,692***	***1,045,839***

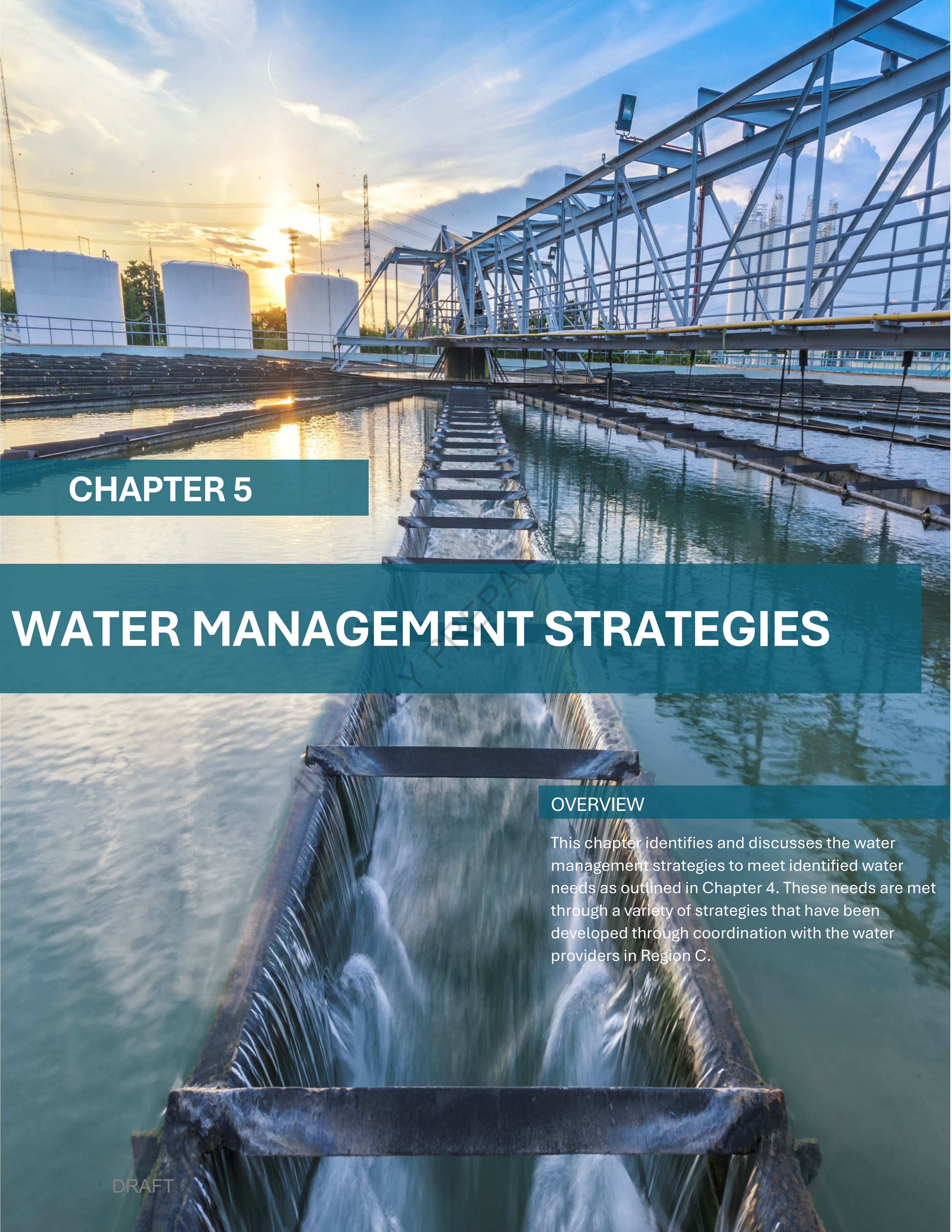
TABLE 4.7 SECOND-TIER WATER NEEDS BY MAJOR WATER PROVIDER

	VALUES IN ACRE FEET PER YEAR					
WUG CATEGORY	2030	2040	2050	2060	2070	2080
Tarrant Regional Water District	66,045	137,264	194,570	269,125	337,963	403,315
North Texas Municipal Water District	22,211	92,322	175,856	251,005	303,439	338,690
Fort Worth	27,860	54,402	73,209	105,345	135,376	162,499
Dallas Water Utilities	25,878	45,826	70,126	96,031	124,581	149,601
Trinity River Authority	3,984	8,066	10,284	13,050	15,045	16,551
Upper Trinity Regional Water District	3,550	25,048	53,679	69,328	86,923	102,096

Note: If one Major Water Provider, supplies another, the needs appear under both providers. Therefore, the needs in this table are not fully additive.

4.6 Chapter 4 List of References

(1) Texas Water Development Board, *Exhibit C Second Amended General Guidelines for Fifth Cycle Regional Water Plan Development* (April 2018), Austin, [Online] URL: http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/doc/current_docs/contract_docs/2ndAmendedExhibitC.pdf?d=1570051503683, April, 2018.



CHAPTER 5

WATER MANAGEMENT STRATEGIES

OVERVIEW

This chapter identifies and discusses the water management strategies to meet identified water needs as outlined in Chapter 4. These needs are met through a variety of strategies that have been developed through coordination with the water providers in Region C.

Chapter 5 Water Management Strategies

Chapter 5 identifies and discusses the water management strategies to meet identified water needs as outlined in **Chapter 4**. These needs are met through a variety of strategies that have been developed through coordination with the water providers in Region C.

Over the planning period, water providers may need to upgrade or modify their water supply systems or develop new supplies in ways that are not specifically identified in this plan. For aggregated water user groups, such as county other, the identification of needs and projects can be challenging due to the county-wide nature of the planning effort. It is the intent of this plan to include all water systems that demonstrate a need for water supply. This includes established water providers and new water suppliers that may be formed in the future to provide a reliable water supply.

The Region C Regional Water Plan outlines a potential approach that water providers can take to meet their projected water needs. Implementation of the water management strategies discussed in this plan is the responsibility of the water providers. The details of strategies will evolve as they are implemented. Sales of water to other users will be agreed upon between the seller and buyer. The identification of such strategies in this plan does not guarantee agreements can be reached nor does it obligate the water provider to provide the water. Costs for water purchases are generic placeholders and do not represent actual negotiated costs between a buyer and seller. The Region C Regional Water Planning Group will not be implementing water management strategies and does not want this plan to be an obstacle in the development of needed water supplies.

5A METHODOLOGY FOR EVALUATION AND SELECTION OF WATER MANAGEMENT STRATEGIES

CHAPTER OUTLINE	
Section 5A5A.1	Types of Water Management Strategies
Section 5A5A.2	Methodology for Evaluating Water Management Strategies
RELATED APPENDICES	
Appendix F	Potentially Feasible Water Management Strategies
Appendix G	Water Management Strategy Evaluations

This section describes the process to determine potentially feasible strategies for Region C as well as the methods used to evaluate potentially feasible strategies and select recommended and alternative strategies.

The steps in the identification of water management strategies for Region C include:

- Review previous plans for water supply in Region C, including locally developed plans and the 2022 State Water Plan [1].
- Consider the types of water management strategies required by Senate Bill One regional planning guidelines [2].
- Consider feasibility screening criteria for management strategies (the strategy must have an identifiable sponsor, must be technically feasible, and must meet existing regulations);
- Seek input from water providers and RCWPG members on potential strategies;
- Evaluate strategies based on the criteria set forth by the TWDB;
- Present the data to the potential sponsors and seek concurrence with recommendations;
- Select recommended strategies for Region C for approval by the RCWPG.

The process to identify potentially feasible water management strategies was presented at a public meeting and approved by the RCWPG on November 6, 2023. A list of the identified potentially feasible water management strategies is included in **Appendix F**.

FIGURE 5A.1 PROCESS TO IDENTIFY AND EVALUATE WATER MANAGEMENT STRATEGIES

5A.1 Types of Water Management Strategies

Regional Planning guidelines require that certain types of water management strategies be considered for developing additional water supplies [(2)].

The Region C Water Planning Group reviewed each of these types of water management strategies and determined whether there were potentially feasible strategies to develop water supply in Region C within each type. Water conservation strategies are discussed in **Chapter 5B**. Drought response planning is discussed in **Chapter 7**.

Other types of management strategies are discussed below, and a detailed listing of potentially feasible water management strategies for Region C is included in **Appendix F**. The evaluations of the potential water management strategies are discussed in **Appendix G**.

Water Management Strategies

The RWPGs shall consider, but not be limited to considering, the following types of WMSs for all identified water needs:

- Water Conservation
- Drought Management Measures
- Water Reuse
- Management and/or Expanded Use of Existing Supplies
  - System Optimization
  - Connection of Existing Supplies
  - Conjunctive Use
  - Reallocation of Reservoir Storage
  - Voluntary Redistribution of Water Resources
  - Voluntary Subordination of Water Rights
  - Yield Enhancement
  - Water Quality Improvements
- New Supply Development
  - Surface Water Resources
  - Groundwater Resources
  - Desalination
  - Water Right Cancellation
  - Brush Control
  - Rainwater Harvesting
  - Precipitation Enhancement
- Aquifer Storage and Recovery (ASR)
- Interbasin Transfers
- Emergency Transfers of Water

5A.1.1 Water Conservation

Water conservation is defined as "those practices, techniques, and technologies that will reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses." (3) Water conservation measures typically result in long-term, on-going changes in water use.

Water conservation is a valued water management strategy in Region C because it helps reduce the growing demands of the region. It is recommended for all individual municipal water users, whether the user has a defined shortage or not. Conservation is also recommended for all non-municipal users that are shown to have a shortage, as appropriate.

Summary of Decision: Consider conservation for all individual municipal water users and non-municipal water users with a need, as appropriate.

5A.1.2 Drought Management Measures

Drought management measures are actions taken by a water provider during drought to reduce demands. Region C did not consider drought management as a feasible strategy to meet long-term growth in demands or currently identified needs. Drought management measures are temporary actions to conserve available water supplies during times of drought or emergencies. These measures minimize the adverse impacts of water supply shortages during drought. Drought management will be employed in the region through the implementation of local drought contingency plans. Region C is supportive of the development and use of these plans during periods of drought or emergency water needs.

Summary of Decision: Do not consider Drought Management Measures to meet long-term water needs.

5A.1.3 Water Reuse

Water reuse utilizes treated wastewater effluent either by direct diversion from a wastewater plant to a use (direct reuse) or by delivery of water through streams or lakes for use (indirect reuse). Water reuse is a major source of water for Region C water providers. As demands increase, the available wastewater effluent also increases. Some providers have projects in place today to utilize the increased effluent. Others are planning to construct new projects to treat and transport the reuse water to the end user. Several major water providers are working together to maximize the available reuse to the region.

Summary of Decision: Include water reuse as part of the water management strategies considered in the Region C plan.

5A.1.4 Management and/or Expanded Use of Existing Supplies

Expanded use of existing supplies includes eight subcategories ranging from selling developed water that is not currently used to enhancing existing supplies through operation, storage, treatment or other means. Each of these subcategories was considered during the identification of potentially feasible strategies, and the applicability to Region C is discussed below.

System Optimization. System optimization is the coordinated use of multiple sources of supply, usually surface water reservoirs. This can also include development of regional water supply facilities or providing regional management of existing water supply facilities. System optimization is widely used throughout Region C, and can be implemented for many purposes, including gaining yield, reducing pumping costs, or maintaining acceptable water quality. Most of the systems in Region C are operated primarily to reduce pumping costs. For the purpose of the Region C planning process, only system operation that results in increased yield will be considered as potentially feasible water management strategies. Generally, only system operation with new water supplies is considered for evaluation as a water management strategy for the Region C Water Plan. Any increase in supplies due to system optimization is included as part of the respective strategy. No strategies were identified for existing reservoir system operations that increase yield above the current supply amounts.

Summary of Decision: System optimization is widely used in Region C, primarily to reduce pumping costs. Potentially feasible system operation strategies to provide additional yield should be investigated as part of other new strategies.

Connection of Existing Supplies. The connection of existing supplies that are not yet being fully utilized is a major element of the *Region C Water Plan*. There are several sources of water supply that have long been committed for use in Region C and could be connected to provide additional water supply. Region C water suppliers could potentially connect to currently uncommitted supplies in other regions through new, renewed or increased contracts or agreements with the seller of the water. This category also includes improvements to infrastructure to utilize the water, such as new or renovated transmission systems and water treatment plants.

Major sources of existing water considered for new connections to Region C water users include: Lake Palestine, Lake Texoma, Toledo Bend Reservoir, Lake O' the Pines, and water from Oklahoma. Other existing sources are considered for expanded use and voluntary sales to others.

Summary of Decision: Include connection of existing supplies as a major component of the Region C plan. Evaluate specific potentially feasible strategies for connection of existing supplies.

Conjunctive Use of Groundwater and Surface Water. In Region C, only about 6 percent of the water used currently comes from groundwater. However, as water providers expand their portfolios of water sources, groundwater and conjunctive use will become more important in developing resilient supplies. When used conjunctively, groundwater can help meet higher dry year demands in systems that have both groundwater and surface water supplies, while more surface water is used during normal to wet years.

Summary of Decision: Consider conjunctive use for Region C providers that have both groundwater and surface water sources. Generally, this will be considered as part of new groundwater strategies.

Reallocation of Reservoir Storage. Reallocation of water storage from a non-water supply use (such as hydropower generation or flood control) is the development of new water supply. Evaluation of reallocation of reservoir storage must consider available unappropriated water and seek appropriate authorizations. This strategy type can only apply to those reservoirs that dedicate storage for a non-water supply use. For Region C, that includes mainly reservoirs operated by the USACE.

Summary of Decision: Evaluate storage reallocation to water supply for Lake Texoma, Wright Patman Lake, and Bardwell Lake.

Voluntary Redistribution of Water Resources. In many cases, the connection of existing sources and the development of new sources require the voluntary redistribution of water resources by sale from the owner of the supply to the proposed user. (This would be true unless the proposed user is also the owner of the supply.) The water management strategies involving the voluntary redistribution of water resources are often discussed under other categories.

Summary of Decision: Evaluate potentially feasible strategies involving the voluntary redistribution of water resources as a unique strategy or as part of other strategies.

Voluntary Subordination of Water Rights

Voluntary subordination of water rights is useful where senior water rights limit reservoir yields under the prior appropriations doctrine.

Very little additional yield is available for existing reservoirs in Region C by voluntary subordination. This strategy is appropriate for new water supply sources that would have junior water rights.

In Region C, subordination of water rights is necessary to obtain the permitted amount for Muenster Lake in Cooke County.

Summary of Decision: Include voluntary subordination of water rights as a source of water supply for Muenster Lake and others as appropriate.

Yield Enhancement

Enhancement of surface water yields would generally include system optimization and conjunctive use, which are listed separately.

Enhancement of groundwater yields would include artificial recharge, which could include several methods. Artificial recharge of aquifers has not been implemented or studied in depth in Region C. If artificial recharge were to be implemented, it would likely be as part of an aquifer storage and recovery (ASR) program, which is discussed separately.

Summary of Decision: Do not include enhancement of yields of existing sources as a source of water supply for Region C water users except as discussed under other categories.

Water Quality Improvements

Water quality improvements allow for the use of impaired water for municipal or other uses. Generally, this strategy is considered for users with existing water supplies but impaired water quality. In Region C, there are some users of brackish surface water and groundwater. Water quality improvement for these sources is typically accomplished through desalination or blending. Desalination is discussed under the strategy type "Desalination". Other types of water quality improvements can be applied at a watershed level, such as the Red River Chloride Control Project. The Chloride Control Project is only partially implemented. Should this project move forward, some benefits may be realized in Lake Texoma.

Summary of Decision: Consider water treatment improvements for users of supplies with impaired water quality.

5A.1.5 New Supply Development

New supply development is a critical component of the *Region C Water Plan*. With a regional projected water need of an additional 1.3 million acre-feet per year of supply by 2080, these shortages cannot be met through conservation and existing supplies alone. Most of the new supply development will be new surface water, but other strategy subtypes were also considered.

Surface Water Resources

New surface water includes a variety of strategies, but all include new appropriations of state water. New reservoirs represent a large source of potential supply for Region C. To develop a new reservoir, both a state water right permit and a federal Section 404 permit are required. The permitting process can take multiple decades, depending upon the project. Design, construction and filling of the reservoir can add another 10 to 15 years. Because of the large amount of time needed to implement new reservoir strategies, long-term planning for these types of strategies is essential for implementation by the time the supply is needed. As a result, many of these potential reservoirs have been previously studied. Five potential new reservoirs are being considered for the *2026 Region C Water Plan*.

Potential New Reservoirs

- Lake Tehuacana
- Lake Columbia
- Marvin Nichols Reservoir
- George Parkhouse Lake (North)
- George Parkhouse Lake (South)

Other new surface sources include three proposed river diversions with off-channel storage, Neches Run-of-River, Sabine River Off-Channel Reservoir, and Red River Off-Channel Reservoir.

In addition, DWU is proposing to construct an off-channel reservoir in Ellis County for impounding wastewater return flows and potentially new appropriations. This strategy is considered under water reuse.

Summary of Decision: Evaluate new reservoirs and river diversions as potentially feasible strategies.

Groundwater Resources

New groundwater supplies within Region C are limited since most of the available groundwater supplies are already developed. However, there may be opportunities to expand current use in specific areas. In this round of planning, there is one recommended water management strategy utilizing brackish groundwater desalination for a new GTUA regional water system in northern Denton and Grayson counties. Also, several water providers are considering importing groundwater from outside the region.

Summary of Decision: Evaluate the importation of groundwater as considered by potential sponsors. Evaluate specific potentially feasible groundwater supplies within Region C.

Desalination

The salinity of water in Lake Texoma, the Red River, and some other potential sources is too high for municipal use. The water must be desalinated or blended with higher-quality water to meet drinking water standards. Desalination is a potentially feasible strategy for some Region C supplies. The cost of desalination has decreased in recent years, and the process is being used more frequently.

Desalination is a potentially feasible strategy to use supplies from the following sources:

- Lake Texoma and the Red River
- Brackish groundwater
- Water from the Brazos River
- Water from the Gulf of Mexico
- Local projects from other sources, if pursued by water suppliers.

Summary of Decision: Include desalination as a potentially feasible water management strategy to utilize supplies that require desalination for the planned use.

Water Right Cancellation

The Texas Commission on Environmental Quality has the power to cancel water rights after ten years of non-use, but this involuntary cancellation authority has seldom been used. The Water Availability Models showed that very little additional supply would be gained from water right cancellation in Region C [4]. Therefore, water rights cancellation is not recommended as a potentially feasible water management strategy for Region C.

Summary of Decision: Do not consider water rights cancellation as a potentially feasible strategy for the development of additional water supplies.

Brush Control

Brush control is the process of removing non-native brush from the banks along rivers and streams and upland areas to reduce water consumption by vegetation and increase stream flows and groundwater availability. Studies and pilot projects of brush control in West Texas show promising results. Two reservoirs in Region C, Lake Jacksboro and Lake Weatherford, were listed in the State Brush Control Plan as potential watersheds where brush control could enhance supplies. No formal studies have been conducted for either watershed. Given that there is no quantifiable evidence that brush control would increase water supply in either reservoir, brush control is not recommended as a potentially feasible water management strategy for any specific water user group (WUG) in Region C. However, brush control may be a management strategy for localized areas within the region, especially as a means to help meet localized livestock water supply needs.

Summary of Decision: Allow for studies and localized pilot projects to further investigate brush control. Do not consider brush control as a potentially feasible strategy for the development of additional water supplies.

Rainwater Harvesting

Rainwater harvesting is an ancient practice involving the capture, diversion, and storage of rainwater for landscape irrigation, drinking and domestic use, aquifer recharge, and, in modern times, stormwater abatement. Due to a lack of detailed data on the quantity of supplies that would be made available through rainwater harvesting, this strategy is not recommended as a potentially feasible water management strategy for any specific water user in Region C. However, there may be localized areas in Region C that might benefit from such a management strategy.

Summary of Decision: Allow for studies and localized pilot projects to further investigate rainwater harvesting. Do not consider rainwater harvesting as a potentially feasible strategy for the development of additional water supplies.

Precipitation Enhancement

Precipitation enhancement involves seeding clouds with silver iodide to promote rainfall. Such programs are generally located within areas where the rainfall is lower than in Region C. Given that Region C has adequate rainfall and that there are no studies showing what impact precipitation enhancement would have on streamflow and reservoirs in Region C, precipitation enhancement is not recommended as a potentially feasible water management strategy for Region C. However, there may be localized areas in Region C that might benefit from such a management strategy.

Summary of Decision: Do not include precipitation enhancement as a potentially feasible strategy for the development of additional water supplies. Allow for studies and localized pilot projects to further investigate precipitation enhancement.

5A.1.6 Aquifer Storage and Recovery

Aquifer storage and recovery (ASR) involves storing water in aquifers and retrieving this water when needed. The water to be stored can be introduced through enhanced recharge or more commonly, injected through a well into the aquifer. If an injection well is used, Texas law requires that the water not degrade the quality of the receiving aquifer. Source water for ASR can include excess surface water, treated wastewater, or groundwater from another aquifer.

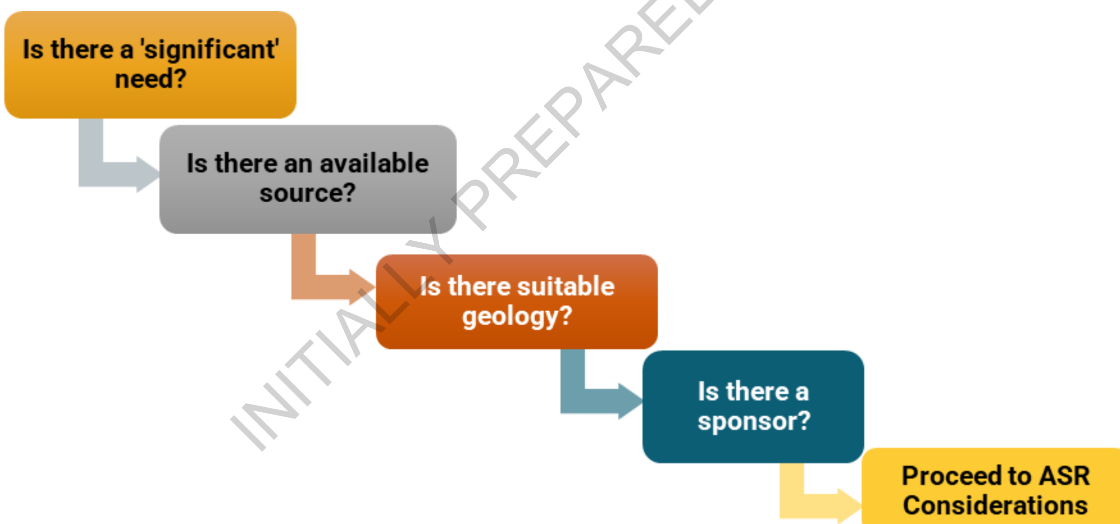
Recent legislation passed by the 86th Texas Legislature and signed by the Governor on June 10, 2019 requires the regional water plans to consider ASR and provide a specific assessment of this strategy if the region has significant needs. The definition of significant need is deferred to each region. For Region C, significant needs are considered only for municipal needs greater than 25,000 acre-feet per year. For purposes of this assessment, the Region C major water providers (MWPs) are shown to have significant needs. Customers of MWPs are not considered individually.

To determine the feasibility and applicability of ASR, there are several technical considerations. Specifically,

- ASR requires suitable geological conditions for implementation. Since geologic conditions vary by location, studies must be performed to determine what specific locations would be suitable for ASR. There is little data available on the suitability of ASR in Region C.
- Raw surface water and water reuse most likely will require pretreatment prior to injection and treatment to drinking water standards after retrieval.
- Operation of an ASR system could significantly impact the amount of water that is retrievable.

Summary of Decision: Develop a large-scale generic strategy for ASR that could be implemented by one or more of the Region C major water providers. Consider small-scale projects that are more likely to be implemented. Support continuing studies of ASR and implementation of pilot projects.

FIGURE 5A.2 ASR DECISION PROCESS



5A.1.7 Interbasin Transfers

Interbasin transfers are the movement of surface water from one basin to another. In Texas, this requires authorization by a water right. This legal requirement potentially will be in effect for new surface water supplies developed in one river basin and used in a different river basin. Additional detailed studies for the receiving and the source basins will be required as part of the permitting process for new interbasin transfers. This strategy category may be a component of several other strategy types, including new surface water development, connecting to existing supplies, and voluntary transfer of water. Development of adequate supplies for Region C and the other growing areas of Texas will require interbasin transfers.

Summary of Decision: Include interbasin transfers as part of the management strategies considered in the Region C plan.

5A.1.8 Emergency Transfers of Water

Emergency transfers of water could include interim water sales during drought or emergency conditions, transfers of water from one use type to another use type, emergency interconnections, and other similar types of projects. Like drought management, such transfers are considered temporary and not appropriate to meet long-term growth water demands. This type of strategy is reserved for emergency use only.

Summary of Decision: Emergency transfers of water are reserved for emergency use only.

5A.1.9 Summary of Potentially Feasible Strategies

Appendix F includes a listing of potentially feasible water management strategies for Region C for major and regional water providers, wholesale water providers, and for all water user groups by county.

A list of the major strategies, defined as providing more than 25,000 acre-feet per year, is presented in **Table 5A.1**. The results of the evaluation and the recommended strategies for Region C are discussed in the subsequent sections of **Chapter 5** and detailed in **Appendix G**.

TABLE 5A.1 LIST OF MAJOR POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES

POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGY	POTENTIAL SPONSOR
Reuse Strategies	
Cedar Creek Wetland Reuse	TRWD
Reuse from TRA Central WWTP	TRWD
Reuse from Mary's Creek WRF	TRWD, Fort Worth
Ralph Hall Indirect Reuse	UTRWD
Additional Indirect Reuse Implementation	DWU
Main Stem Balancing Reservoir	DWU
Additional Lavon Watershed Reuse	NTMWD
Expanded Wetland Reuse	NTMWD
Connection of Existing Supplies	
Integrated Pipeline	TRWD, DWU
Connect to Lake Palestine (IPL Delivery Point to DWU WTP)	DWU
Lake Texoma (Blending)	NTMWD, UTRWD
GTUA Regional System	GTUA
Sabine Conjunctive System Operations	DWU
Toledo Bend Reservoir (Phase 1)	NTMWD, TRWD, UTRWD, DWU
Lake O' the Pines (Cypress Basin Supplies)	NTMWD
Water from out-of-state (Oklahoma)	NTMWD, UTRWD, Irving

POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGY	POTENTIAL SPONSOR
New Surface Water	
Marvin Nichols Reservoir	NTMWD, UTRWD, TRWD, DWU and/or Irving
George Parkhouse Reservoir (North)	NTMWD and/or UTRWD
George Parkhouse Lake (South)	NTMWD and/or UTRWD
Wright Patman Reallocation	NTMWD, UTRWD, TRWD, DWU and/or Irving
Lake Texoma Reallocation	GTUA
Tehuacana Reservoir	TRWD
Lake Columbia	DWU
Red River Off Channel Reservoir	DWU, UTRWD
Neches Basin Supplies	DWU
New Groundwater	
Carrizo-Wilcox Groundwater	NTMWD, TRWD, DWU, UTRWD
Desalination	
Gulf of Mexico with Desalination	Multiple
Lake Texoma with Desalination	NTMWD, GTUA, DWU, Denison
Aquifer Storage and Recovery (ASR)	
Aquifer Storage and Recovery	Multiple

5A.1.10 Potentially Feasible Strategies with Flood Mitigation Benefits

TWDB contract requirements for regional water planning require identification of feasible strategies with flood mitigation benefits. TWDB contract Exhibit C, Section 2.5.1 includes the following language:

Identify those potentially feasible WMSs, if any, that, in addition to providing water supply, could potentially provide non-trivial flood mitigation benefits or that might be the best potential candidates for exploring ways that they might be combined with flood mitigation features to leverage planning efforts to achieve potential cost savings or other combined water supply and flood mitigation benefits. The work required to identify these WMSs will be based entirely on a high-level, qualitative assessment and should not require modeling or other additional technical analyses.

Generally, strategies that provide flood benefits are those that provide storage or detention of flood waters. Strategy types that are considered under this requirement include new reservoirs, conjunctive use and ASR strategies that utilize excess surface water. This assessment is discussed in **Section 5F** for the recommended WMSs.

5A.2 Methodology for Evaluating Water Management Strategies

The TWDB guidelines set forth certain factors that are to be considered by the regional water planning groups in the evaluation of water management strategies [(2)]. This subsection discusses the specific evaluation factors selected by the Region C Water Planning Group for the potentially feasible water management strategies, including the environmental evaluation of alternatives and the development of costs. Additional details on the evaluation of strategies are included in various appendices.

5A.2.1 Factors Considered in Evaluation

The factors specifically considered by the Region C Water Planning Group in the evaluation of potential water management strategies are summarized in the blue box at the right. As required, the evaluation of water management strategies includes the quantitative reporting of quantity, reliability, costs and environmental factors. While the quantitative reporting of water made available and the unit cost of delivered and treated water can readily be developed, data for the quantitative reporting of environmental factors are limited. The detailed quantitative assessment of environmental factors requires data from site-specific studies, which are often not conducted at the planning level. Available data for environmental factors are used in the evaluation.

Consistency with plans of Region C water suppliers is an important factor in the evaluation of strategies. It is the intent of the Region C Water Planning Group to consider the existing plans of the water suppliers in the region, especially the major and regional wholesale water providers, in the development of the *2026 Region C Water Plan*.

Equitable comparison of all feasible strategies is not included as an explicit evaluation factor because it describes the way the entire evaluation is conducted. This factor was considered in the development of the methodology for evaluations. Interbasin transfer requirements in the Texas Water Code were considered in the development of strategies.

Water Management Strategy Evaluation Factors

- Quantity of water made available
- Reliability of supply
- Unit cost of delivered and treated water
- Environmental factors
- Impacts on agricultural and rural areas
- Impacts on natural resources
- Impacts on other water management strategies and possible third party impacts
- Impacts to key water quality parameters
- Consistency with plans of Region C water suppliers
- Consistency with other regions

5A.2.2 Environmental Evaluation

The environmental evaluation of potentially feasible management strategies is summarized in **Appendix G**. Factors reported quantitatively include the total acres impacted by the strategy and the number of threatened and endangered species listed in the counties of the proposed water source. For existing water sources, only the species that are water-dependent are included in the count of threatened and endangered species. Other factors were assigned a high, moderate, or low rating based on existing data and the potential to avoid or mitigate each of the environmental factors. These evaluations were summarized in an overall environmental evaluation for the strategy. Certain management strategies were evaluated as a category rather than individually because their environmental effects do not vary greatly. Examples of evaluation by category include purchasing water from another provider and the development of new wells in aquifers with additional water available.

5A.2.3 Agricultural Resources and Other Natural Resources

The evaluation of impacts on agricultural resources and rural areas assesses the ability to continue current agricultural and livestock activities. Strategies that move considerable amounts of water from rural to urban areas were also considered under this category. The impacts of recommended strategies on these factors are discussed in more detail in **Chapter 6**.

Impacts to other natural resources include potential impacts to water resources that are not the direct source for the strategy and impacts to mineral resources, oil and gas, timber resources, and parks and public lands. (Impacts to the water resources that are the source for the strategy are included under environmental factors.) The consideration of the impacts to agricultural and natural resources is used to assess how the regional water plan is consistent with the protection of the state's resources. This discussion is also summarized in **Chapter 6** of the plan.

5A.2.4 Recommended Water Management Strategies

Water management strategies are recommended based on the overall factors set forth in the strategy evaluations. As discussed above, consistency with the on-going water development plans of regional water providers is an important factor in the strategy selection. All factors are considered in the selection process. The recommended strategies are based on the ability to supply the quantity of water needed at a reasonable cost while providing long-term protection of the state's resources.

5A.3 Chapter 5A List of References

(1) Texas Water Development Board: *2022 State Water Plan for Texas, Austin* [Online] Available URL: https://www.twdb.texas.gov/waterplanning/swp/2022/, July 2022.

(2) Texas Water Development Board: Chapter 357, *Regional Water Planning Guidelines*, Austin, November 2019.

(3) Texas Water Code, Title 2, Subtitle B, Chapter 11, Subchapter A. Section 11.002(8)(B). Online: https://statutes.capitol.texas.gov/Docs/WA/htm/WA.11.htm .

(4) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2011 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, October 2010.

5B WATER CONSERVATION AND REUSE RECOMMENDATIONS

CHAPTER OUTLINE	
Section 5B.1	Summary of Region C Water Planning Group Decisions
Section 5B.2	Historical Water Use in Region C
Section 5B.3	Existing Water Conservation and Reuse in Region C
Section 5B.4	Recommended Water Conservation and Reuse in Region C
Section 5B.5	Per Capita Water Use in Region C
Section 5B.6	Water Conservation Plans and Reporting Requirements
Section 5B.7	Evaluation of Water Conservation Planning Requirements
RELATED APPENDICES	
Appendix E	Water Supply Available
Appendix G	Water Management Strategy Evaluations
Appendix H	Cost Estimates
Appendix I	Water Conservation Savings

The Region C Water Planning Group places strong emphasis on water conservation and reuse as a means of meeting projected water needs. This chapter consolidates the water conservation and reuse recommendations in the *Region C Water Plan*.

It also includes:

- Background on the historical context of water use and conservation in Region C
- Summary of Region C Water Planning Group decisions regarding water conservation and reuse
- Discussion of existing water conservation and reuse in Region C
- Review of the historical and projected per capita water use in Region

Although both water conservation and reuse recommendations are included within this chapter, reuse is considered a unique strategy type for regional water planning purposes and is reported separately in DB27.

5B.1 Summary of Region C Water Planning Group Decisions

Texas Water Development Board (TWDB) planning rules require Regional Water Planning Groups (RWPGs) to "evaluate potentially feasible water management strategies for all water user groups (WUGs) and wholesale water providers (WWPs) with identified water needs," including water conservation measures and reuse of treated wastewater effluent.

This section summarizes the decisions of the Region C Water Planning Group for these water management strategies and addresses decisions made regarding new information available since the *2021 Region C Water Plan*.

Potential Applications for Water Reuse in Region C

- Landscape irrigation
- Agricultural irrigation
- Industrial and power generation reuse
- Recreational/environmental uses
- Supplementing potable water supplies through indirect reuse and/or direct reuse

5B.1.1 Water Conservation

Water Conservation in Region C

The Region C WPG developed two guiding principles of the water conservation recommendations as follows:

1. Continued improvement in conservation that demonstrates the Region's commitment to using existing sources efficiently; and
2. Reasonable, practical recommendations that do not put an undue financial burden on WUGs.

These principles guided the development of water conservation strategies that go beyond the savings achieved through plumbing codes. Plumbing code savings, also known as water efficiency savings, result from federal and state laws mandating that new appliances and fixtures be efficient.

Definitions

Conservation: "The development of water resources; and those practices, techniques, and technologies that will reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses." TAC §11.002(8)

Drought/Emergency Management: Temporary measures that are implemented when certain criteria are met and are terminated when these criteria are no longer met.

These savings occur passively as households naturally replace older fixtures and appliances without actively seeking more water-efficient options.

In contrast, the water conservation strategies discussed in this chapter refer to active measures implemented by utilities. These strategies aim to accelerate the replacement of older fixtures and reduce water use through advanced technology and behavioral changes.

Summary of Decisions: Incorporate water management strategies involving water conservation as a major component of the long-term water supply for Region C. Consider water conservation for all municipal WUGs regardless of their need. Conservation will also be evaluated for irrigation and mining customers with a need. Conservation is not evaluated for manufacturing users with a need because the manufacturing processes are specific for each facility, which limits identification of region-wide conservation measures.

5B.1.2 Reuse of Treated Wastewater Effluent

Reuse of treated wastewater effluent is an important source of water in Region C and across the state of Texas. The *2021 Region C Water Plan*[1] projected that reclaimed water would provide supply equal to approximately 26 percent of the 2070 Region C water supply. There are a number of water reuse projects in operation in Region C, and many others are currently in the planning and permitting process. Reuse will serve a major role in meeting future water supply requirements for the region.

There are several benefits associated with water reuse as a water management strategy:

- Water reuse represents an effective water efficiency measure.
- Water reuse provides a reliable source that remains available in a drought.
- Water reuse quantities typically increase as population increases.
- Water demands that can be met by reuse are often near reuse sources.
- Water reuse is a viable way to defer or avoid construction of new water supplies.

Available reuse quantities are dependent on water use, and as such are subject to reduced supplies from ongoing conservation strategies. It should also be noted that reliable reuse quantities should be based on dry-weather flows, which are likely to be most limited during periods of drought.

Direct Reuse

Direct reuse and indirect reuse have significantly different permitting requirements and potential applications. Direct reuse occurs when treated wastewater is delivered from a wastewater treatment plant directly to a water user, with no intervening discharge to waters of the state. Direct non-potable reuse requires a notification to the Texas Commission on Environmental Quality (TCEQ), which is routinely accepted so long as the requirements of the agency's regulations regarding direct non-potable reuse, designed to protect public health, are met. Direct non-potable reuse is most commonly used to supply water for landscape irrigation (especially golf courses) and industrial uses (such as cooling for steam electric power plants).

There is currently one direct potable reuse (DPR) project in operation in Texas, owned and operated by the Colorado River Municipal Water District. The City of Wichita Falls operated a temporary DRP project in a response to the 2011-2015 drought. This operation has since been converted to an indirect reuse project. No new entities in Texas have begun operating DPR projects. However, El Paso Water has completed the design of a DPR project and is beginning construction. That project, when complete, would be the first DPR project in Texas and the United States to deliver purified water directly to the distribution system (rather than first blending with other raw water supplies upstream of a conventional surface water treatment plant).

Summary of Decision: Incorporate direct reuse water management strategies for municipal and non-municipal water needs where feasible and if requested by the sponsoring entity.

Indirect Reuse

Indirect reuse occurs when treated wastewater is discharged to a stream or reservoir and is diverted downstream or out of a reservoir for reuse. The discharged water mixes with ambient water in the stream or reservoir as it travels to the point of diversion. Many of the water supplies within Region C have historically included return flows from treated wastewater as well as natural runoff.

New indirect reuse projects may require a water right permit from the TCEQ and may also require a wastewater discharge permit from the TCEQ if the discharge location is changed as part of the reuse project. Many Region C reservoirs have water right permits in excess of firm yield and are currently using return flows in their watersheds to provide a supplement to supply. These return flows may not be a long-term reliable supply if they are diverted for future direct reuse projects or redirected to other water bodies for future indirect reuse projects.

In general, indirect reuse strategies will require the use of multiple barriers (such as industrial pretreatment, advanced water/wastewater treatment, blending, residence time, and/or monitoring) to mitigate potential negative impacts to public health, the environment, agricultural resources, and other resources.

Sources of wastewater effluent needed for new reuse projects are generally limited to owners of the source water and/or operators of wastewater treatment plants. These include Trinity River Authority (TRA), Tarrant Regional Water District (TRWD), North Texas Municipal Water District (NTMWD), the Cities of Fort Worth and Dallas, as well as several other cities.

Summary of Decision: Incorporate water management strategies involving indirect reuse as a major component of the long-term water supply for Region C. Encourage planning and implementation of additional reuse projects. Monitor legislation and regulatory actions related to reuse.

John Bunker Sands Wetlands Center

Located near Seagoville, this reuse project allows NTMWD to divert up to 91 million gallons per day (MGD) of return flow from the Trinity River and return it to Lake Lavon to be reused. The Wetland Center is a unique public private partnership between NTMWD and The Rosewood Corporation to provide education, research and conservation opportunities pertaining to water reuse and supply, wetland systems and wildlife habitat.

TRWD George Shannon Wetlands Water Reuse Project

This wetland project is one way TRWD is extending its current resources to meet a rapidly growing population. A joint effort with Texas Parks and Wildlife Department, this 2,200 acre facility near Richland Chambers Lake was completed in 2013 and consists of a series of sedimentation ponds and wetland cells that naturally filter water diverted from the Trinity River, providing an additional 90 MGD of supply for TRWD customers.

5B.2 Historical Water Use in Region C

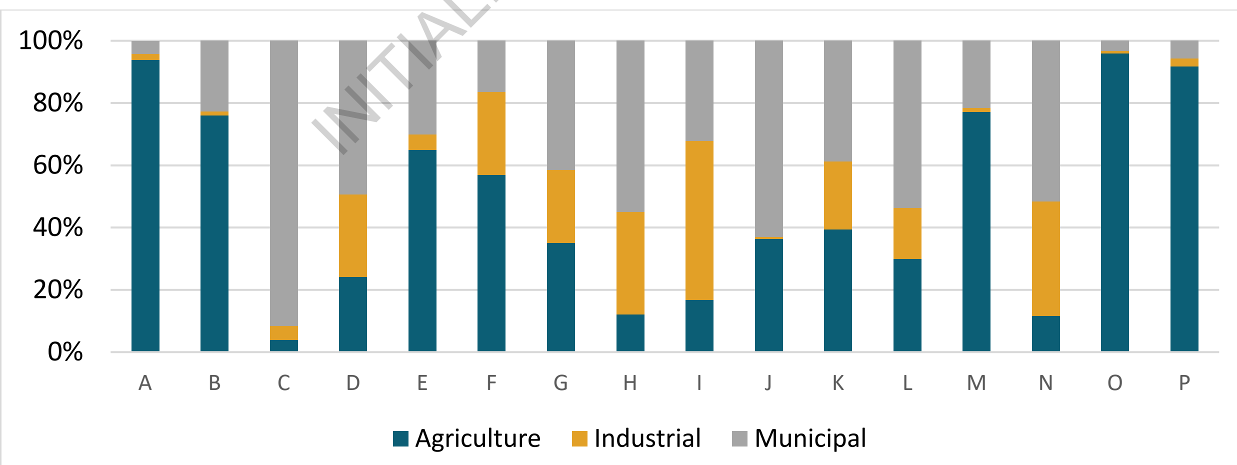
The first step in developing effective water conservation and reuse recommendations for Region C is to understand current water use. This section discusses historical water use in Region C, describes normalization of water use data, shows Region C water use in a statewide context, and reports historical water losses.

Water use data obtained from the TWDB[2] were used to analyze historical water use in Region C. **Table 5B.1** shows the summary of water use in Region C for year 2021. According to these data, 91.4 percent of the water use in Region C in the year 2021 was for municipal purposes. **Figure 5B.1** shows the composition of water use by sectors in Texas in 2021, which also indicates that Region C's water use composition is very different from other regions, as it is predominantly municipal use.

TABLE 5B.1 TWDB REGION C SUMMARY OF WATER USE FOR YEAR 2021

CATEGORY	REPORTED WATER USE (ACRE FEET)	PERCENTAGE OF REGIONAL WATER USE
Irrigation	39,519	2.8%
Livestock	18,084	1.3%
Manufacturing	42,595	3.1%
Mining	6,946	0.5%
Municipal	1,270,291	91.4%
Steam Electric Power	12,156	0.9%
TOTAL	**1,389,591**	**100.0%**

FIGURE 5B.1 COMPOSITION OF WATER USE ACROSS TEXAS – 2021



Normalized Historical Water Use Data

Normalizing water use by the service population to obtain a per capita water use (GPCD) is often used to gain a sense of whether water is being used efficiently. The TWDB/TCEQ/WCAC *Guidance* *and Methodology for Reporting on Water Conservation and Water Use* [11] recommends calculating net municipal per capita water use by this formula:

$$GPCD = \frac{(\textit{water diverted and/or purchased}) - (\textit{wholesale sales} + \textit{industrial sales} + \textit{power sales})}{(\textit{Population of retail service area}) \times (365\ \textit{days})}$$

This formula provides an estimate of municipal per capita water use that includes commercial, residential, some light industrial, and institutional water users and in some cases, municipal golf course irrigation. This definition provides a historical context for water use by a single water provider and may be a reasonable tool to assess water conservation trends over time for that provider.

The *Guidance* also recommends using total per capita water use for comparison to targets and goals. The recommended formula for total per capita water use credits indirect reuse against total diversion volumes but does not credit wholesale, industrial, or power sales:

$$GPCD = \frac{(\textit{total water diverted and/or purchased}) - (\textit{indirect reuse})}{(\textit{Population of retail and wholesale service area}) \times (365\ \textit{days})}$$

The *Guidance* does not quantify specific per capita water conservation targets or goals.

Due to local and regional differences in the factors that drive water use, the *Guidance* does not recommend comparison of municipal GPCD or total GPCD values between utilities or regions. Differences in the following factors can significantly influence per capita water use of one utility relative to another:

- Composition of the customer base. Some utilities have a much greater commercial and industrial base than others and experience greater commercial and institutional water usage than others. In addition, most of the major water users in some regions receive water from municipal providers, while in other regions, there are significant self-supplied users. (Large users tend to develop their own supplies in areas where major groundwater wells can easily be developed and in areas where substantial surface water supplies are available.)
- Climate
- Economic conditions
- Water rates
- Availability of water supplies
- Presence of an active water conservation program

Municipal GPCD

Total municipal water use less wholesale and industrial sales divided by the service area population

Total GPCD

Total water use divided by the service area population (this includes both municipal and non municipal water use)

Without additional data and analysis, comparison of municipal GPCD or total GPCD between utilities or regions may lead to inappropriate conclusions about comparative water use efficiencies. Instead, these quantities should be used to track water conservation progress over time for a single water provider. However, even for a single provider, if there are significant shifts in development patterns or in the percentages of commercial/institutional water use to residential use, these measurements may not accurately reflect changes in water use due to conservation practices.

For more comprehensive analysis of a utility's water use, the *Guidance* recommends dividing water use into residential, industrial, commercial, institutional, and agricultural sectors and normalizing water use in each sector by factors that drive water use in each sector.

Example normalization factors are shown in **Table 5B.2.** Each utility must determine appropriate factors for its service area and water use sectors. Clear, consistent definitions of each water use sector and normalization factor are required to ensure that data are comparable for each reporting entity. Utilities will likely choose different factors to characterize their water uses. Even for residential water use, there are potential inconsistencies. For example, different utilities report multi-family usage as either residential or commercial usage, making even residential comparisons difficult. Furthermore, there is little historical data at this level of detail.

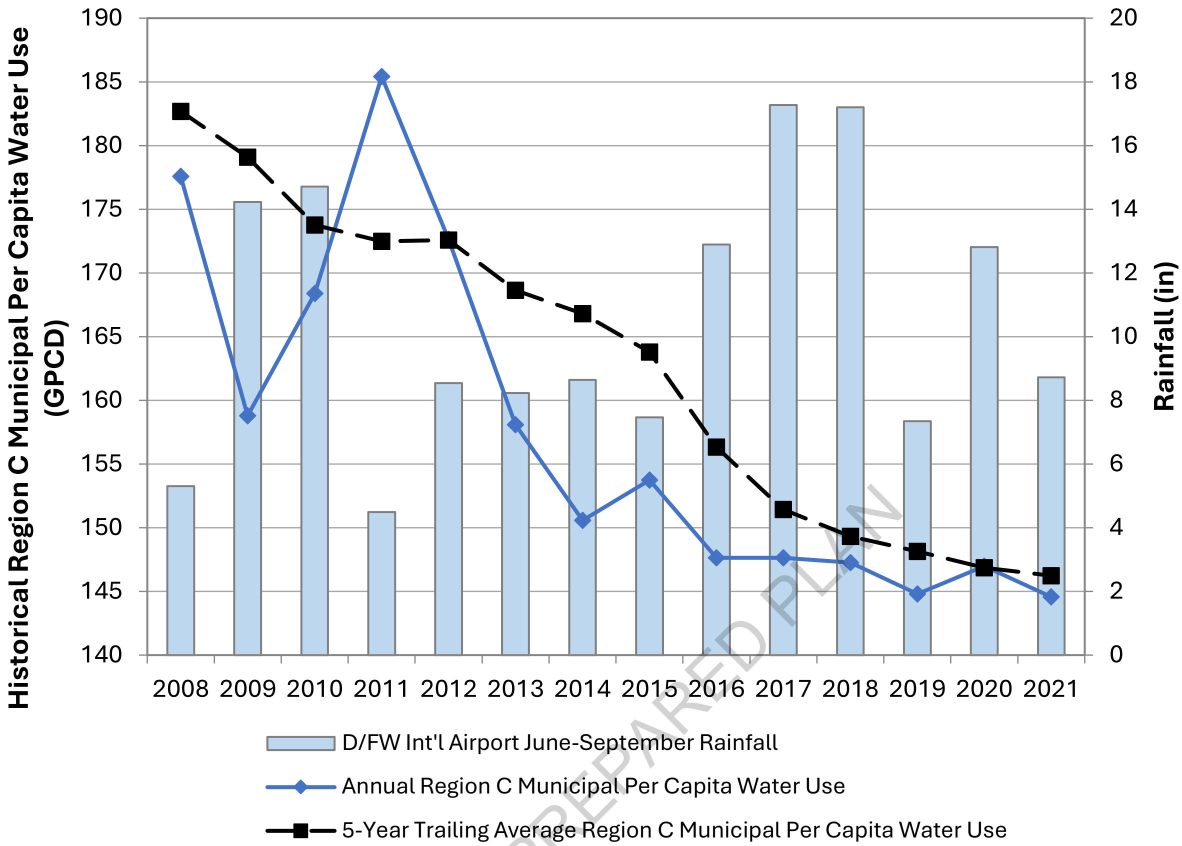
TABLE 5B.2 EXAMPLE NORMALIZATION FACTORS FOR WATER USE ANALYSIS BY SECTOR

WATER USE SECTOR	EXAMPLE NORMALIZATION FACTOR
Total residential	Total residential population
Single-family residential	Single-family residential population
Multi-family residential	Multi-family residential population
Industrial	Unit of production/output (e.g., tons of paper produced) Unit of input (e.g., barrels of oil refined)
Commercial	Hotels: occupied room-nights Restaurants: number of customers Retail: number of employees
Institutional	Hospitals: occupied bed-days Universities and schools: number of students Prisons: inmate population
Agricultural	Livestock: head of cattle Nursery: square foot of nursery space Crops: irrigated acres

Information in table is from source[3]. Water use in each sector is divided by a normalization factor to allow better tracking/comparison of water use over time. For example, crop water use could be calculated in terms of gallons per irrigated acre per day.

Figure 5B.2 shows historical municipal per capita water use in Region C on an annual basis and as a five-year trailing average. The five-year trailing average, which eliminates some of the variability due to changes in annual rainfall, shows a steady decrease in Region C municipal per capita water use in recent years. Many Region C utilities implemented drought response stages during 2011-2014, which contributed to the reduction in municipal per capita water use. However, when rainfall became more abundant in 2016-2017 and drought response stages were lifted, municipal per capita water usage has remained low, even during years with relatively low summer rainfall (**Figure 5B.2**).

FIGURE 5B.2 REGION C HISTORICAL MUNICIPAL PER CAPITA WATER USE

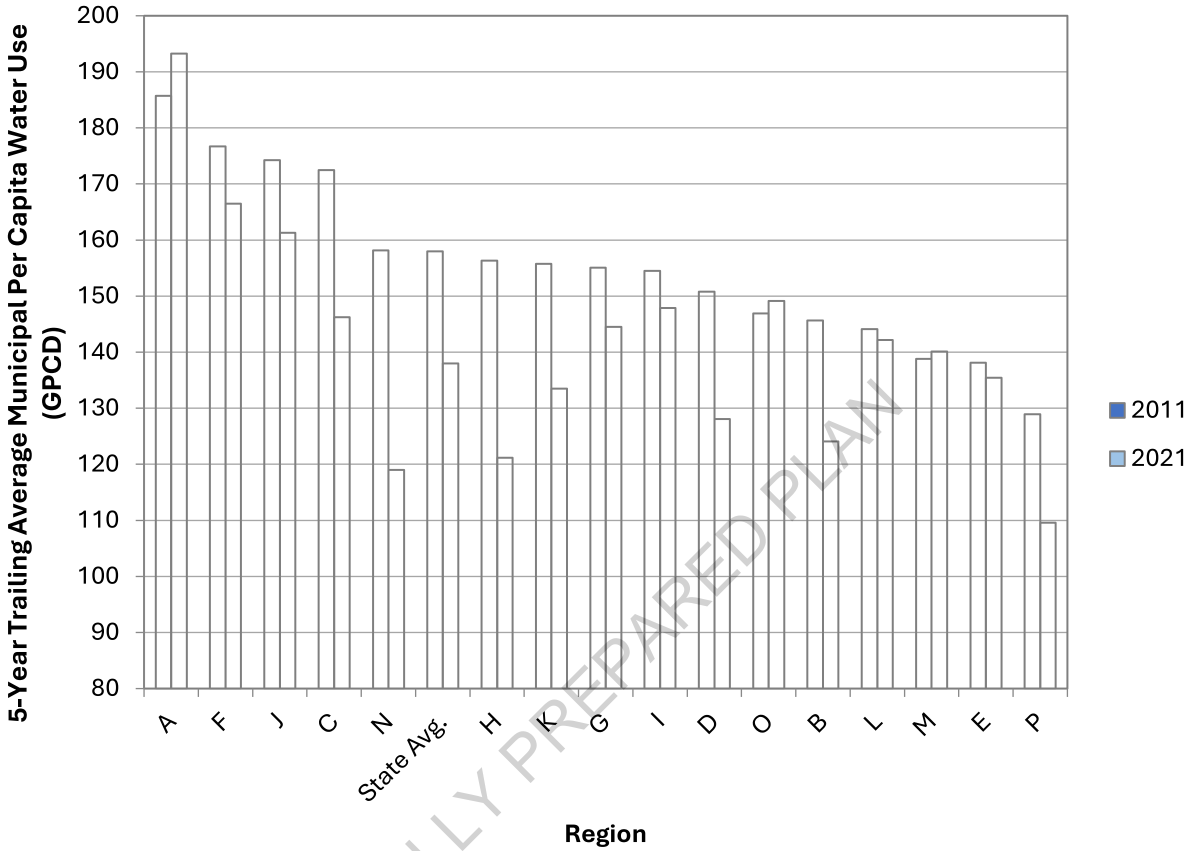


The usefulness of comparing per capita water use between the planning regions will be improved when residential water use data are available and when uniform normalizing factors are developed for the non-municipal sectors. However, at present, the regional data available from the TWDB only support calculations of municipal per capita water use and total per capita water use. Therefore, **Figure 5B.3** and **Figure 5B.4** show five-year trailing average 2011 and 2021 municipal per capita water use and total per capita water use for Region C in a statewide context. (Trailing averages normalize yearly variations due to weather and other factors.) These figures were developed using data reported to the TWDB from water use surveys and are intended to show recent changes in water use [(10)].

As shown in Figure 5B.3, in year 2021 five-year trailing average municipal per capita water use varies among the planning regions from 110 GPCD to 193 GPCD. Except for Regions A, M, and O[1], each region shows a decreasing trend in municipal per capita water use.

[1] These three regions rely heavily on agriculture and irrigation, and their growing water demand may be driven by economic growth.

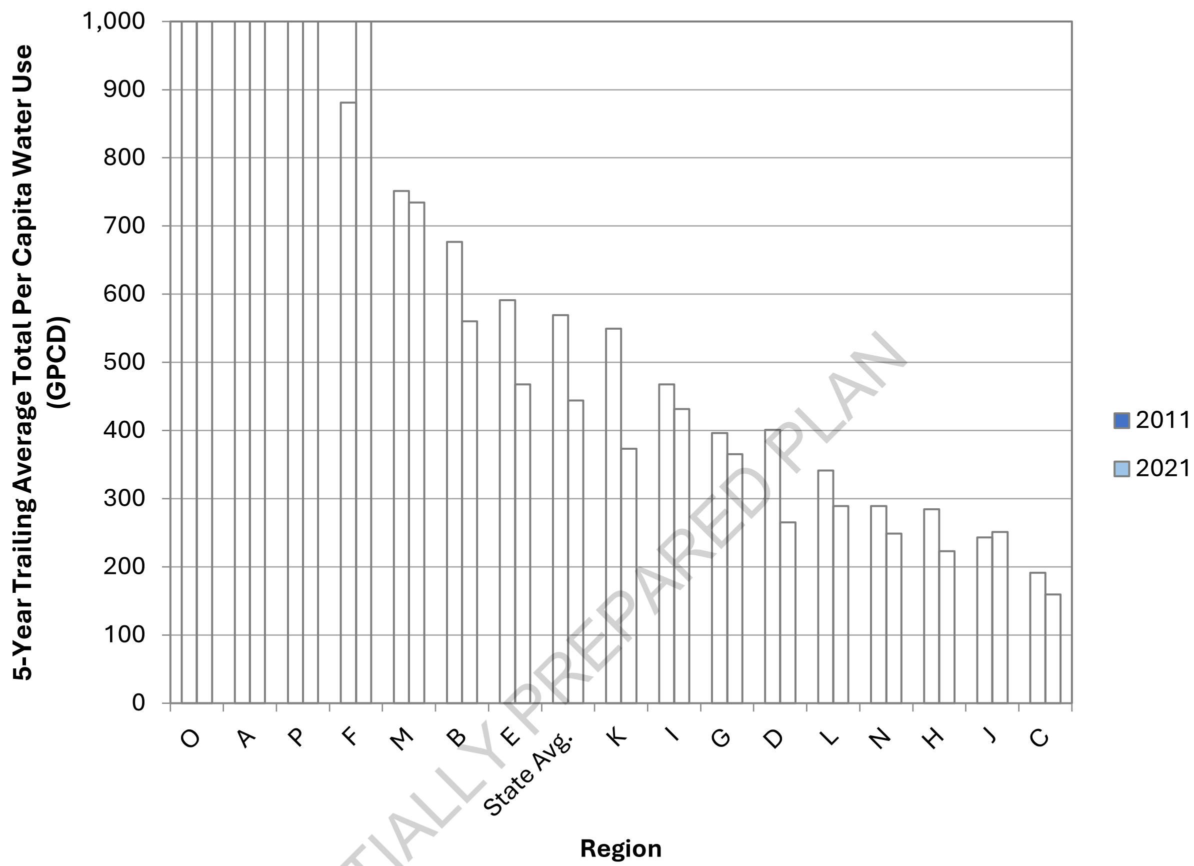
FIGURE 5B.3 2011 AND 2021 FIVE-YEAR TRAILING AVERAGE MUNICIPAL PER CAPITA WATER USE BY REGION



As shown in **Figure 5B.4**, the year 2021 five-year trailing average total per capita water use (includes both municipal and non-municipal water use) in Region C is by far the lowest of any region in the state at 160 GPCD and was much lower than the statewide average of 444 GPCD. Regions with high total per capita water use have large non-municipal demands and relatively small populations. This is evidenced by the extremely high total GPCD for Regions O and A, which have large irrigation demands. Except for Regions F and J, each region shows a decreasing trend in total per capita water use.

There are several reasons for differences in municipal per capita water use across the state, most of which have already been discussed**.** Some municipalities differ in their methods of accounting for water use and their ability to accurately distinguish between municipal water use and other uses provided by the municipal retail provider.

FIGURE 5B.4 2011 AND 2021 FIVE-YEAR TRAILING AVERAGE TOTAL PER CAPITA WATER USE BY REGION



Note: The Y-axis is capped at 1,000 GPCD. The table within the chart shows the GPCD values for regions that exceed this cap.

Historical Water Loss in Region C

Since 2003, retail public water utilities have been required to complete and submit a water loss audit form to the TWDB every five years. Since 2013, retail public utilities that supply potable water to more than 3,300 connections or receive financial assistance from the TWDB must file an annual water audit with the TWDB. The most recent available data were reported in 2023 for water loss during calendar year 2023. The TWDB compiled the data from these reports. The water audit reporting requirements follow the International Water Association (IWA) and American Water Works Association (AWWA) Water Loss Control Committee methodology.

The primary purposes of a water loss audit are to account for all water being used and to identify potential areas where water can be saved. Water audits track multiple sources of water loss that are commonly described as apparent loss and real loss. Apparent loss is water that was used but for which the utility did not receive compensation. Apparent losses are associated with customer meters under-registering, billing adjustments and waivers, and unauthorized consumption. Real loss is water that was physically lost from the system before it could be used, including main breaks and leaks, customer service line breaks and leaks, and storage overflows. The sum of the apparent loss and the real loss make up the total water loss for a utility.

In Region C, 123 public water suppliers submitted a water loss audit to TWDB for the 2023 calendar year. These water suppliers represent a retail service population of approximately 6.65 million. **Table 5B.3** shows a summary of reported 2023 water loss accounting in Region C. **Figure 5B.5** and **Figure 5B.6** compare losses in all Regional Water Planning Areas (RWPAs).

TABLE 5B.3 REPORTED 2023 WATER LOSS ACCOUNTING IN REGION C

<table>
<tr><td rowspan="9">Corrected input volume
100.0%
401,080,316,728</td><td rowspan="4">Authorized consumption
87.6%
351,302,802,778</td><td rowspan="2">Billed authorized consumption
83.2%
333,882,344,795</td><td>Billed metered consumption
83.2%
333,827,723,294</td><td rowspan="2">Revenue water
83.2%
333,882,344,795</td></tr>
<tr><td>Billed unmetered consumption
0.0%
54,621,501</td></tr>
<tr><td rowspan="2">Unbilled authorized consumption
4.3%
17,420,457,983</td><td>Unbilled metered consumption
2.3%
9,398,487,868</td><td rowspan="7">Non-revenue water
16.8%
67,197,971,933</td></tr>
<tr><td>Unbilled unmetered consumption
2.0%
8,021,970,115</td></tr>
<tr><td rowspan="5">Water losses
12.4%
49,777,513,950</td><td rowspan="3">Apparent losses
1.6%
6,343,851,313
$33,750,849</td><td>Unauthorized consumption
0.2%
835,633,244</td></tr>
<tr><td>Customer meter under-registering
1.2%
4,688,166,880</td></tr>
<tr><td>Data handling discrepancies
0.2%
820,051,189</td></tr>
<tr><td rowspan="2">Real losses
10.8%
43,433,662,637
$87,707,195</td><td>Reported breaks and leaks
1.4%
5,579,887,605</td></tr>
<tr><td>Unreported loss
9.4%
37,853,775,032</td></tr>
</table>

Note: Water volumes shown in gallons.

FIGURE 5B.5 REPORTED 2023 APPARENT LOSSES BY REGION

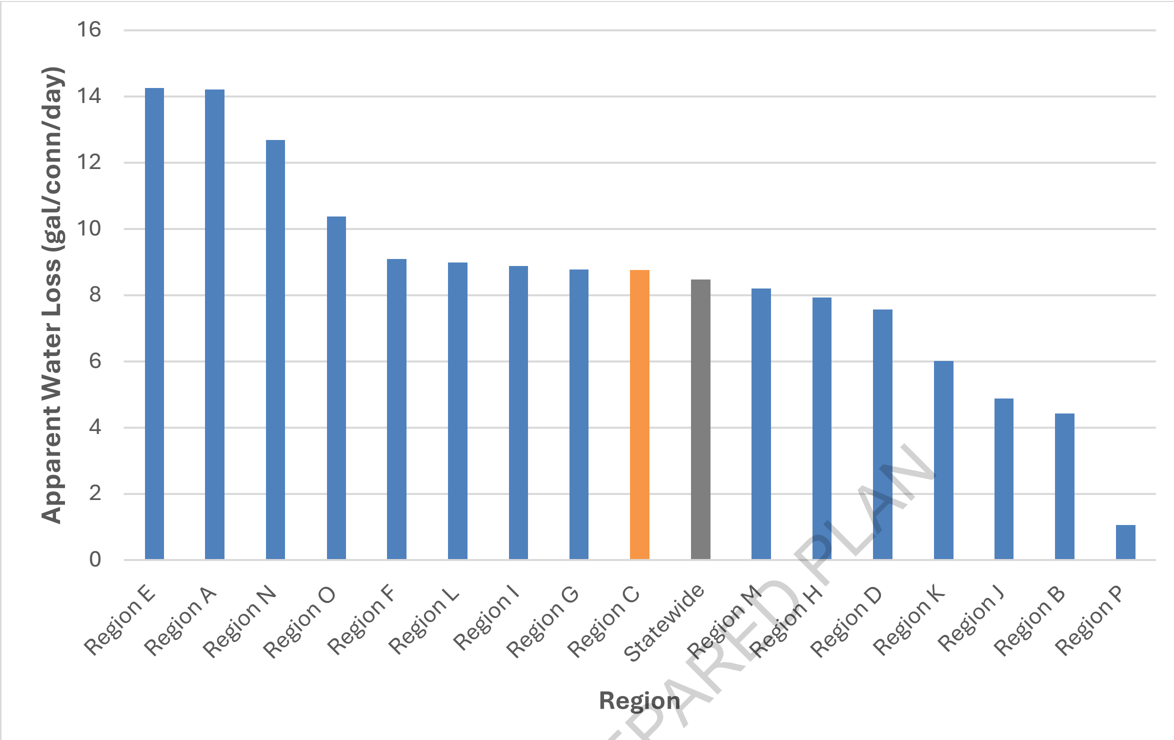
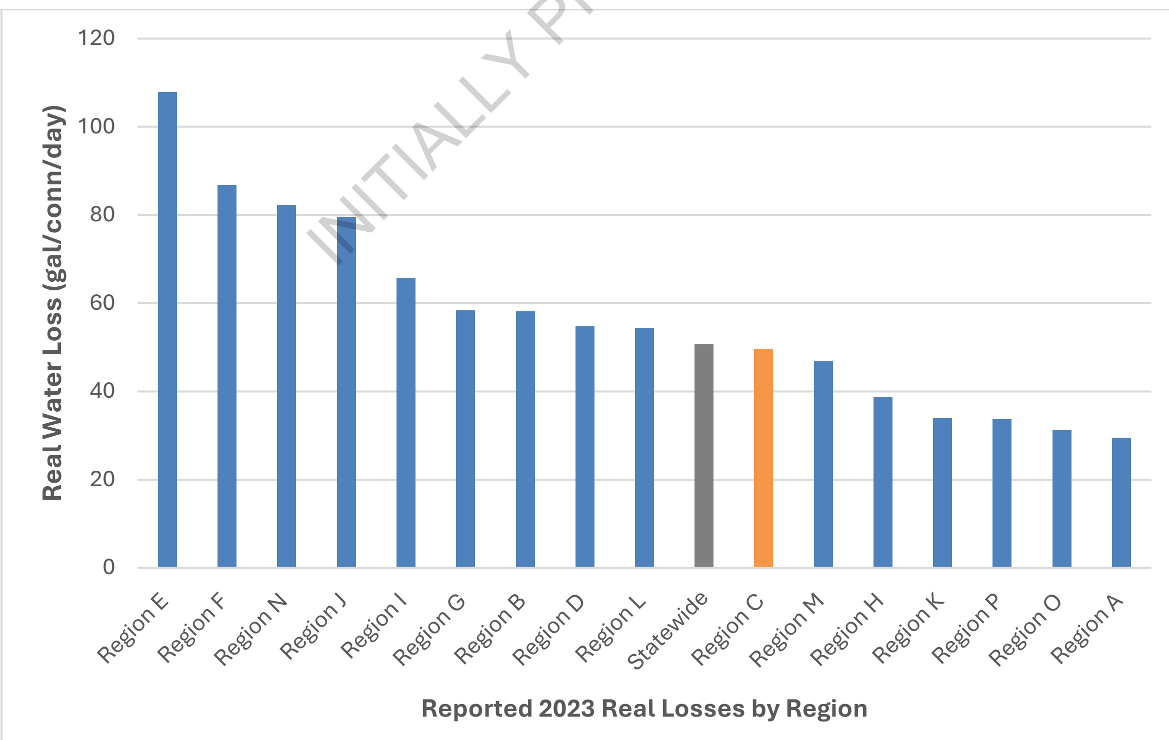


FIGURE 5B.6 REPORTED 2023 REAL LOSSES IN REGIONS WITH HIGH CONNECTION DENSITY



Note: Data reported for systems in each region with 32 or more service connections per mile

On a regional basis, the percentage of total water loss for Region C was 12.4 percent[4]. Extrapolating performance indicator guidelines[5] from individual utilities to entire regions, apparent losses should be normalized by the number of service connections, and real losses (for systems with 32 or more service connections per mile of main) should also be normalized by the number of service connections.

Based on the 2023 water loss data, Region C is performing slightly above the state average for apparent water loss and slightly below the statewide average for real water loss. Therefore, the water loss mitigation strategy is still considered a potentially feasible water conservation strategy for Region C WUGs.

5B.3 Existing Water Conservation and Reuse in Region C

The next step in developing effective water conservation and reuse recommendations for Region C is to understand the current level of water conservation implementation. This section discusses existing water conservation measures and reuse projects in Region C.

5B.3.1 Existing Water Conservation in Region C

Water conservation measures and reuse strategies currently practiced in Region C were identified from reviewing submitted annual water conservation reports and from meetings with selected water suppliers.

Water Conservation Requirements in Texas

Table 5B.4 outlines the required items, the parties responsible for compliance, and the respective timelines for each requirement. Additional details are discussed in Section 5B.6.

TABLE 5B.4 REGULATORY REQUIREMENTS

REQUIRED ITEMS	COMPLIANT PARTIES	COMPLIANCE TIMELINE
Water Use Survey	Community public water systems, manufacturers, mining facilities, and electric power generating plants	Every Year by Mar 1
Water Loss Audit	All retail public water suppliers >3,300 connections or a financial obligation to the TWDB	Every Year by May 1
	All other retail public water suppliers	Every Five Years by May 1
Annual Water Conservation Report	Retail public water suppliers ≥3,300 connections, a $500,000 or more loan with the TWDB, or have a TCEQ surface water right	Every Year by May 1
Water Conservation Plan	Retail public water suppliers ≥3,300 connections, a $500,000 or more loan with the TWDB, or have a TCEQ surface water right	Every Five Years by May 1
Water Conservation Coordinator	Retail public water suppliers ≥3,300 connections	N/A

Water Conservation Data Reports

Table 5B.5 presents the number of entities who implemented various Best Management Practices (BMPs) from 2016 to 2022, which indicates that three of the most popular BMPs are Public Information, Metering New Connections & Retrofitting Existing Connections, and Utility Water Audit & Water Loss, respectively.

TABLE 5B.5 SUMMARY OF BMP IMPLEMENTATION BY REGION C ENTITIES

BMP	2016	2017	2018	2019	2020	2021	2022	AVERAGE
Athletic Fields Conservation	11	12	15	14	16	17	19	15
Conservation Coordinator	22	31	45	48	51	52	48	42
Conservation Ordinance Planning & Development	n/a	n/a	n/a	n/a	19	21	27	22
Conservation Programs for ICI Accounts	2	2	2	1	4	3	5	3
Cost Effective Analysis	8	4	5	5	4	7	5	5
Custom Conservation Rebates	2	3	3	3	3	3	3	3
Customer Characterization	n/a	n/a	n/a	n/a	3	3	3	3
Enforcement of Irrigation Standards	n/a	n/a	n/a	n/a	22	25	32	26
Golf Course Conservation	5	6	5	7	9	11	10	8
Landscape Irrigation Conservation & Incentives	20	21	20	22	18	24	20	21
Metering New Connections & Retrofitting Existing Connections	48	58	62	56	58	64	69	59
New Construction Graywater	1	n/a	1	1	1	1	1	1
Other	7	9	6	5	6	6	6	6
Outdoor Watering Schedule	n/a	n/a	n/a	n/a	29	34	38	34
Park Conservation	13	15	17	18	20	19	15	17
Partnerships with Nonprofit Organizations	8	13	11	14	12	15	12	12
Plumbing Assistance for Economically Disadvantaged Customers	n/a	n/a	n/a	n/a	2	3	3	3
Prohibition on Wasting Water	41	42	44	43	40	43	47	43
Public Information	66	74	72	76	68	69	71	71
Public Outreach & Education	4	4	3	7	30	38	46	19
Rainwater Harvesting & Condensate Reuse	9	7	7	9	6	9	10	8
Residential Clothes Washer Incentive Program	2	3	4	3	5	3	3	3
Residential Landscape Irrigation Evaluation	14	17	20	24	22	25	28	21
Residential Toilet Replacement Programs	7	5	7	8	6	6	6	6
Reuse for Agriculture	n/a	1	3	3	2	2	2	2

BMP	2016	2017	2018	2019	2020	2021	2022	AVERAGE
Reuse for Chlorination/Dechlorination	7	8	6	5	6	7	6	6
Reuse for Industry	2	4	3	3	3	4	4	3
Reuse for On-site Irrigation	10	9	12	12	9	11	9	10
Reuse for Plant Washdown	15	18	18	12	13	13	13	15
School Education	29	31	34	37	23	31	26	30
Showerhead, Aerator, & Toilet Flapper Retrofit	12	10	10	10	9	7	8	9
Utility Water Audit & Water Loss	46	51	46	49	49	54	60	51
Water Conservation Pricing	40	40	40	43	41	45	41	41
Water Survey for Single Family & Multi-family Customers	6	6	5	4	7	6	3	5
Water Wise Landscape Design & Conversion Programs	7	4	6	8	6	8	7	7

Note: Summary of 119 Region C entities from the TWDB compiled annual water conservation reports from 2016 to 2022. Values above show the number of entities who indicated they have implemented each measure. The values presented above could be underestimated if an entity does not report their activities.

The Water Conservation Advisory Council (WCAC) created the Blue Legacy Awards to recognize water conservation in the municipal and agricultural sectors. Region C entities that have received Blue Legacy awards in recognition of their dedication to advancement of water use efficiency and water conservation are shown in the blue bar below.

In addition to these awards, multiple entities have been recognized at the federal level under the EPA WaterSense program over the years. This program honors public and private partners that promote water efficiency. In 2024, the EPA recognized five entities in Texas and three were in the Region C planning area: City of Plano, TRWD, and the City of Arlington. Plano was awarded the Sustained Excellence Award that recognizes the continued efforts for water efficiency at the highest levels. TRWD received the Partner of the Year Award for demonstrating outstanding education and outreach with strategic collaboration, and Arlington received the Excellence in Education and Outreach Award.

Region C Recipients of Blue Legacy Award

- NTMWD for its water conservation public awareness campaign (2011)
- City of McKinney's Office of Environmental Stewardship for its public awareness outreach program (2012)
- City of Fort Worth Water Department for its SmartWater ICI Audit Program (2013)
- City of Frisco for its evidence based educational approach to water conservation (2015)
- NTMWD for its collaborative effort with the Irrigation Technology Program of the Texas A&M AgriLife Extension Service to provide its customers with weather based irrigation recommendations (2015)
- City of Mansfield for building relationships with unconventional partners to spread conservation messages (2017)
- NTMWD for its creation of the Water4Otter program to educate school children about water conservation (2017)
- TRWD for promoting water conservation through education and outreach programs (2021)

5B.3.2 Existing Reuse Projects

Region C has historically accounted for significant portions of supply from both indirect and direct reuse systems. Indirect reuse systems use highly treated wastewater effluent to augment raw water sources/supplies. Conversely, direct reuse systems pump treated wastewater directly to authorized users, offsetting potable water demand and resulting in immediate reductions in per capita potable water usage. Historically, reclaimed water usage has been higher during drought periods, further offsetting water supply requirements during these critical periods.

Indirect reuse accounted for approximately 93 percent of the existing water reuse supplies in the *2021 Region C Water Plan*. The *Region C Water Plan* anticipates this trend to continue with existing indirect reuse projects collectively providing 93 percent of existing reuse supplies (approximately 355,000 acre-feet (ac-ft) per year) by the year 2030. The *Region C Water* Plan also anticipates that existing direct reuse projects will collectively provide over 26,000 acre-feet per year of water by the year 2030.

More details regarding existing reuse projects are provided in **Table 5B.6**, which lists currently operating reuse projects in Region C and the amount that can be used with existing infrastructure and current users (for direct reuse). Based on existing permitted reuse projects, Region C is expected to have more than 381,000 acre-feet per year of wastewater return flows available for use as water supplies in 2030. Under current permits and infrastructure, this existing supply is expected to increase to more than 417,000 acre-feet per year by 2080.

There are also several reuse projects that are permitted but do not yet have the needed infrastructure. Others are not fully utilized due to infrastructure limitations. Development of the infrastructure for these projects is considered a water management strategy. Further discussion of current reuse projects is included in **Appendix E**.

Reuse projects implemented since the last plan include:

- **TRA:** treated wastewater effluent from the Mountain Creek Regional Wastewater System is used to augment supplies in Joe Pool Lake for indirect reuse. The treated wastewater effluent from Mountain Creek Regional Wastewater System is discharged to Mountain Creek, an upstream tributary of Joe Pool Lake.
- **TRA/Flower Mound:** treated wastewater effluent from the TRA Denton Creek Regional Wastewater System is pumped directly to Flower Mound to serve irrigation users.
- **Ennis:** treated wastewater effluent from the Ennis Wastewater Treatment Plant is used to augment raw water supply in Lake Bardwell via an agreement with TRA (indirect reuse).
- **Weatherford:** treated wastewater effluent from the Weatherford Wastewater Treatment Plant is pumped to Lake Weatherford to augment raw water sources in the lake (indirect reuse).
- **Weatherford:** backwash water from the Weatherford Water Treatment Plant is treated in lagoons before being pumped to Lake Weatherford to augment raw water sources in the lake (indirect reuse).

TABLE 5B.6 PROJECTED AVAILABLE SUPPLIES FROM EXISTING REUSE PROJECTS IN REGION C

PROVIDER	PROJECT NAME	TYPE	COUNTY	2030	2040	2050	2060	2070	2080
Annetta	Annetta Direct Reuse	Direct	Parker	129	154	180	205	231	256
Azle	Azle Direct Reuse	Direct	Tarrant	300	300	300	300	300	300
Bryson	Jack County Direct Reuse	Direct	Jack	25	25	25	25	25	25
Crandall	Crandall Direct Reuse	Direct	Kaufman	579	666	666	666	666	666
Dallas	Cedar Crest Golf Course Reuse	Direct	Dallas	1,121	1,121	1,121	1,121	1,121	1,121
Dallas	Dallas Indirect Reuse	Indirect	Denton	44,265	50,653	57,558	59,928	62,610	64,834
Denton	Denton Power Plant Direct Reuse	Direct	Denton	1,175	1,175	1,175	1,175	1,175	1,175
Denton	Denton County Indirect Reuse	indirect	Denton	4,608	4,969	4,953	6,457	8,320	10,143
Denton	Denton County Direct Reuse	Direct	Denton	265	265	265	265	265	265
Ennis	Ennis Direct Reuse	Direct	Ellis	1,574	1,574	1,574	1,574	1,574	1,574
Ennis	Ennis Indirect Reuse	Indirect	Ellis	890	2,122	2,122	2,122	2,122	2,122
Fort Worth	Fort Worth Village Creek Direct Reuse	Direct	Tarrant	2,296	2,296	2,296	2,296	2,296	2,296

PROVIDER	PROJECT NAME	TYPE	COUNTY	2030	2040	2050	2060	2070	2080
Fort Worth	Waterchase Golf Course Direct Reuse	Direct	Tarrant	550	550	550	550	550	550
Gainesville	Gainesville Direct Reuse	Direct	Cooke	4	4	4	4	4	4
Garland/Forney	Garland Direct Reuse (sales through Forney)	Direct	Kaufman	10,089	10,089	10,089	10,089	10,089	10,089
Grapevine	Grapevine Reuse (Lake Grapevine) DCPCMUD	Indirect	Tarrant	3,355	3,346	3,346	3,346	3,346	3,346
Millsap ISD	Millsap WWTP Reuse	Direct	Parker	2	2	2	2	2	2
NTMWD/Frisco	Stewart Creek West Reuse	Direct	Collin	3,038	3,038	3,038	3,038	3,038	3,038
NTMWD	Rowlett Creek Reuse	Direct	Collin	1,540	1,540	1,540	1,540	1,540	1,540
NTMWD	Wilson Creek Direct Reuse	Direct	Collin	100	100	100	100	100	100
NTMWD	Buffalo Creek Reuse	Direct	Rockwall	672	0	0	0	0	0
NTMWD	Lavon Watershed Reuse	Indirect	Collin	69,402	73,008	73,008	73,008	73,008	73,008
NTMWD	East Fork Reuse	Indirect	Kaufman	102,000	102,000	102,000	102,000	102,000	102,000
Pinnacle Club	Pinnacle Club Direct Reuse	Direct	Henderson	32	32	32	32	32	32

PROVIDER	PROJECT NAME	TYPE	COUNTY	2030	2040	2050	2060	2070	2080
The Colony	Stonebriar County Club (golf irrigation)	Direct	Collin	457	457	457	457	457	457
TRA/DCURD	TRA/Las Colinas Indirect Reuse (Dallas County Irrigation)	Indirect	Dallas	8,000	8,000	8,000	8,000	8,000	8,000
TRA	TRA/Waxahachie Indirect Reuse	Indirect	Ellis	5,129	5,129	5,129	5,129	5,129	5,129
TRA	TRA Ten Mile Creek WWTP Reuse	Direct	Dallas	125	125	125	125	125	125
TRA	TRA Mountain Creek WWTP Reuse	Indirect	Ellis	10,089	13,452	13,452	13,452	13,452	13,452
TRA/Flower Mound	Flower Mound Direct Reuse	Direct	Tarrant	222	556	556	556	556	556
TRA/Irving	Irving Indirect for Municipal Use	Indirect	Dallas	486	486	486	486	486	486
TRWD	Richland-Chambers Reuse	Indirect	Navarro	100,465	100,465	100,465	100,465	100,465	100,465
Trophy Club	Denton County Direct Reuse	Direct	Denton	800	800	800	800	800	800

PROVIDER	PROJECT NAME	TYPE	COUNTY	2030	2040	2050	2060	2070	2080
	(Golf irrigation)								
Denton County FWSD#1/ UTRWD/Lewisville	UTRWD Direct Reuse	Direct	Denton	897	897	897	897	897	897
UTRWD	UTRWD Lake Chapman Reuse	Indirect	Denton	3,388	4,409	5,378	5,243	5,109	4,974
Weatherford	Weatherford Direct Reuse	Direct	Parker	123	123	123	123	123	123
Weatherford	Weatherford WWTP Indirect Reuse	Indirect	Parker	2,860	2,810	2,760	2,717	2,673	2,630
Weatherford	Weatherford WTP Backwash Indirect Reuse	Indirect	Parker	700	855	1,034	1,121	1,121	1,121
Total in Acre-Feet per Year				**381,752**	**397,593**	**405,606**	**409,414**	**413,807**	**417,701**
Total in MGD				**341**	**355**	**362**	**365**	**369**	**373**

5B.4 Recommended Water Conservation and Reuse in Region C

Water conservation has been a major component of the previous Region C Water Plans. The Region C Water Planning Group continues to place strong emphasis on water conservation and reuse as a means of meeting projected water needs in the region. Following a discussion of conservation requirements for interbasin transfers of water, this section discusses new recommendations for water conservation and reuse strategies in Region C.

5B.4.1 Conservation Requirements for Interbasin Transfers of Water

Recommended water management strategies for many WUGs in Region C include a new interbasin transfer of surface water. Section 11.085 of the Texas Water Code includes permitting requirements for such interbasin transfers. Section 11.085(l)(2) defines the conservation standard for interbasin transfers, indicating that the TCEQ may grant a water right "to the extent that…the applicant for the interbasin transfer has prepared a drought contingency plan and has developed and implemented a water conservation plan that will result in the highest practicable levels of water conservation and efficiency achievable within the jurisdiction of the applicant."

Section 11.1271(e) of the Water Code indicates that the TWDB and the TCEQ should jointly "develop model water conservation programs for different types of water suppliers that suggest BMPs for achieving the highest practicable levels of water conservation and efficiency achievable for each specific type of water supplier." The TWDB and the TCEQ have addressed this requirement by preparing Best Management Practices Guides for agricultural, commercial and institutional, industrial, municipal, and wholesale water suppliers [3]. The TWDB, the TCEQ, and the WCAC update these BMPs periodically.

5B.4.2 Projected Demand Reduction from Plumbing Code Savings

The Region C municipal water demand projections incorporate an expected level of conservation through the planning period. For municipal use, the assumed reductions in per capita water use are the result of the implementation of three regulatory initiatives that will reduce water use over time simply through the natural replacement of high-water use fixtures and appliances:

The **first initiative** is the Water Saving Performance Standards for Plumbing Act, implemented by Texas in 1992. This act prohibits the sale, distribution, or importation of plumbing fixtures that do not meet certain low flow performance standards. House Bill 2667, implemented September 1, 2009, updated the water savings performance standards. Beginning January 1, 2014, new plumbing fixtures must comply with stricter efficiency requirements, including a maximum toilet flush volume of 1.28 gallons per flush and a maximum showerhead flow rate of 2.0 gallons per minute.

The **second initiative** is a federal requirement that new residential clothes washers must achieve the following levels of efficiency:

- Front-loading machines: maximum integrated water factor (total weighted per-cycle water consumption for all wash cycles divided by the clothes container capacity) of 4.5 gallons per cubic foot.

- Top-loading machines: maximum integrated water factor of 6.5 gallons per cubic foot.

The **third initiative** is a federal requirement that new residential dishwashers must achieve water consumption of 5 gallons per cycle or less.

As of June 2021, the 2018 edition of the Uniform Plumbing Code (UPC) and the 2018 edition of the International Code Council's International Plumbing Code have been adopted by the State Board's Rule 367.2 in Title 22 of the Texas Administrative Code. These codes increase the efficiency of shower heads and faucet aerators, as shown in **Table 5B.7** below. The 2024 UPC was released in January 2024, and the standards for plumbing fixtures in the 2024 UPC align with those shown in the table below.

TABLE 5B.7 STANDARDS FOR PLUMBING FIXTURES

FIXTURE	STANDARD
Toilets	1.28 gallons per flush
Shower Heads	2.5 gallons per minute at 80 psi
Urinals	0.5 gallon per flush
Faucet Aerators	1.5 gallons per minute at 60 psi
Drinking Water Fountains	Shall be self-closing

The municipal water demand projections assume that all new construction will be built with:

- Water-saving plumbing fixtures and existing plumbing fixtures will be replaced over time with low flow fixtures.
- Efficient clothes washers and dishwashers and existing clothes washers and dishwashers will be replaced over time with efficient appliances.

On a regional basis, these regulatory initiatives are projected to reduce municipal water use by 2.9 percent (approximately 83,811 ac-ft per year) by 2080.

5B.4.3 Recommended Municipal Conservation Strategies

Recommended water conservation measures and their associated triggers are shown in **Table 5B.8**. These measures are categorized into two main groups: water use reduction strategies (i.e., the first seven strategies) and a water loss mitigation strategy. Population is used to determine which strategies are recommended for specific WUGs. With this approach, WUGs with larger populations—often indicative of greater resources for implementing conservation—are encouraged to implement more comprehensive measures compared to those with more limited resources.

TABLE 5B.8 RECOMMENDED WATER CONSERVATION MEASURES FOR REGION C WUGS

WATER CONSERVATION MEASURES	APPLICABLE WUGS
Water Use Reduction Strategies	
Public and school education	All Municipal WUGs
Price elasticity/rate structure impacts	All Municipal WUGs
Water waste ordinance	All Municipal WUGs
Time-of-day irrigation restriction	All Municipal WUGs
Water conservation coordinator	WUGs with population> 10,000
Twice weekly irrigation restriction	WUGs with population > 20,000
Landscape ordinance for new development	WUGs with population > 20,000
Water Loss Mitigation Strategy	
Water loss mitigation strategy	All Municipal WUGs

Notes: 1) All retail public water suppliers >3,300 connections are required to have a water conservation coordinator. Assuming about 3 people per household, a population of 10,000 is estimated. 2) In alignment with Local Government Code Section 551.006, all municipalities with populations exceeding 20,000 are required to adopt ordinances related to irrigation.

The development of the recommended conservation measures included several assumptions related to measure adoption rates and realization of full benefits over time. For most measures it was assumed that full benefits would be realized by the second decade of implementation (e.g., 2040 for a measure implemented in 2030). Methods for estimating costs and water savings for the Water Conservation Package are described in **Appendix I**.

5B.4.4 Recommended Non-Municipal Conservation Strategies

The recommended water conservation strategies for non-municipal WUGs are as follows:

- A general rebate program for irrigation demands. It is anticipated that municipal WUGs would offer rebates for golf course water conservation measures implemented within their service areas.
- Additional on-site recycling for mining WUGs with needs.

For WUGs that are projected to receive water in the future from a new interbasin transfer, the water savings associated with the recommended municipal and non- municipal water conservation strategies represent the highest practicable level of water conservation and efficiency achievable in the region. With respect to projected water savings and costs, the Water Conservation Package is expected to have similar reliability to the other recommended water management strategies in the plan.

Manufacturing. The current state of water conservation at existing manufacturing facilities is unknown. Conservation measures associated with industries are highly industry- and site-specific. For example, some industries can utilize brackish water supplies or wastewater effluent while others require only potable water. In addition, the water demand types of future industries are unknown.

In evaluating conservation strategies for industries, it is important to balance the water savings from conservation with economic benefits to the industry and the region. In the Region C RWPA, especially where water is not readily available, the Region C Water Planning Group encourages manufacturers to implement water reuse and other conservation measures. It will be in the manufacturers' best interest to continue promoting water conservation should water rates increase due to limited supply. However, the Region C Water Planning Group lacks the specific information needed to assess the current status of water conservation in manufacturing or to prescribe specific measures. Consequently, the Region C Water Planning Group has not recommended specific water conservation strategies for manufacturing WUGs. Any manufacturer receiving water from a water provider will need to abide by the provider's water conservation plan. Manufacturing customers can refer to the latest TWDB website for BMPs for industrial, commercial, and institutional water users: https://www.twdb.texas.gov/conservation/BMPs/index.asp.

Other. Steam-electric power and livestock WUGs together account for 2.5 percent of the total 2030 water demand in the Region C RWPA. Although the cost of water in these industries comprises a small percentage of the overall business cost, it is still important to consider the benefits of water conservation. Implementing water conservation measures can contribute to the sustainability of water resources and ensure long-term availability as water becomes more scarce. Therefore, even though the Region C Water Planning Group has not recommended specific water conservation strategies for steam-electric power, livestock, and mining WUGs (other than onsite recycling for mining), it encourages those WUGs to adopt water conservation strategies. These customers can refer to the latest TWDB website for BMPs: https://www.twdb.texas.gov/conservation/BMPs/index.asp.

5B.4.5 Recommended Reuse Projects in Region C

Discussions with the regional and local water providers identified several potential reuse projects that could be used to help meet the projected shortages in Region C.

Section 5B.5.1 summarizes recommended reuse strategies for Region C. More detailed descriptions of the recommended reuse projects are included in **Appendix E**.

5B.4.6 Summary of Recommended Water Conservation and Reuse in Region C

Cities and utilities in Region C have made significant strides in the implementation of water conservation efforts. It is important that suppliers in the region build on this momentum with continued conservation efforts, and this plan suggests areas of emphasis for that effort. Section 5B.5.1 provides a regional summary of estimated water savings from recommended water conservation and reuse strategies. It also shows the amount of conservation that is included in the approved water demands for the region.

The projected 2080 Region C water demand with no conservation is almost 2,900,000 acre-feet per year. This amount includes the TWDB-approved 2080 demand plus 83,811 acre-feet per year of conservation from low flow plumbing fixtures, efficient residential clothes washer standards, and efficient residential dishwasher standards. The existing and recommended 2080 water conservation and reuse strategies, including those that are assumed in the demands, will meet approximately 1.28 million ac-ft per year (or 44 percent) of the pre-conservation demand. Estimated costs for these strategies by entity are included in **Appendix H**.

5B.4.7 Other Recommendations

Although specific water conservation measures (or BMPs) are identified as part of the Water Conservation Package, these are suggested methods to achieve the projected water savings. However, WUGs and WWPs should not be restricted to these specific measures in their approach to achieving the projected water savings associated with the Water Conservation Package. The recommended measures were studied at a regional level, and more detailed studies conducted for individual suppliers may indicate that some of these measures are not practicable for individual suppliers or that alternative measures should be implemented. Each WUG and WWP should tailor its water conservation implementation to fit the particular characteristics of its service area, considering not only the measures in the Region C Water Plan but also measures determined appropriate for the user based on service area composition and other factors.

Policy Recommendations

- Support legislative and state agency findings regarding water use evaluation
- Support more state funding for water conservation efforts
- Support research to advance reuse and desalination
- Funding assistance for desalination and water reuse projects
- Revise Federal Section 316(b) regulations on power plant cooling water

5B.5 Per Capita Water Use in Region C

Section 5B.5 discusses the projected conservation and water reuse progress by Region C entities and their achievement on reducing reliance on new water in the planning horizon as well as the recommended GPCD goals for each entity.

5B.5.1 Per Capita Water Use with Implementation of the Recommended Plan

This section provides an in-depth overview of the projected water conservation savings in the 2026 Region C Regional Water Plan (RWP) and the recommended reuse projects. It also evaluates the reduction in per capita water use resulting from these strategies, underscoring Region C's dedication to water conservation and reducing dependence on new water sources. The following subsections are covered:

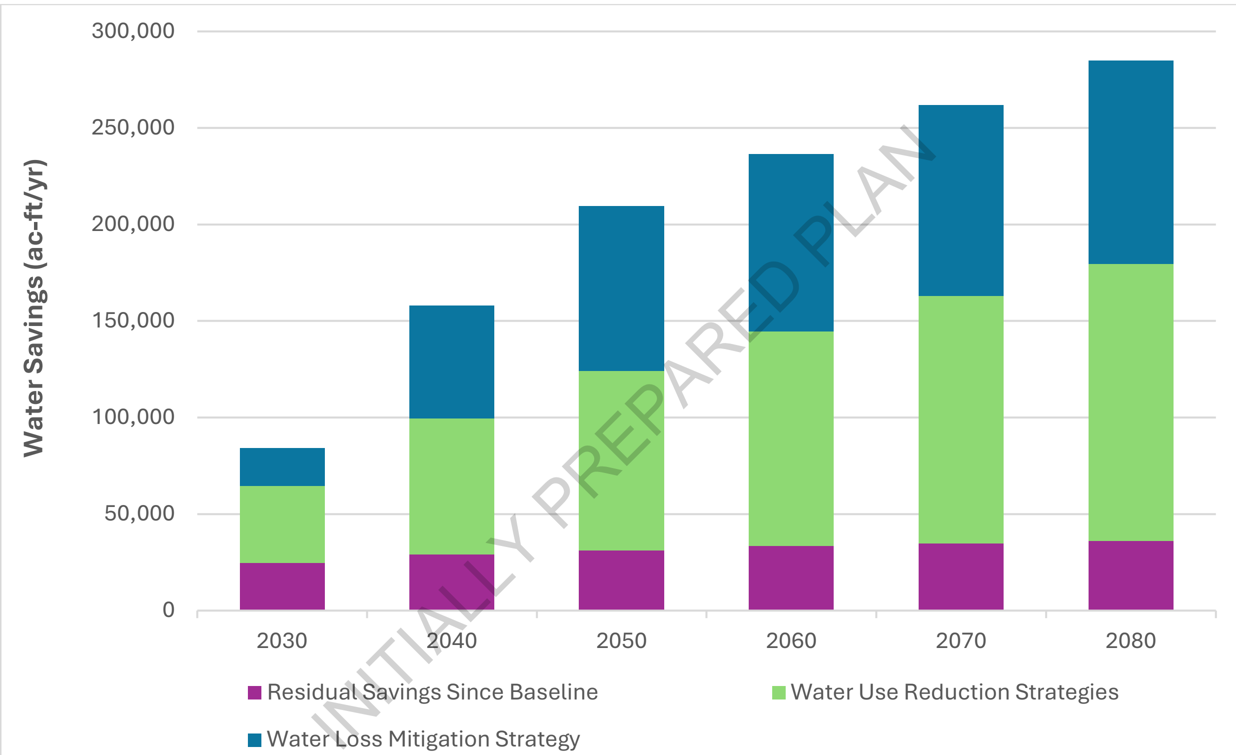
- Water Conservation Savings Overview: This section covers the savings since the baseline year from existing conservation strategies and the total conservation savings from the recommended water use reduction and water loss mitigation strategies.
- Recommended Reuse Projects: This section focuses on the recommended reuse projects.

- Summary of Total Water Savings from Conservation and Reuse: This final section provides an overall summary of the total water savings achieved through both conservation and reuse and assesses the reduction in GPCD resulting from these strategies.

Water Conservation Savings Overview

With the recommended strategies, total conservation savings are projected to range from approximately 84,000 acre-feet per year in 2030 to 285,000 acre-feet per year in 2080, as shown in **Figure 5B.7**. Estimated savings include the water use reduction and water loss mitigation strategies as well as residual water savings since the baseline year.

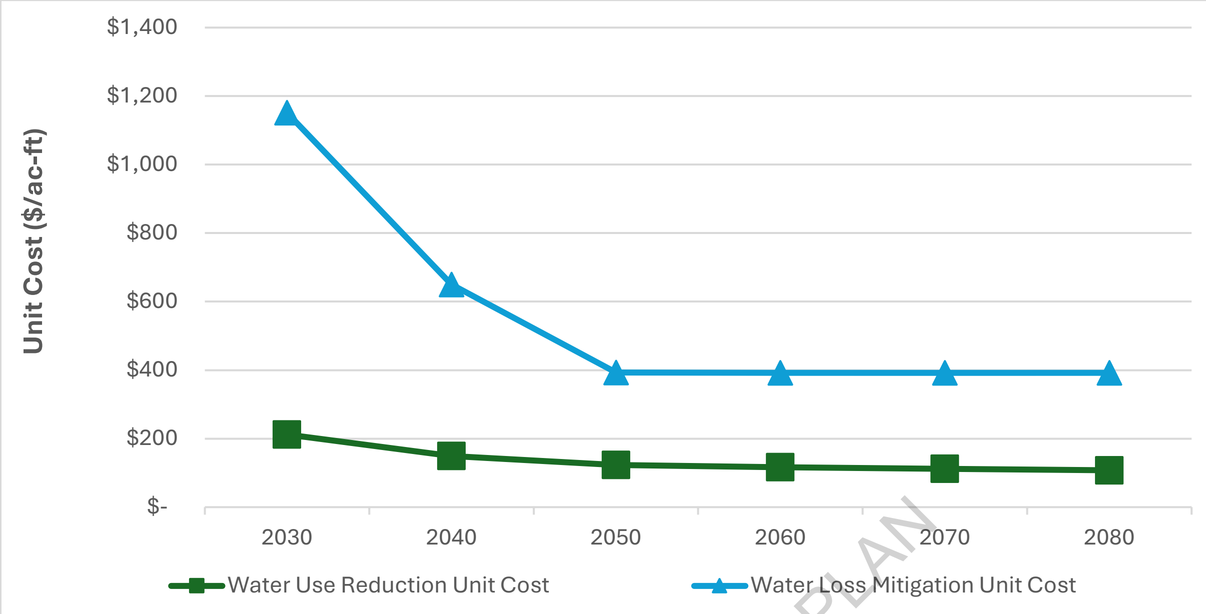
FIGURE 5B.7 ESTIMATED WATER CONSERVATION SAVINGS FOR REGION C WUGS



Note: *The conservation quantities shown above are associated with the Region C primary WUGs whose demand is located within the Region C area.*

Figure 5B.8 illustrates the weighted average cost of the recommended water use reduction strategies and the recommended water loss mitigation strategy for Region C WUGs. The cost of water use reduction strategies is generally lower than that of water loss mitigation, as Region C prioritizes BMPs that avoid undue financial burden on the WUGs. The higher unit costs associated with water loss mitigation can be attributed to resource-intensive initiatives such as main replacement (with a payback period of 20 years) and ongoing leak detection programs. Additionally, the observed decrease in unit costs over time reflects the 20-year payback period for capital cost as well as increased compliance and broader implementation of these strategies.

FIGURE 5B.8 ESTIMATED WATER CONSERVATION UNIT COST FOR REGION C WUGS



Historical water savings associated with water conservation measures are based on the reductions in per capita water use since the baseline year for the 2001 Region C Water Plan to the baseline year for the 2026 Plan. Residual water savings refer to savings achieved from previously implemented water conservation measures recommended by the Region C RWPG since the baseline year (i.e., 2011 for most WUGs). For example, many entities adopted twice-weekly watering restrictions in the mid-2010s. The reductions in water use resulting from this measure are not reflected in the baseline demand, which is primarily based on 2011 demand. Therefore, it is important to account for these savings from existing measures. Water use reductions have also been achieved through initiatives such as public education, water rate structures, water conservation coordinators, and irrigation-related BMPs and not reflected in the baseline. The projected demand reduction from the recommended water conservation measures implemented since the base planning year is summarized in Table 5B.9.

TABLE 5B.9 PROJECTED WATER DEMAND REDUCTION FROM EXISTING WATER CONSERVATION MEASURES SINCE 2001 REGION C WATER PLAN

SAVINGS	IMPLEMENTATION PERIOD	PROJECTED DEMAND REDUCTION (ACRE FEET/YEAR)					
		2030	2040	2050	2060	2070	2080
Savings reflected in 2026 RWP Projection	Through Base Planning Year[a]	541,861	619,963	700,581	771,569	840,626	897,757
Residual Savings	Since Base Planning Year[b]	24,780	29,097	31,253	33,515	34,879	36,000

[a]These quantities were estimated based on a comparison of baseline water demand projections for the 2001 and 2021 Region C Water Plans. Since the 2001 Region C Water Plan only contains projections through 2050, the 2060 to 2080 quantities are based on the 2050 per capita water savings.

[b] These quantities reflect the residual water savings from recommended BMPs that have already been implemented by Region C WUGs since the baseline year (2011 for most WUGs). The conservation quantities shown above are associated with the Region C primary WUGs whose demand is located within the Region C area.

Methods for estimating demand reduction for water conservation measures implemented since the base planning year are described in **Appendix I**. No future costs are included in the plan for this demand reduction, because the costs have already been incurred. This is analogous to how existing water supplies are handled in the Region C Water Plan.

Recommended Reuse Projects

Table 5B.10 lists the reuse project sponsors, location, and estimated yields. More detailed descriptions of the recommended reuse projects are included in **Appendix E**.

TABLE 5B.10 RECOMMENDED REUSE PROJECTS IN REGION C

PROVIDER	USER	PROJECT NAME	TYPE	COUNTY [a]	2030	2040	2050	2060	2070	2080
Athens MWA	Athens Fish Hatchery	Athens Fish Hatchery	Indirect	Henderson	2,872	2,872	2,872	2,872	2,872	2,872
Denton	Denton	Denton Direct Reuse	Direct	Denton	0	2.242	5,605	5,605	5,605	5,605
Denton	Denton	Denton Additional Indirect Reuse	Indirect	Denton	3,764	4,059	4,046	5,274	6,797	8,286
Gainesville	Gainesville	Gainesville Direct Reuse	Direct	Cooke	70	70	70	70	70	70
NTMWD	DWU	Elm Fork Swap to NTMWD	Indirect	Dallas	9,499	12,638	11,966	11,966	11,966	11,966
DWU	DWU	Main Stem Balancing Reservoir	Indirect	Ellis	0	0	112,997	114,342	114,342	114,342
UTRWD	DWU	Additional Indirect Reuse Lewisville Lake	Indirect	Denton	560	6,204	9,009	10,272	11,527	12,476
Flower Mound	Flower Mound	Long Prairie/Lakeside Business District Service Areas	Direct	Denton	1,355	4,066	4,066	4,066	4,066	4,066
Fort Worth	Fort Worth	Village Creek WRF Future Direct Reuse	Direct	Tarrant	2,442	2,442	2,442	2,442	2,442	2,442
Fort Worth	Fort Worth	Mary's Creek WRF Future Direct Reuse	Direct	Parker/ Tarrant	0	3,139	6,278	6,278	6,278	6,278
NTMWD	Frisco	Collin County Direct Reuse, Expanded	Direct	Collin	500	500	500	500	500	500
NTMWD/TRA	NTMWD	Additional East Fork Reuse	Indirect	Collin	1,166	5,467	12,638	18,080	20,950	21,843

PROVIDER	USER	PROJECT NAME	TYPE	COUNTY[a]	2030	2040	2050	2060	2070	2080
DWU	NTMWD	Elm Fork Swap/Lake Lewisville	Indirect	Collin	9,499	12,638	11,966	11,966	11,966	11,966
NTMWD	DWU	Ray Hubbard Exchange	Indirect	Dallas	29,624	28,839	29,960	30,633	30,633	30,633
NTMWD	NTMWD	Additional Lavon Watershed	Indirect	Collin	0	12,088	25,764	39,440	43,700	45,045
NTMWD	NTMWD	Sabine Creek WWTP Indirect Reuse	Indirect	Rockwall	0	3,475	5,829	7,399	9,416	10,649
Mustang SUD	Mustang SUD	Mustang SUD Direct Potable Reuse	Direct	Denton/Grayson	2,803	2,803	2,803	2,803	2,803	2,803
TRA	Tarrant County Irrigation, Denton County Irrigation	Alliance Corridor Direct Reuse	Direct	Tarrant/Denton	3,134	7,840	7,840	7,840	7,840	7,840
TRA	TRWD	TRA Central to TRWD	Indirect	Dallas	25,000	37,000	48,500	60,000	60,000	60,000
Fort Worth	TRWD	Trinity River Indirect Reuse - Cedar Creek	Indirect	Henderson/ Kaufman	10,167	18,085	20,969	29,037	38,956	48,455
Fort Worth	TRWD	Mary's Creek WWTP Indirect Reuse	Indirect	Tarrant	10,405	17,547	17,288	20,168	23,048	25,928
UTRWD	UTRWD	Indirect Reuse of Sulphur Basin Supplies (Marvin Nichols)	Indirect	Denton	0	897	1,497	12,985	12,947	12,910

PROVIDER	USER	PROJECT NAME	TYPE	COUNTY[a]	2030	2040	2050	2060	2070	2080
UTRWD	UTRWD	Indirect Reuse of Lake Ralph Hall Water	Indirect	Denton	12,174	16,204	20,204	20,120	20,046	20,007
UTRWD	Denton County Irrigation	Direct Reuse	Direct	Denton	560	1,121	2,240	2,240	2,240	2,240
Weatherford	Weatherford	Additional Lake Weatherford Indirect Reuse	Indirect	Parker	123	123	123	344	681	1,059
Waxahachie	Waxahachie	Additional Waxahachie Indirect Reuse	Indirect	Ellis	1,259	4,106	8,200	9,469	10,739	12,008
Total Reuse in Acre-Feet per Year					**127,476**	**206,465**	**375,672**	**436,211**	**462,430**	**482,289**
Total Reuse in MGD					**114**	**184**	**335**	**389**	**413**	**430**

[a]*County reflects location of reuse project.*

Summary of Total Water Savings from Conservation and Reuse

Table 5B.11 provides a regional summary of estimated water savings from recommended water conservation and reuse strategies. It also shows the amount of conservation that is included in the approved water demands for the region.

TABLE 5B.11 SUMMARY OF EXISTING AND RECOMMENDED CONSERVATION (INCLUDING REUSE) FOR REGION C

STRATEGY	2030	2040	2050	2060	2070	2080
Municipal Conservation						
State/Federal Initiatives[a]	45,894	59,171	66,097	72,498	78,699	83,811
Demand Reduction Since Base Planning Year	24,780	29,097	31,253	33,515	34,879	36,000
Municipal Recommended Conservation	59,377	128,958	178,179	202,876	226,769	248,737
Non-Municipal Conservation						
Non-Municipal Recommended Conservation[b]	168	978	2330	4,399	7,267	10,984
Reuse Strategies						
Existing Reuse	381,752	397,593	405,606	409,414	413,807	417,701
Recommended Reuse Strategies	127,476	206,465	375,672	436,211	462,430	482,289
Total Conservation and Reuse[c]	**639,450**	**822,269**	**1,059,176**	**1,158,970**	**1,223,921**	**1,279,594**
Total Region C Water Demand[d]	1,766,451	2,006,633	2,236,410	2,445,263	2,636,102	2,797,416
Total Water Demand without Conservation	1,812,345	2,065,804	2,302,507	2,517,761	2,714,801	2,881,227
Total Conservation and Reuse Percentage	35%	40%	46%	46%	45%	44%

[a]State/federal initiatives include low flow plumbing fixtures, efficient residential clothes washer standards, and efficient residential dishwasher standards. These values were provided by the TWDB.

[b]Non-municipal water conservation measures include estimated conservation savings from irrigation rebates for golf course customers and reuse from mining customers.

[c]The conservation quantities shown above are associated with the Region C primary WUGs whose demand is located within the Region C area.

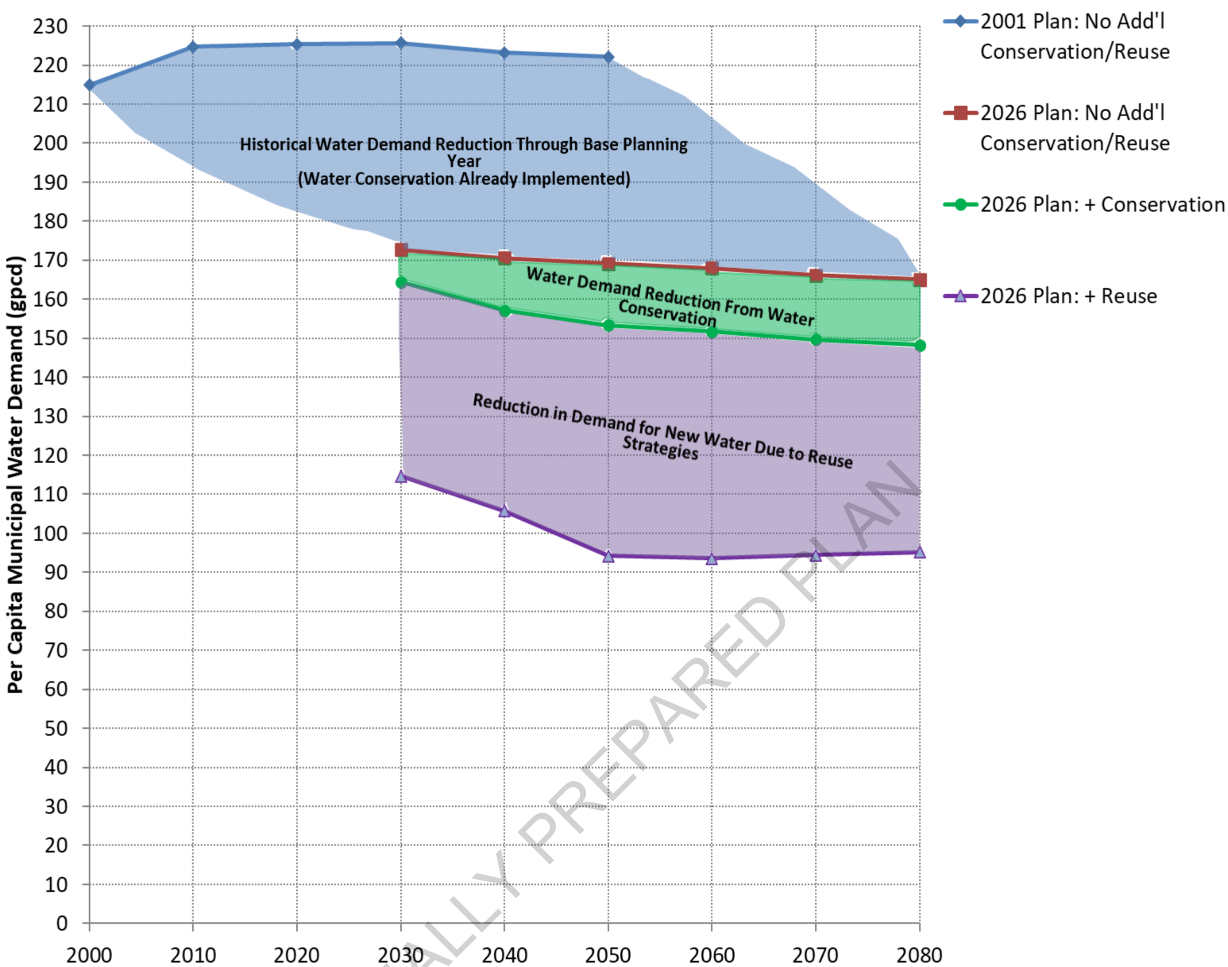
[d]Total Region C Water Demand includes projected conservation savings from low flow plumbing fixtures, efficient residential clothes washer standards, and efficient residential dishwasher standards. These savings were added to the Total Region C Water Demand to obtain the Total Water Demand without Conservation, a projection of Region C water demands if no conservation occurred.

Figure 5B.9 is a graph of the data from **Table 5B.12**, which summarizes the projected per capita municipal water use for Region C with the implementation of the plan. The figure and the table show the following:

- With no conservation or reuse at all, the projected dry-year per capita municipal water use in Region C is 170 GPCD in 2080.
- However, with the implementation of water conservation and reuse strategies, the average per capita demand in Region C is expected to decrease by 45 percent, reaching 94 GPCD. This reduction is driven by the following factors:
    - Implementation of the plumbing code requiring the use of low flow plumbing fixtures is expected to reduce the 2080 per capita municipal use by 5 GPCD
    - Accounting for demand reduction since the base planning year due to existing water conservation measures will reduce the projected 2080 per capita municipal use by an additional 2 GPCD.
    - The recommended water conservation measures in the *2026 Region C Water Plan* will reduce the projected 2080 per capita municipal use by an additional 15 GPCD.
    - The existing and recommended municipal water reuse projects will reduce the 2080 per capita municipal use by an additional 53 GPCD.
- The projected normal year per capita use is 10-15 percent lower than dry-year use and is estimated to be around 84 GPCD.

Figure 5B.9 shows the historical and the 2026 RWP per capita water demand projections. The differences between historical water demands and water demands in this plan represent water conservation and reuse savings. Region C has greatly reduced its per capita water demand since the beginning of the regional planning process and is poised to make significant additional reductions in water demand. Region C has reduced its dependency on new water by almost 50 percent since the 2001 RWP.

FIGURE 5B.9 PROJECTED MUNICIPAL PER CAPITA WATER USE IN REGION C



Note: The green shading represents water savings from plumbing code efficiency, which is included in the TWDB-adopted demand projection, as well as residual savings from conservation measures implemented since the base planning year and recommended municipal water conservation. The increase in the purple line, i.e., the GPCD after accounting for reuse, is due to the reuse quantity not keeping pace with demand growth.

TABLE 5B.12 PROJECTED POPULATION AND MUNICIPAL DEMAND IN REGION C

	2030	2040	2050	2060	2070	2080
Basic Data						
Population	9,133,116	10,504,043	11,804,305	13,000,417	14,163,968	15,126,596
Municipal Demand without Add'l Low Flow Fixtures (ac-ft/yr)	1,812,345	2,065,804	2,302,507	2,517,761	2,714,801	2,881,227
Municipal Demand with Add'l Low Flow Fixtures (ac-ft/yr)	1,766,451	2,006,633	2,236,410	2,445,263	2,636,102	2,797,416
Municipal Demand Reduction Since Base Planning Year (ac-ft/yr)	24,782	29,103	31,291	33,572	34,949	36,072
Recommended Municipal Water Conservation (ac-ft/yr)	59,377	128,958	178,179	202,876	226,769	248,737
Current Municipal Reuse (ac-ft/yr)	381,752	397,593	405,606	409,414	413,807	417,701
Recommended Municipal Reuse (ac-ft/yr)	127,476	206,465	375,672	436,211	462,430	482,289
Municipal Per Capita Use (Gallons per Capita per Day)						
No Additional Conservation or Reuse	177	176	174	173	171	170
With Full Implementation of Low Flow Fixtures	173	171	169	168	166	165
With Demand Reduction from Measures Implemented Since Base Planning Year	170	168	167	166	164	163
With Recommended Conservation	164	157	153	152	150	148
With Recommended Reuse	115	106	94	94	94	95
Normal-Year Use (Assumed Dry-Year Use 12 Percent Higher)	102	94	84	84	84	85

Note: Total may not sum due to rounding.

5B.5.2 Municipal Per Capita Goals

House Bill 807 was passed by the 86th Texas Legislature and signed by the Governor on June 10, 2019. The Bill amended Section 16.053 of the Texas Water Code to include, among others, the requirement that RWPGs "set one or more specific goals for gallons of water use per capita per day in each decade of the period covered by the plan for the municipal water user groups in the RWPA." (TWC §16.053(e)(11)).

TWDB provided the following guidance regarding this requirement. "TWDB will provide a list of municipal WUGs in each RWPG as well as supporting information of historic GPCD estimates, projected GPCDs, and relevant information from conservation annual reports submitted to TWDB to inform their process to set GPCD goals. GPCD goals may be a specific GPCD, or ranges of GPCD; may be based on specific municipal WUGs, or groupings of municipal WUGs as determined appropriate by the RWPG."

GPCD Goal = (Projected Water Demand minus Demand Reduction Since the Base Planning Year minus Recommended Water Conservation) divided by WUG population

This is analogous to the "With Recommended Conservation" line in **Table 5B.12** for Region C as a whole. The GPCD goal by decade for each municipal WUG is provided in **Appendix I**.

5B.6 Water Conservation Plans and Reporting Requirements

The TCEQ requires water conservation plans for the following entities[6]:

- All municipal, industrial, and other non-irrigation water users with surface water rights of 1,000 acre-feet per year or more,
- All irrigation water users with surface water rights of 10,000 acre-feet per year or more, and
- All retail public water suppliers providing water service to 3,300 connections or more.

Water conservation plans are also required for all water users applying for a new or amended state water right and for entities seeking state funding of more than $500,000 for water supply projects. Updated water conservation plans were required to be submitted to the TCEQ and/or the TWDB by May 1, 2019.

Table 5B.13 lists Region C entities that are required by TCEQ to develop a water conservation plan based on having 3,300 or more retail water connections, irrigation water rights of 10,000 acre-feet per year or more, and/or non-irrigation water rights of 1,000 acre-feet per year or more. Connections for each WUG were identified from the population projections with an assumption of 3 people per connection, and applicable water rights were identified from TCEQ's Water Rights Database[7]. **Table 5B.13** may not include Region C entities required to develop water conservation plans based on a water right application or a state funding application.

TABLE 5B.13 REGION C WATER USERS REQUIRED TO DEVELOP WATER CONSERVATION PLANS

PWS NAME	WUG NAME
BEAR CREEK SUD	Bear Creek SUD
BENBROOK WATER AUTHORITY	Benbrook Water Authority
BOIS D ARC MUD	Bois D Arc MUD
BOLIVAR WSC	Bolivar WSC
CITY OF ALEDO	Aledo
CITY OF ALLEN	Allen
CITY OF ANNA	Anna
CITY OF ARLINGTON	Arlington
CITY OF ATHENS	Athens
CITY OF AZLE	Azle
CITY OF BALCH SPRINGS	Balch Springs
CITY OF BEDFORD	Bedford
CITY OF BELLS	Bells
CITY OF BONHAM	Bonham
CITY OF BOYD	Boyd
CITY OF CARROLLTON	Carrollton
CITY OF CEDAR HILL	Cedar Hill
CITY OF CELINA	Celina
CITY OF COLLEYVILLE	Colleyville
CITY OF COPPELL	Coppell
CITY OF CORINTH	Corinth
CITY OF CORSICANA	Corsicana
CITY OF CROWLEY	Crowley
CITY OF DENISON	Denison
CITY OF DENTON	Denton
CITY OF DESOTO	Desoto
CITY OF DODD CITY	County-Other, Fannin
CITY OF DORCHESTER	Dorchester
CITY OF DUNCANVILLE	Duncanville
CITY OF ENNIS	Ennis
CITY OF EULESS	Euless
CITY OF EVERMAN	Everman
CITY OF FARMERS BRANCH	Farmers Branch
CITY OF FARMERSVILLE	Farmersville
CITY OF FATE	Fate
CITY OF FOREST HILL	Forest Hill
CITY OF FORNEY	Forney
CITY OF FORT WORTH	Fort Worth
CITY OF FRISCO	Frisco
CITY OF GAINESVILLE	Gainesville
CITY OF GARLAND	Garland
CITY OF GLENN HEIGHTS	Glenn Heights
CITY OF GRAND PRAIRIE	Grand Prairie
CITY OF GRAPEVINE	Grapevine
CITY OF GUNTER	Gunter

PWS NAME	WUG NAME
CITY OF HALTOM CITY	Haltom City
CITY OF HEATH	Heath
CITY OF HIGHLAND VILLAGE	Highland Village
CITY OF HONEY GROVE	Honey Grove
CITY OF HURST	Hurst
CITY OF IRVING	Irving
CITY OF JACKSBORO	Jacksboro
CITY OF KAUFMAN	Kaufman
CITY OF KELLER	Keller
CITY OF KENNEDALE	Kennedale
CITY OF KRUM	Krum
CITY OF LADONIA	Ladonia
CITY OF LANCASTER	Lancaster
CITY OF LEONARD	Leonard
CITY OF LEWISVILLE	Lewisville
CITY OF MABANK	Mabank
CITY OF MANSFIELD	Mansfield
CITY OF MCKINNEY	McKinney
CITY OF MELISSA	Melissa
CITY OF MESQUITE	Mesquite
CITY OF MIDLOTHIAN	Midlothian
CITY OF MURPHY	Murphy
CITY OF NORTH RICHLAND HILLS	North Richland Hills
CITY OF PARADISE	County-Other, Wise
CITY OF PILOT POINT	Pilot Point
CITY OF PLANO	Plano
CITY OF POTTSBORO	Pottsboro
CITY OF PRINCETON	Princeton
CITY OF RICHARDSON	Richardson
CITY OF RIVER OAKS	River Oaks
CITY OF ROCKWALL	Rockwall
CITY OF ROWLETT	Rowlett
CITY OF ROYSE CITY	Royse City
CITY OF SACHSE	Sachse
CITY OF SAGINAW	Saginaw
CITY OF SANGER	Sanger
CITY OF SAVOY	Savoy
CITY OF SEAGOVILLE	Seagoville
CITY OF SHERMAN	Sherman
CITY OF SOUTHLAKE	Southlake
CITY OF SPRINGTOWN	Springtown
CITY OF TERRELL	Terrell
CITY OF THE COLONY	The Colony
CITY OF TIOGA	Tioga
CITY OF TOM BEAN	Tom Bean
CITY OF TRINIDAD	Trinidad

PWS NAME	WUG NAME
CITY OF UNIVERSITY PARK	University Park
CITY OF VALLEY VIEW	County-Other, Cooke
CITY OF VAN ALSTYNE	Van Alstyne
CITY OF WATAUGA	Watauga
CITY OF WAXAHACHIE	Waxahachie
CITY OF WEATHERFORD	Weatherford
CITY OF WHITE SETTLEMENT	White Settlement
CITY OF WHITEWRIGHT	Whitewright
CITY OF WILLOW PARK	Willow Park
CITY OF WYLIE	Wylie
COLLEGE MOUND SUD	College Mound SUD
COPEVILLE SUD	Copeville WSC
CULLEOKA WSC	Culleoka WSC
DALLAS COUNTY PARK CITIES MUD	NA - Wholesaler
DALLAS WATER UTILITY	Dallas
DENTON COUNTY FWSD 7 LANTANA	Denton County FWSD 7
EAST CEDAR CREEK FWSD BROOKSHIRE	East Cedar Creek FWSD
EAST FORK SUD	East Fork SUD
FORNEY LAKE WSC	Forney Lake WSC
GOBER MUD	County-Other, Fannin
GREATER TEXOMA UTILITY AUTHORITY	NA - Wholesaler
HIGH POINT WATER SUPPLY CORPORATION	High Point WSC
LAKE CITIES MUNICIPAL UTILITY AUTHORITY	Lake Cities Municipal Utility Authority
LAKE KIOWA SUD	Lake Kiowa SUD
MOUNTAIN PEAK SUD	Mountain Peak SUD
MUSTANG SUD	Mustang SUD
NEVADA SUD	Nevada SUD
NORTH COLLIN SUD	North Collin SUD
NORTH KAUFMAN WSC	North Kaufman WSC
NORTH TEXAS MWD	NA - Wholesaler
NORTHWEST GRAYSON COUNTY WCID 1	Northwest Grayson County WCID 1
PARKER COUNTY SUD GROUND WATER	Parker County SUD
PARKER COUNTY SUD SURFACE	Parker County SUD
ROCKETT SUD	Rockett SUD
SARDIS LONE ELM WSC	Sardis Lone Elm WSC
SEIS LAGOS UTILITY DISTRICT	Seis Lagos UD
TALTY SUD	Talty SUD
TARRANT REGIONAL WD	NA - Wholesaler
TOWN OF ADDISON	Addison
TOWN OF FAIRVIEW	Fairview
TOWN OF FLOWER MOUND	Flower Mound
TOWN OF LITTLE ELM	Little Elm
TOWN OF NORTHLAKE	Northlake
TOWN OF PROSPER	Prosper

PWS NAME	WUG NAME
TRINITY RIVER AUTHORITY	NA - Wholesaler
TROPHY CLUB MUD 1	Trophy Club MUD 1
UPPER TRINITY REGIONAL WD	NA - Wholesaler
WALNUT CREEK SUD	Walnut Creek SUD
WEST CEDAR CREEK MUD	West Cedar Creek MUD
WEST WISE SUD	West Wise SUD
WHITE SHED WSC	White Shed WSC

[a]The table shows Region C entities with 3,300 or more retail water connections, irrigation water rights of 10,000 acre-feet per year or more, and/or non-irrigation water rights of 1,000 acre-feet per year or more. It may not include Region C entities required to develop water conservation plans based on a water right application or a state funding application.

5B.6.1 Municipal Water Conservation Plan Requirements

The TCEQ requires the following content in a municipal water conservation plan:

- Utility profile
- Record management system
- Specific, quantified five-year and ten-year targets for water savings
- Accurate metering
- Universal metering
- Determination and control of water loss
- Public education and information program
- Non-promotional water rate structure
- Reservoir system operation plan
- Means of implementation and enforcement
- Coordination with regional water planning group.
- Implementation report detailing progress toward implementing the water conservation plan and whether water savings targets are being met.

In addition, the TCEQ requires additional minimum content for municipal entities that are projected to supply 5,000 people or more in the following 10 years:

- Leak detection, repair, and water loss accounting
- Requirement for water conservation plans by wholesale customers.

The TCEQ also suggests optional content for municipal water conservation plans:

- Conservation-oriented water rates

- Ordinances, plumbing codes, or rules about water-conserving fixtures
- Programs for the replacement or retrofit of water-conserving plumbing fixtures in existing structures
- Reuse and recycling of wastewater and/or graywater
- Pressure control and/or reduction
- Landscape water management ordinance or program
- Method for monitoring the effectiveness and efficiency of the water conservation plan
- Other conservation methods
- Review and update of the plan

In addition, the TCEQ requires additional minimum content for municipal entities that are projected to supply 5,000 people or more in the following 10 years:

- Leak detection, repair, and water loss accounting
- Requirement for water conservation plans by wholesale customers.

The TCEQ also suggests optional content for municipal water conservation plans:

- Conservation-oriented water rates
- Ordinances, plumbing codes, or rules about water-conserving fixtures
- Programs for the replacement or retrofit of water-conserving plumbing fixtures in existing structures
- Reuse and recycling of wastewater and/or graywater
- Pressure control and/or reduction
- Landscape water management ordinance or program
- Method for monitoring the effectiveness and efficiency of the water conservation plan
- Other conservation methods
- Review and update of the plan

5B.6.2 Irrigation Water Conservation Plan Requirements

The TCEQ requires the following minimum content in an irrigation water conservation plan:

- Description of the irrigation production process
- Description of the irrigation method or system and equipment

- Accurate metering
- Specific, quantified five-year and ten-year targets for water savings
- Description of water-conserving irrigation equipment and application system
- Leak detection, repair, and water-loss control
- Irrigation timing and/or measuring the amount of water applied
- Land improvements for retaining or reducing runoff and increasing the infiltration of rain and irrigation water
- Tailwater recovery and reuse
- Other conservation practices, methods, or techniques.
- Review and update of the plan.
- Implementation report detailing progress toward implementing the water conservation plan and whether water savings targets are being met.

5B.6.3 Manufacturing and Steam Electric Power Water Conservation Plan Requirements

The TCEQ requires the following minimum content in manufacturing or steam electric power water conservation plans:

- Description of water use in the production process
- Specific, quantified five-year and ten-year targets for water savings
- Accurate metering
- Leak detection, repair, and water-loss accounting
- Water use efficiency process and/or equipment upgrades
- Other conservation practices
- Review and update of plan.
- Implementation report detailing progress toward implementing the water conservation plan and whether water savings targets are being met.

5B.6.4 Model Water Conservation Plans

Model water conservation plans for Region C have been developed for four different water user types: municipal, irrigation, manufacturing, and steam electric power.

The model water conservation plans are available online at regioncwater.org.

The model plans are designed to show the content required by the TCEQ, optional content suggested by the TCEQ, and optional content suggested by the Region C Water Planning Group (e.g., potentially feasible water conservation strategies).

The model plans are intended to be a template that Region C water user groups can use as a starting point and customize to develop their own situation-specific water conservation plans.

Other Conservation Reporting

- Annual Reports
- Water Loss Audits
- Water Use Surveys

5B.6.5 Other Water Conservation Reporting Requirements

Each entity that is required to submit a water conservation plan to the TWDB or the TCEQ must file a report by May 1 each year on the entity's progress in implementing its water conservation plan. These reports document system information, water use accounting, water conservation programs and activities data, leak detection and water loss, program effectiveness, and drought plan implementation.

Retail public utilities that supply potable water to more than 3,300 connections or receive financial assistance from the TWDB must file a system water loss audit with the TWDB by May 1 each year. Other retail public utilities that supply potable water must file a system water loss audit with the TWDB every five years[8].

Water use surveys: Each year, the TWDB surveys persons and/or entities using groundwater and surface water for municipal, industrial, power generation, or mining purposes to gather data to be used for long-term water supply planning. Entities that receive a water use survey are required to respond within 60 days[8].

5B.7 Evaluation of Water Conservation Planning Requirements

TWDB regional water planning rules[9] require consideration of water conservation for various water user groups. **Table 5B.14** shows each requirement and documents that the requirements have been fulfilled.

TABLE 5B.14 EVALUATION OF WATER CONSERVATION PLANNING REQUIREMENTS

REQUIREMENT	EVALUATION	FULFILLED?
Conservation, Drought Management Measures, and Drought Contingency Plans shall be considered by RWPGs when developing the regional plans, particularly during the process of identifying, evaluating, and recommending WMSs. RWPs shall incorporate water conservation planning and drought contingency planning in the RWPA. [31 TAC 357.34(i)]	Water conservation practices were considered for each water user group. Existing water conservation plans and other water conservation planning information were considered during development of the Water Conservation Package for municipal water suppliers, as described in Section 5B.4.	Yes
RWPGs must consider water conservation practices, including potentially applicable BMPs, for each identified Water Need. [31 TAC 357.34(i)(2)]	Water conservation practices, including potentially applicable BMPs, were considered for all Region C WUGs, as described in Section 5B.4.	Yes
RWPGs shall include water conservation practices for each user group to which Texas Water Code §11.1271 and §13.146 (relating to Water Conservation Plans) apply. The impact of these water conservation practices on Water Needs must be consistent with requirements in appropriate Commission administrative rules related to Texas Water Code §11.1271 and §13.146. [31 TAC 357.34(i)(2)(A)]	The Water Conservation Package was recommended for each municipal WUG, as described in Section 5B.4. In addition, it is recommended that municipal WUGs offer rebates for water conservation by irrigation WUGs. The impact of these recommendations is consistent with the water conservation plan requirements.	Yes
RWPGs shall consider water conservation practices for each WUG beyond the minimum requirements of subparagraph (A) of this paragraph, whether or not the WUG is subject to Texas Water Code §11.1271 and §13.146. If RWPGs do not adopt a Water Conservation Strategy to meet an identified need, they shall document the reason in the RWP. [31 TAC 357.34(i)(2)(B)]	As described in Section 5B.4, water conservation practices were considered for each water user group.	Yes

REQUIREMENT	EVALUATION	FULFILLED?
For each WUG or WWP that is to obtain water from a proposed interbasin transfer to which Texas Water Code §11.085 (relating to Interbasin Transfers) applies, RWPGs shall include a Water Conservation Strategy, pursuant to Texas Water Code §11.085(l), that will result in the highest practicable level of water conservation and efficiency achievable. For these strategies, RWPGs shall determine, and report projected water use savings in gallons per capita per day based on its determination of the highest practicable level of water conservation and efficiency achievable. RWPGs shall develop conservation strategies based on this determination. In preparing this evaluation, RWPGs shall seek the input of WUGs and WWPs as to what is the highest practicable level of conservation and efficiency achievable, in their opinion, and take that input into consideration. RWPGs shall develop water conservation strategies consistent with guidance provided by the Commission in its administrative rules that implement Texas Water Code §11.085. When developing water conservation strategies, the RWPGs must consider potentially applicable BMPs. Strategy evaluation in accordance with this section shall include a quantitative description of the quantity, cost, and reliability of the water estimated to be conserved under the highest practicable level of water conservation and efficiency achievable. [31 TAC 357.34(i)(2)(C)]	Water conservation strategies were included for each WUG or WWP that is to obtain water from a proposed interbasin transfer to which Texas Water Code §11.085 applies. Recommended water conservation strategies were developed based on review of water conservation plans, analysis of existing conservation practices in the region, and BMPs. The recommendations reflect practices that are practicable for implementation in Region C, projected to provide long-term water savings, and projected to provide a reasonable quantity of water savings at a reasonable cost for a wide range of water user groups. Descriptions of the quantity, cost, and reliability of the projected water savings are presented in Section 5B.4 and Appendix I.	Yes
RWPGs shall consider strategies to address any issues identified in the information compiled by the Board from the water loss audits performed by Retail Public Utilities pursuant to §358.6 of this title (relating to Water Loss Audits). [31 TAC 357.34(i)(2)(D)]	A water loss mitigation strategy is recommended for each municipal WUG.	Yes
RWPs shall include a subchapter consolidating the RWPG's recommendations regarding water conservation. RWPGs shall include in the RWPs model Water Conservation Plans pursuant to Texas Water Code §11.1271. [31 TAC 357.34(j)]	The RWPG recommendations on water conservation are consolidated in Chapter 5B. Model water conservation plans for municipal, manufacturing, irrigation, and steam electric power WUGs are presented online at http://www.regioncwater.org/Documents/Model_Drought_Plan.pdf.	Yes
RWPGs shall perform a secondary water needs analysis for all WUGs and WWPs for which conservation WMSs or direct Reuse WMSs are recommended. This secondary water needs analysis shall calculate the Water Needs that would remain after assuming all recommended conservation and direct Reuse WMSs are fully implemented. The resulting secondary water needs volumes shall be presented in the RWP by WUG and MWP and decade. [31 TAC 357.33(d)]	The secondary water needs analysis is presented in **Chapter 4 Section 4.5**.	Yes

REQUIREMENT	EVALUATION	FULFILLED?
RWPGs shall describe the level of implementation of previously recommended WMSs and associated impediments to implementation in accordance with guidance provided by the board. Information on the progress of implementation of all WMSs that were recommended in the previous RWP, including conservation and Drought Management WMSs; and the implementation of WMSPs that have affected progress in meeting the state's future water needs. [31 TAC 357.45(a)]	The level of implementation of previously recommended water conservation strategies in Region C is summarized in **Table 5B.5**.	Yes
The Board shall consider approval of an RWP that includes unmet municipal Water Needs provided that the RWPG includes adequate justification, including that the RWP documents that the RWPG considered all potentially feasible WMSs, including Drought Management WMSs and contains an explanation why additional conservation and/or Drought Management WMSs were not recommended to address the need. [31 TAC 357.50(j)(1)]	Unmet needs are discussed in **Chapter 6, Section 6.5.1.**	Yes

5B.8 Chapter 5B List of References

[1] Freese and Nichols, Inc., Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc: 2021 Region C Water Plan, prepared for the Region C Water Planning Group, November 2020. https://www.twdb.texas.gov/waterplanning/rwp/plans/2021/

[2] Texas Water Development Board: Water Use Survey Historical Summary Estimates by Region, [Online] Available URLs: http://www2.twdb.texas.gov/ReportServerExt/Pages/ReportViewer.aspx?%2fWU%2fSumFinal_RegionReport&rs:Command=Render and http://www2.twdb.texas.gov/ReportServerExt/Pages/ReportViewer.aspx?%2fWU%2fSumFinal_RegionReportWithReuse&rs:Command=Render.

[3] Texas Water Development Board and Texas Commission on Environmental Quality in consultation with Water Conservation Advisory Council: *Guidance and Methodology for Reporting on Water Conservation and Water Use*. [Online] Available URL: http://www.twdb.texas.gov/conservation/doc/SB181Guidance.pdf, December 2012.

[4] Texas Water Development Board: 2023 Water Loss Audit Data by Region, [Online] Available URL: https://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2026/conservationresources.asp

[5] Mathis, M., Kunkel, G., and Chastain Howley, A.: Water Loss Audit Manual for Texas Utilities, Report 367, prepared for the Texas Water Development Board, Austin, March 2008.

[6] Texas Administrative Code, Title 30, Part 1, Chapter 288, [Online], Available URL: https://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=288, accessed January 2025.

[7] Texas Commission on Environmental Quality, Water Rights Data File, [Online], Available URL: https://www.tceq.texas.gov/assets/public/permitting/watersupply/water_rights/applications/wractive.xlsx, accessed January 2025.

[8] Texas Administrative Code Title 31, Part 10, Chapter 358, [Online], Available URL: https://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=4&ti=31&pt=10&ch=358, accessed January 2025.

[9] Texas Administrative Code Title 31, Part 10, Chapter 357, [Online], Available URL: http://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=4&ti=31&pt=10&ch=357&rl=Y, accessed January 2025.

5C EVALUATION OF MAJOR WATER MANAGEMENT STRATEGIES

CHAPTER OUTLINE	
Section 5C.1	New Surface Water
Section 5C.2	Connection of Existing Supplies
Section 5C.3	New Groundwater
Section 5C.4	Reuse Strategies
Section 5C.5	Desalination
Section 5C.6	Aquifer Storage and Recovery
Section 5C.7	Summary of Recommended Major Water Management Strategies
RELATED APPENDICES	
Appendix F	Potentially Feasible Water Management Strategies
Appendix G	Water Management Strategy Evaluations
Appendix H	Cost Estimates
Appendix J	Updated Quantitative Marvin Nichols Analysis

The total water needs for Region C increase to over 1.3 million acre-feet per year by 2080. To meet these large needs, the region has identified a diverse list of potential water management strategies.

Each of these strategies is described in detail and evaluated further in **Appendix G** with detailed costs included in **Appendix H**.

This chapter of the report summarizes the major potentially feasible water management strategies. Major strategies are those that would supply a substantial amount of water, typically around 25,000 acre-feet per year or more. These major water management strategies are generally sponsored by the Region C major and regional wholesale water providers and account for most of the new water supplies. Region C has identified five new major reservoirs of which four are currently designated as unique reservoir sites and the remaining site is recommended for designation.

5C.1 New Surface Water

Region C has identified multiple new surface water strategies for potential future supplies, including five new major reservoirs, three river diversions, and reallocation of flood storage in Lake Texoma and Wright Patman Reservoir. The new reservoirs include three potential reservoir sites in the Sulphur River Basin, Lake Tehuacana in the Trinity River Basin, and Lake Columbia in the Neches River Basin. Each of these sites have been previously studied by Region C and are designated as unique reservoir sites or are recommended for designation.

5C.1.1 Dredging or Reallocation

While increasing the capacities of existing lakes does not qualify as a major strategy (> 30,000 acre-feet per year of supply), this concept has been raised by the public as an alternative to new reservoir development. Region C evaluated the potential for increased water supply and associated costs to increase the storage capacities at 4 lakes in the greater Metroplex area through dredging or reallocation of flood storage for water supply. The quantity of reliable supply gained through dredging to the permitted conservation storage ranged from 1,700 to 3,360 acre-feet per year for the lakes evaluated. Consideration of reallocation provided new supplies of only 7,200 acre-feet per year due to the lack of unappropriated water in the Trinity River Basin. The costs for these strategies averaged $133.99 per 1,000 gallons of supply for dredging, and no costs were developed for the reallocation. Reallocation of storage in reservoirs within the Metroplex was considered not potentially feasible due to the permitting obstacles and uncertainty of impacts on flooding.

Dredging a large major reservoir is a massive technical and financial undertaking with only small gains in water supply. While reallocating water to water supply at area lakes does not provide reliable water of the quantity needed for the Metroplex, it also potentially places an increasingly urban area at risk for flooding. Dredging and reallocation of reservoirs in the Metroplex area are not recommended or alternative strategies for Region C. Reallocation of storage for Lakes Wright Patman and Texoma are discussed separately in **Sections 5C.1.8 and 5C.1.9**

5C.1.2 George Parkhouse Reservoir II (North)

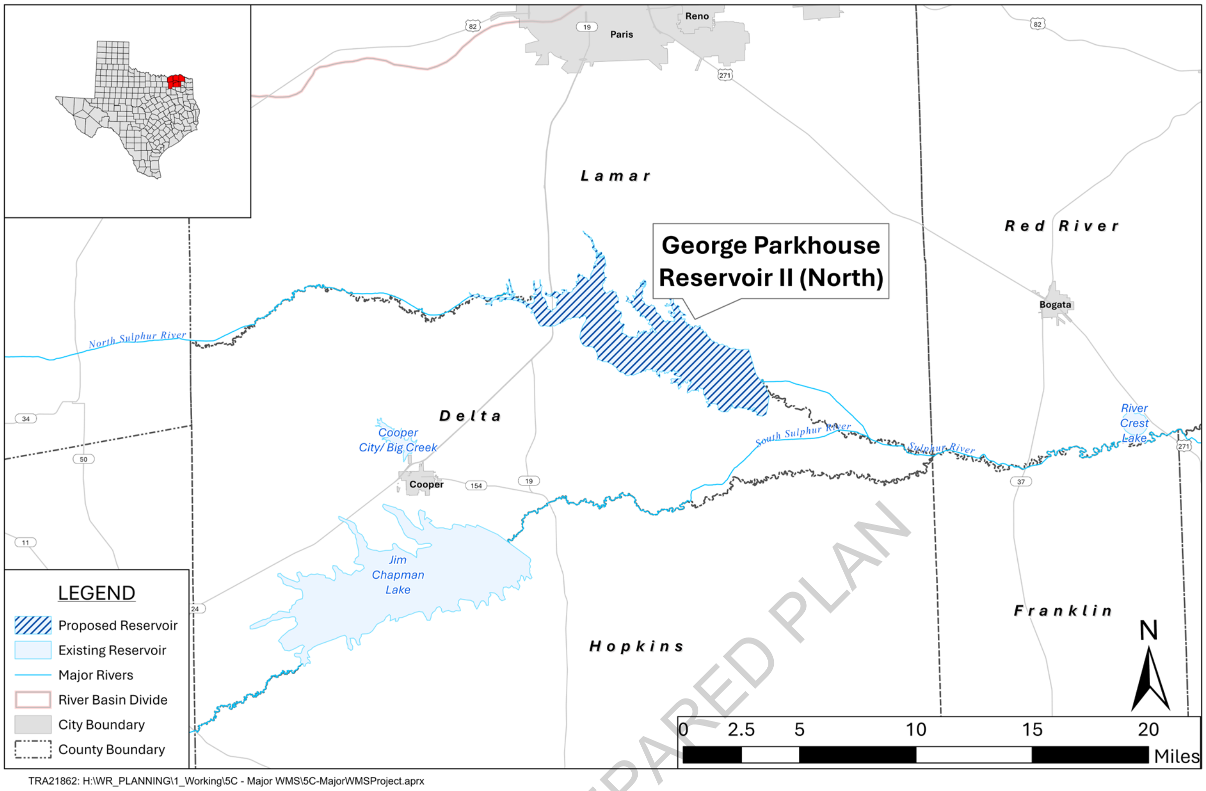
George Parkhouse Reservoir (North), also known as Parkhouse II, is a potential reservoir located on the North Sulphur River in Lamar and Delta Counties, about 15 miles southeast of the City of Paris. This reservoir site was originally proposed as the second phase of the larger George Parkhouse Reservoir, formerly known as Sulphur Bluff Reservoir. At a proposed conservation elevation of 410.0 feet MSL, the reservoir would store approximately 331,000 acre-feet of water and inundate 14,400 acres. It is assumed that the project would either be pursued solely by NTMWD or solely by UTRWD.

The firm yield of George Parkhouse (North) with Consensus Criteria Environmental Flow Needs instream releases is estimated to be 94,460 acre-feet per year. It is assumed the full yield will be available to Region C users. This yield considers new drought of record conditions in the Sulphur River Basin and assumes senior priority over other potential future Sulphur Basin projects. If other proposed projects in the Sulphur River Basin are permitted as senior to George Parkhouse (North), the quantity of available supply could change significantly. Previous studies have shown that the reduction in yield could be more than 70 percent [1].

Facilities included in this strategy include both the proposed reservoir and the infrastructure needed to transport raw water to the Leonard Water Treatment Plant in Fannin County for NTMWD. For UTRWD, the transmission system delivers water to the Harpool Water Treatment Plant. Of the approximate 15,000 acres of impacted land at the reservoir site, there are less than 1,250 acres of wetlands and less than 2,000 acres of bottomland hardwoods.

This project has the potential to produce a reliable supply for Region C only if other potential reservoirs are not permitted senior to George Parkhouse (North). It is located near Lake Jim Chapman and Lake Ralph Hall, so it could be operated as a system with those sources. As a stand-alone strategy, there is an associated capital cost of approximately $1.8 billion. This is an alternative strategy for NTMWD and UTRWD.

FIGURE 5C.1 GEORGE PARKHOUSE RESERVOIR II (NORTH)



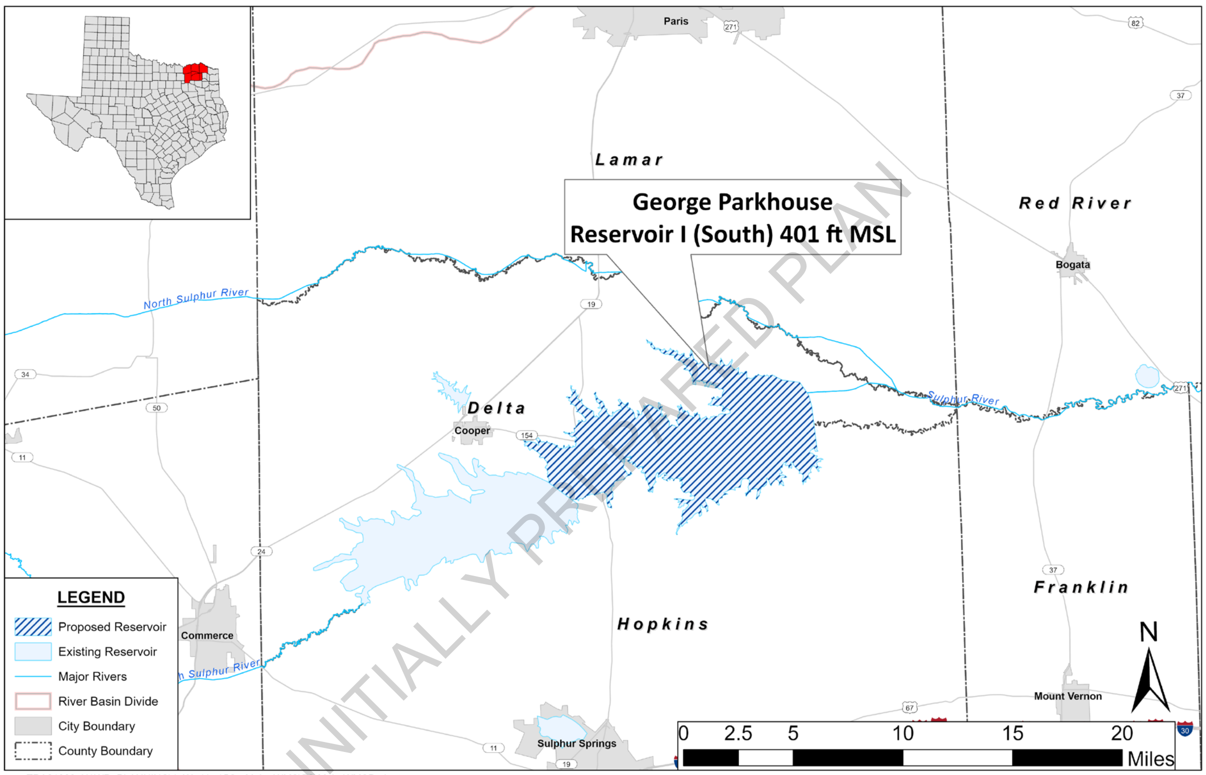
5C.1.3 George Parkhouse Lake I (South)

George Parkhouse Lake (South), also known as George Parkhouse Lake I, is a potential reservoir located in Region D on the South Sulphur River in Hopkins and Delta Counties. This reservoir site was originally proposed as the first phase of the larger George Parkhouse Reservoir, formerly known as Sulphur Bluff Reservoir. It is located downstream from Jim Chapman Lake and would yield 114,960 acre-feet per year for Region C users. At conservation elevation 401 feet MSL, George Parkhouse Lake (South) would inundate approximately 28,900 acres and store 651,700 acre-feet. The yield of George Parkhouse (South) is contingent upon other water development in the Sulphur River Basin. If other downstream projects are permitted with a senior priority to George Parkhouse (South), then the yield would decrease. Previous studies have indicated the reduction in yield could be up to 60 percent of the stand-alone firm yield(2). This would likely make this project not economically viable for Region C providers. This project could be developed in conjunction with George Parkhouse (North). The yield of the combined projects has not been assessed.

The lake, as currently configured, would abut the dam for Jim Chapman Lake and over fifty percent of the land impacted would be bottomland hardwood forest or marsh(1). This reservoir site has over 10,000 acres of bottomland hardwood forest and potential wetlands (marsh and seasonally flooded shrubland). The impacts to these resources would require mitigation, which is included in the cost estimate.

This project is considered a potential strategy for NTMWD and UTRWD. It is assumed that this project will be pursued either solely by NTMWD or jointly with NTMWD and UTRWD. As a standalone strategy for NTMWD, there is an associated capital cost of $1.98 billion. The joint strategy assumes UTRWD would receive 30 percent of the firm yield (34,488 acre-feet per year) and NTMWD would receive the remaining yield (80,472 acre-feet per year). All water for NTMWD would be delivered to the Leonard WTP in Fannin County. For UTRWD, the water would be delivered to the Lake Ralph Hall Balancing Reservoir through the existing Chapman pipeline. If there is insufficient capacity in the Chapman pipeline, UTRWD will construct a parallel pipeline. The total capital cost for the joint strategy is $1.86 billion, with $447 million for UTRWD and $1.4 billion for NTMWD. This is an alternate strategy for NTMWD and UTRWD.

FIGURE 5C. 2 GEORGE PARKHOUSE RESERVOIR I (SOUTH)



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

5C.1.4 Marvin Nichols Reservoir

The Marvin Nichols Reservoir has been included as a recommended strategy in each of the Region C Water Plans since the beginning of regional water planning and in previous State Water Plans. This project is retained as a potentially feasible strategy for the 2026 Region C Water Plan. Marvin Nichols Reservoir is a potential reservoir located on the Sulphur River in Titus, Red River, and Franklin Counties, about 100 miles east from the Metroplex. The Marvin Nichols Reservoir has historically been pursued as a joint strategy by several Metroplex water providers.

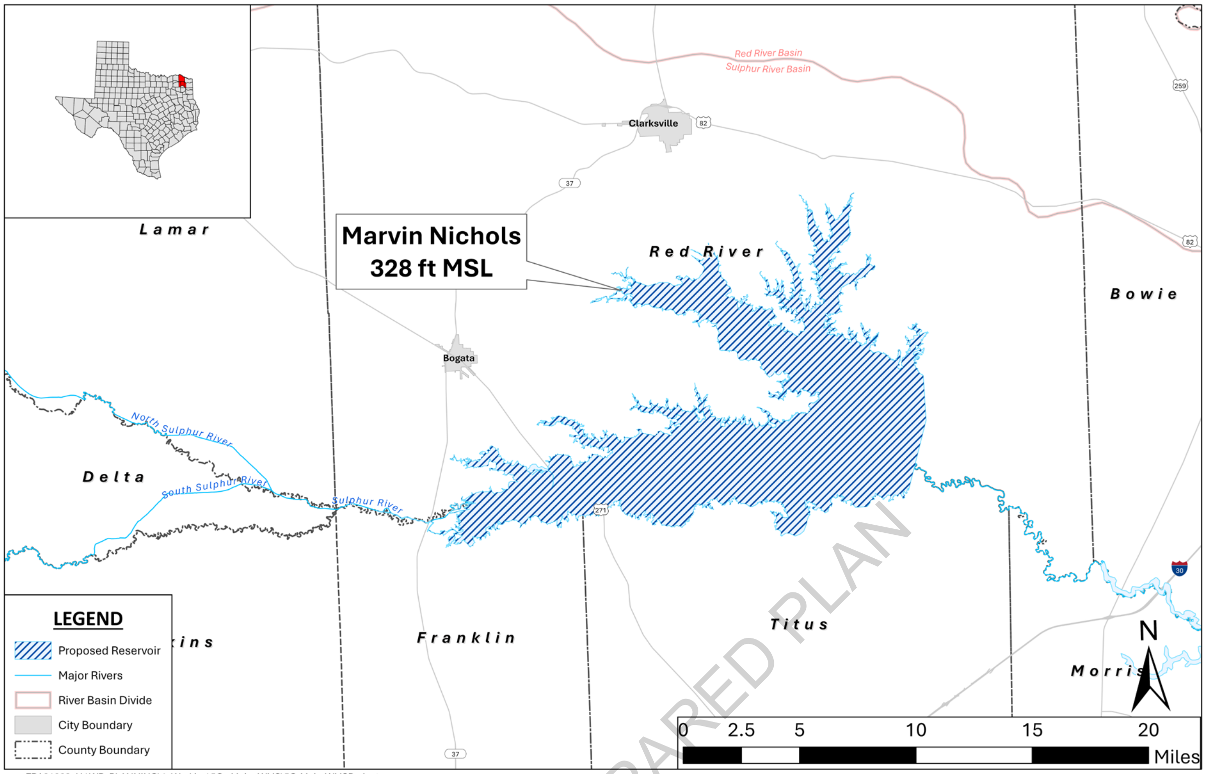
At a proposed conservation elevation of 328 feet MSL, the reservoir would store 1,532,000 acre-feet of water with a water surface area of 66,103 acres. The firm yield of Marvin Nichols at 328 feet MSL is estimated to be 400,200 acre-feet per year. Of this amount, it is assumed that approximately 320,000 acre-feet per year would be available to water providers in Region C, and the remaining 20 percent of the yield would remain in the Sulphur Basin for local use. This yield considers new drought of record conditions in the Sulphur River Basin and assumes senior priority over other potential future Sulphur Basin. If other potential projects in the Sulphur River Basin are permitted as senior to the Marvin Nichols Reservoir, the available supply from Marvin Nichols Reservoir could be reduced.

Feasibility studies have been conducted for the Marvin Nichols Reservoir, but no detailed field studies or permit applications have been submitted. Environmental studies indicate there are approximately 25,000 acres of existing wetlands and 9,000 acres of bottomland hardwood forests within the reservoir footprint. Impacts to these resources and associated streams would be mitigated as part of the strategy implementation and are included in the cost. Capital costs to construct the Marvin Nichols Reservoir and deliver water to the sponsors are estimated at $7.4 billion. This equates to an overall project cost of approximately $4.62/1,000 gallons of raw water during debt service and $0.96/1,000 gallons after debt service. Capital and unit costs for each participant are dependent upon the respective infrastructure and supply share of the project.

This strategy provides a reliable new source of fresh water supplies for Region C water providers at similar costs to other large-scale projects. It is located near other existing water sources that could potentially be operated as a system. The challenges to this strategy are permitting and the current political opposition. Economic studies conducted as part of the 2021 Region C Water Plan show that the construction and operation of the reservoir would induce economic benefit to the local communities. The construction of the reservoir would increase economic activity by $5.5 billion over the construction period and $228 million annually during operation.

This strategy is a recommended strategy for NTMWD, TRWD, and UTRWD. It is an alternative strategy for DWU and Irving. **Appendix G** and **Appendix J** of this plan contain additional information on the quantitative evaluation of this strategy and the 2020 Economic Study.

FIGURE 5C.3 MARVIN NICHOLS RESERVOIR



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

5C.1.5 Neches River Basin Supply

Dallas Water Utilities (DWU) plans to develop additional supplies in the Neches River Basin and fully utilize the capacity of the Integrated Pipeline (IPL) from Lake Palestine to the DWU service area. Two new supply options are considered under this strategy: Neches Run-of-River Diversion and Lake Columbia. Both options are evaluated; however, only the Neches Run-of-River strategy is selected for implementation during this planning cycle. The Lake Columbia option is considered an alternative strategy and may be implemented after 2080.

Neches Run-of-River Diversion

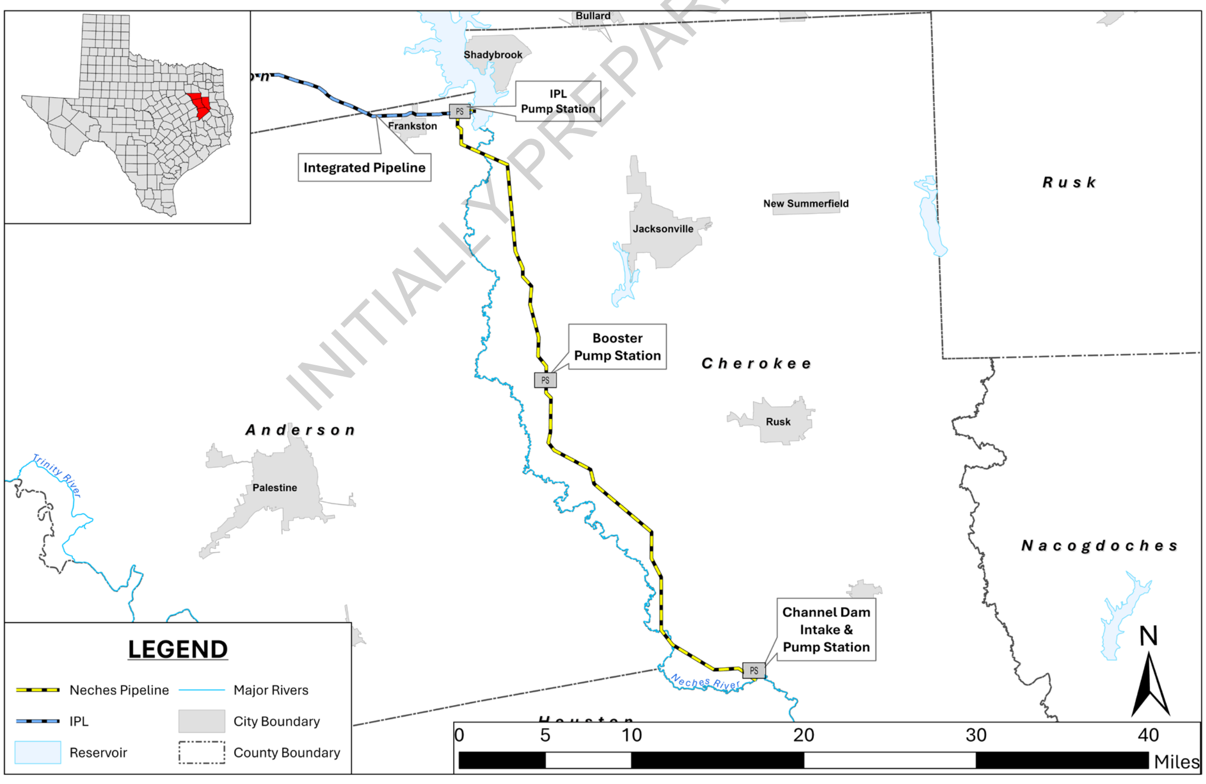
The Neches River Run-of-River Diversion Strategy is part of the Dallas Water Utilities (DWU) plan to develop additional supplies in the Neches River Basin. This project would be sponsored by the Upper Neches River Municipal Water Authority (UNRMWA) with water supplies contracted to DWU.

The Neches River Run-of-River Diversion Strategy would include a new river intake and pump station on the Neches River near the State Highway 21 crossing. Water would be delivered through a 42-mile pipeline to DWU's pump station at Lake Palestine for delivery to DWU through the Integrated Pipeline (see **Section 5C.2.5**). The run-of-river diversions would be operated as a system with Lake Palestine to supplement existing water supplies. Dallas' existing contract with UNRMWA for Lake Palestine water is for an annual quantity of 114,337 acre-feet per year (102 MGD). The strategy can provide an additional 74 MGD of reliable supply from the Neches River Basin. The IPL, when completed, will have a capacity of 150 MGD, so there is a remaining infrastructure capacity of approximately 48 MGD available for this strategy. The remaining 26 MGD of available supply would require additional transmission capacity to convey the water to DWU's service area. The new run-of-river diversion will be interruptible, so the quantity available with this strategy is the incremental increase in the firm yield of Lake Palestine resulting from system operations of the new diversion and the existing reservoir. If other new water rights are granted in the Neches River Basin before the water right for this project, the yield could be affected.

The Neches Run-of-River strategy provides supplemental water for DWU that is located near existing DWU water sources. This strategy assumes that existing IPL infrastructure can be used to transport this water to the DWU service area, which minimizes transmission costs. Also, the use of a small river diversion structure provides fewer environmental impacts than a new reservoir, and the operations with Lake Palestine provide the necessary reliability for the river diversion. It is anticipated that this project will be online by 2070 and will provide 48 MGD (53,800 acre-feet per year) of supply through the planning horizon. Additional transmission is needed to provide additional supply from the Neches River Basin. This could be additional water from the Neches Run-of-River diversion and/or Lake Columbia. Both Lake Columbia and the additional transmission system may be implemented after 2080.

The estimated capital cost is $719 million. The Neches Run-of-River is a recommended strategy for DWU.

FIGURE 5C.4 NECHES RUN OF RIVER DIVERSION



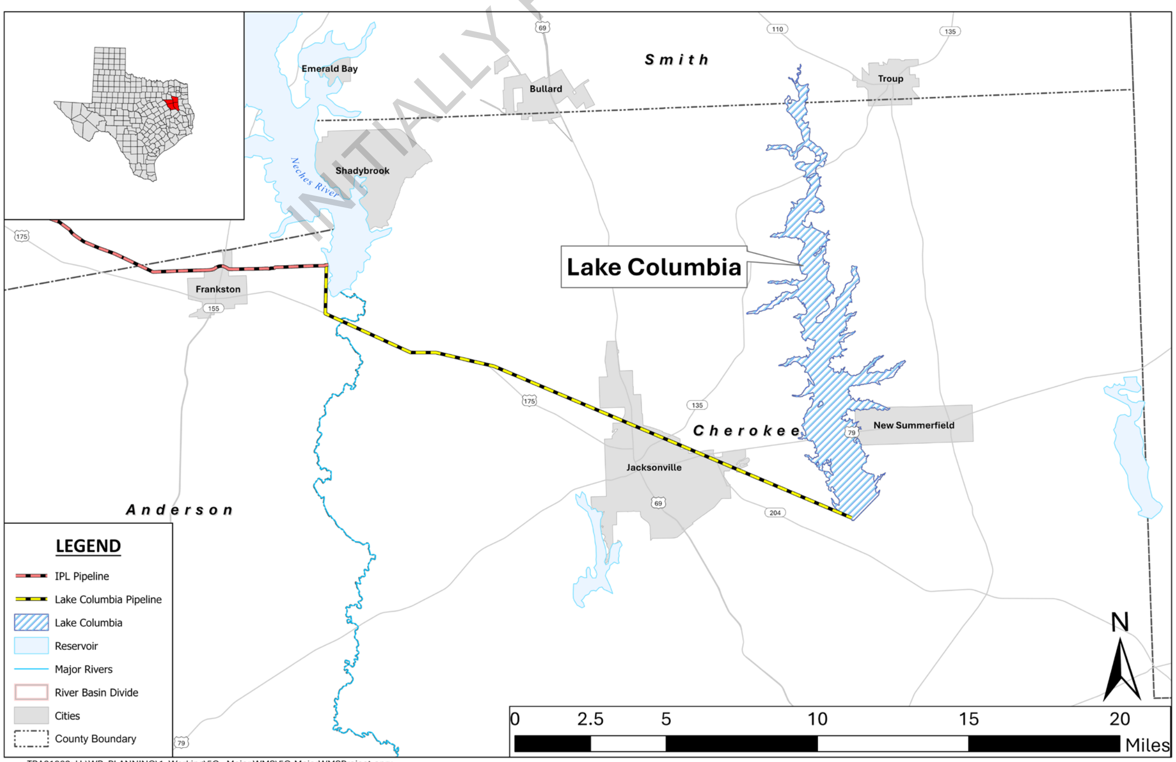
Lake Columbia

Lake Columbia is a proposed new reservoir in the Neches River Basin on Mud Creek in Cherokee County in Region I. Angelina and Neches River Authority (ANRA) is the sponsor for the Lake Columbia project. ANRA has been granted a water right permit by the TCEQ to impound 195,500 acre-feet and to divert 85,507 acre-feet per year (76.3 MGD) for municipal and industrial purposes. Based on discussions between ANRA and DWU, Dallas would contract for supplies from ANRA and participate in the development of this project. The projected share of the proposed Lake Columbia project for DWU is 56,000 acre-feet per year. Lake Columbia would be connected to Dallas' western system via a pipeline from the reservoir to the IPL pump station at Lake Palestine. Supplies would then be transported to the Lake Joe Pool area via a new pipeline parallel to the IPL.

Currently, the Lake Columbia project is subject to completion of the NEPA process and issuance of a 404 permit from the USACE. If Dallas were to participate in the Lake Columbia project, the current water right permit would be amended to add an interbasin transfer from the Neches to the Trinity basin.

Lake Columbia would provide a new water source near existing water resources for DWU. This makes it easier to operate and maintain as part of the overall DWU system. Dallas' share of the capital cost is estimated at $685 million. This strategy is considered part of an overall Neches Watershed strategy that looks to develop new supplies from the Neches River Basin. The Neches Watershed strategy also includes the Neches Run-of-River strategy. At this time, Lake Columbia is an alternative strategy for DWU and may be recommended for implementation after 2080. This strategy is also recommended for other users located in Region I.

FIGURE 5C.5 LAKE COLUMBIA



5C.1.6 Red River Off-Channel Reservoir

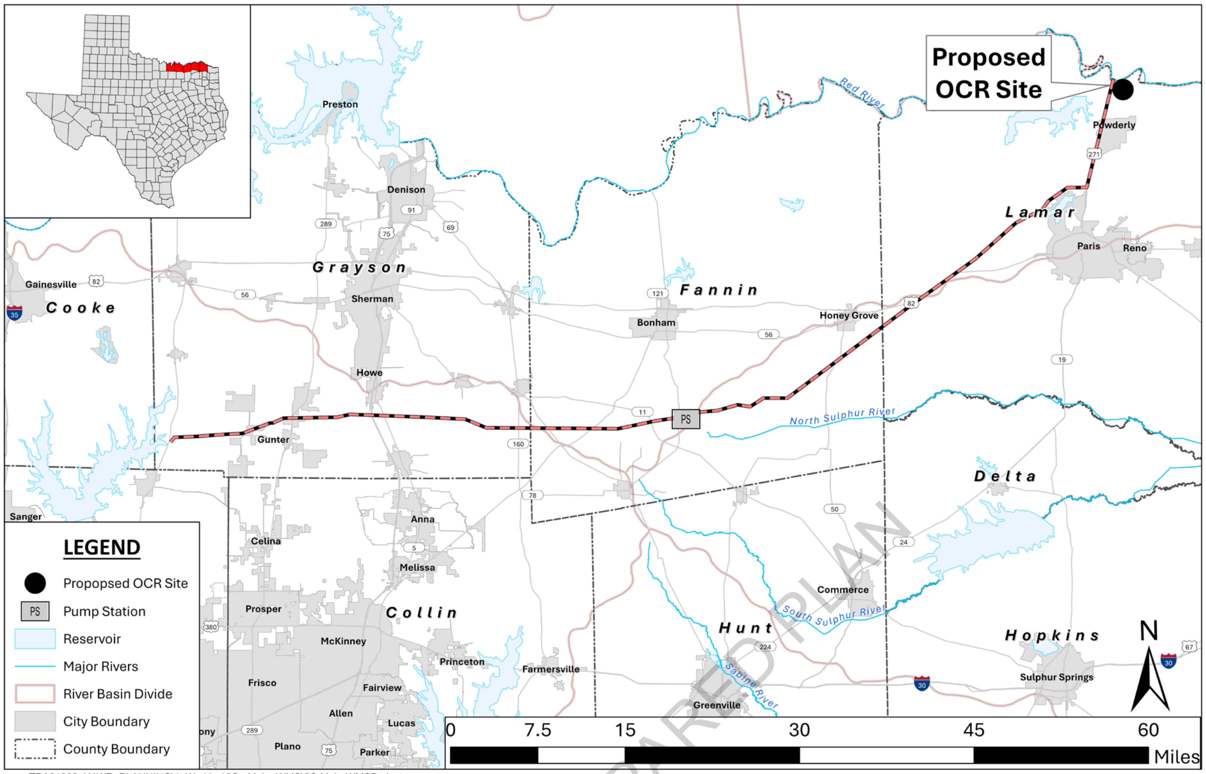
This strategy would develop new water supplies from the Red River, downstream of Lake Texoma. The project would divert a portion of Texas' share of the flow in the Red River for diversion and impoundment in a series of off-channel reservoirs (OCR). The water would then be transported to Lake Ray Roberts for subsequent diversion and use.

This project includes an intake and pump station on the Red River at Arthur City, Texas, immediately downstream of the Highway 271 Bridge. Diversions from the Red River would be pumped approximately 2 miles to three off-channel reservoirs in series. The first OCR would consist of a 2,500-acre-foot basin for initial sediment settling and removal. The next OCR in the series would have a capacity of 5,300 acre-feet and would provide additional sediment removal and water quality improvement. The third and final OCR would consist of a 32,000-acre-foot storage basin to allow for extended pumping when the flow in the Red River is extremely low or water quality is impaired. Water would be diverted from the third OCR by an intake and pump station that would transport supplies via a transmission pipeline to Lake Ray Roberts for subsequent blending and use by Dallas. The total area of the reservoirs is 803 acres with a total capacity of 39,800 acre-feet. The reliable supply from the reservoir would be 114,000 acre-feet per year. Capital costs for this project are $2.1 billion.

The Red River OCR project has the potential to provide DWU with significant new water supplies. Potential issues with this project include bank stability for the intake structure along the Red River, water quality, sediment control and invasive species. Other risks include permitting and potential future upstream diversions and impoundments. A significant portion of the available flow to the project originates in the Blue and Muddy Boggy River watershed in Oklahoma. If large reservoirs are constructed in these watersheds, the available flow could be reduced.

The Red River OCR project is an alternative strategy for DWU and UTRWD in the *Region C Regional Water Plan*.

FIGURE 5C.6 PROPOSED OCR SITE



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

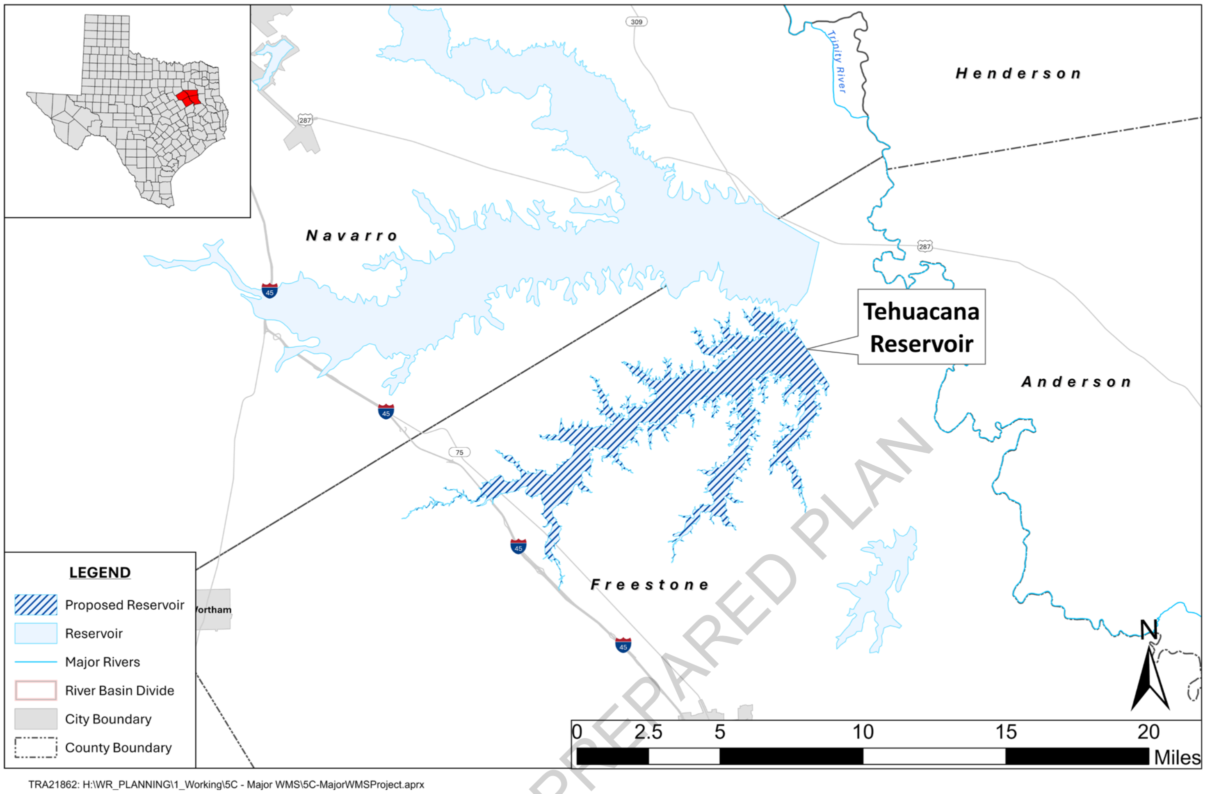
5C.1.7 Tehuacana Reservoir

Tehuacana Reservoir is a proposed reservoir on Tehuacana Creek within the Trinity River Basin in Freestone County in Region C. Tehuacana Creek is a tributary of the Trinity River and lies immediately south and adjacent to the existing Richland-Chambers Reservoir on Richland Creek. Tehuacana Reservoir would connect to Richland-Chambers Reservoir by a 9,000-foot channel and be operated as an integrated extension of that reservoir. The project would have a safe yield of 22,330 acre-feet per year. The reservoir would store approximately 338,000 acre-feet and inundate approximately 15,000 acres. Supplies derived from Tehuacana would be transported from the expanded reservoir utilizing existing and proposed TRWD transmission facilities.

Most of the reservoir site is classified as upland deciduous forest and grassland. Less than 3 percent is presently classified as marsh or open water. There are about 1,200 acres of bottomland hardwood forest that are concentrated near the dam site. Further, part of the Tehuacana Reservoir site is underlain by lignite.

Lake Tehuacana is a recommended strategy for TRWD and has an associated capital cost of $457 million. The reservoir, if constructed, would provide a new water source near existing water resources for TRWD.

FIGURE 5C.7 TEHUACANA RESERVOIR



5C.1.8 Wright Patman Reallocation

Wright Patman Lake is an existing reservoir on the Sulphur River, about 150 miles from the Metroplex. It is owned and operated by the USACE. The City of Texarkana has contracted with the Corps of Engineers for storage in the lake and holds a Texas water right to use up to 180,000 acre-feet per year from the lake. Presently, the available supply from Wright Patman Lake is limited due to the use of the USACE "Interim Rule" operating curve. The reallocation of flood storage along with changes in operation would result in the full water right of 180,000 acre-feet per year being available to Texarkana and 125,100 acre-feet per year available to Region C.

While this strategy is based on the reallocation of flood storage in Wright Patman Lake to elevation 235 feet MSL, water supplies from Wright Patman could also include purchases from Texarkana. The amount of water available from Texarkana would be negotiated between the Metroplex providers and the seller.

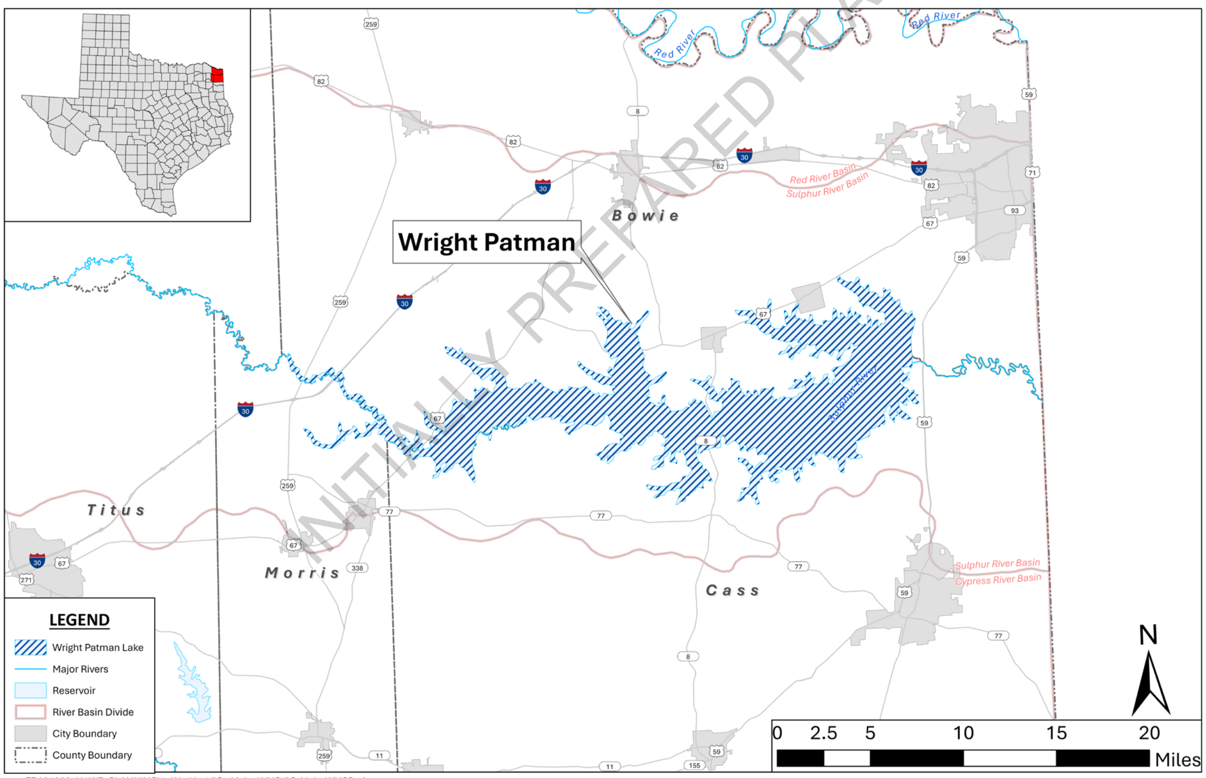
The Wright Patman Reallocation quantity is based on a study by the USACE in February 2019, where the USACE selected an increase of Lake Wright Patman water supply pool to an elevation of 235.0 as the Tentatively Selected Plan (TSP)[3]. This results in reallocating about 326,000 acre-feet of flood storage to water supply.

The higher conservation pool at Wright Patman Lake would inundate an additional 14,372 acres above the permitted conservation pool elevation (ultimate rule curve). This recommendation provides the desired quantity of water for Region C, while minimizing impacts to the White Oak Mitigation Area.

Reallocation at Wright Patman Lake on the scale envisioned in this strategy would require approval of the U.S. Congress. A new State water right and inter-basin transfer approval would be required from TCEQ.

This strategy provides a reliable new source of freshwater supplies for Region C water providers. It is located near other existing and proposed water sources that could potentially be operated as a system. Costs are higher than other WMSs due to the relatively small quantity of water and the distance to the westernmost providers. The challenges to this strategy are permitting and the uncertainty for Congressional approval of the reallocation. This is a recommended strategy for NTMWD and TRWD. It is an alternative strategy for DWU, UTRWD, and Irving.

FIGURE 5C.8 PROPOSED WRIGHT PATMAN REALLOCATION



5C.1.9 Reallocation of Storage in Lake Texoma

Lake Texoma is an existing Corps of Engineers reservoir on the Red River on the border between Texas and Oklahoma. The reservoir is about 50 miles from the Metroplex. Under the terms of the Red River Compact, the yield of Lake Texoma is divided equally between Texas and Oklahoma. Currently all the available water supply storage for Texas is contracted to North Texas providers, and there is little to no available water from Lake Texoma for additional supplies. The only options for new supplies from Lake Texoma are through sales from Oklahoma or reallocation of either hydropower or flood storage to water supply. Sales from Oklahoma are discussed in **Section 5C.2.8**.

Reallocation of storage less than 50,000 acre-feet does not require Congressional approval but does require approval from the USACE. The GTUA intends to seek reallocation of storage in Lake Texoma of 50,000 acre-feet with half of the storage available to Texas. Based on water supply modeling the 25,000 acre-feet of storage results in a reliable yield of about 28,000 acre-feet per year.

This supply would be contracted to GTUA and used as part of the GTUA Regional Water System (Phase 2). A new State water right and inter-basin transfer approval would be required from TCEQ.

This strategy provides a reliable new source of supplies for Region C water users. GTUA has existing water supplies from Lake Texoma and the additional supplies would provide the needed water to meet demands in its service area. The challenge to this strategy is the uncertainty for USACE approval of the reallocation. This is a recommended strategy for GTUA.

5C.1.10 Sabine River Off-Channel Reservoir

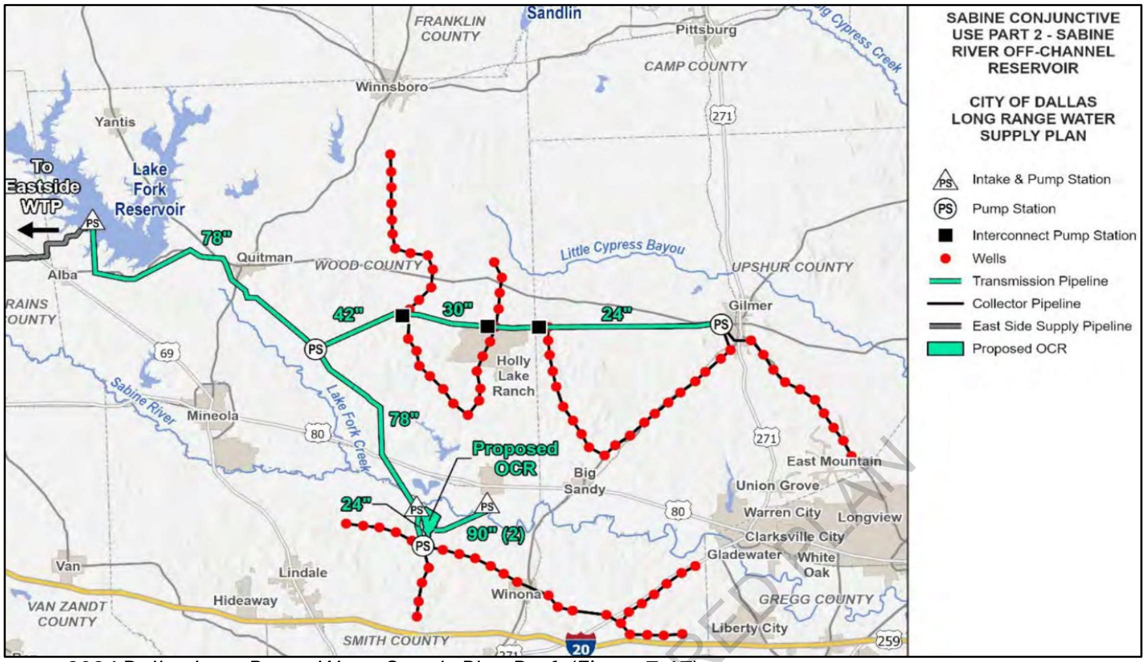
The Sabine Off-Channel Reservoir (OCR) strategy is the Phase 2 component of DWU's Sabine River Basin Conjunctive Use strategy. Phase 1 of this strategy is the development of groundwater from the Carrizo-Wilcox Aquifer, which is discussed in **Section 5C.3.2**. The OCR stores streamflow diverted from the Sabine River using an intake, pump station, and short-distance transmission pipelines. Water is stored in the OCR and is diverted to the Lake Fork pump station. The primary source of water in the OCR is surface water. Groundwater supplies from the Carrizo-Wilcox Groundwater project are used to back up the surface water supplies when surface water becomes limited.

The ability to combine surface water and groundwater sources will provide some relief to the groundwater source, which will be beneficial to the management of the aquifer system. The stand-alone evaluation of the OCR shows the site has a surface area of 799 acres and could store 78,036 acre-feet per year.

The conjunctive use system provides a firm yield of 93 MGD (104,200 acre-feet per year). If the OCR component and groundwater component are operated independently, they have a combined yield of 87 MGD (97,200 acre-feet per year) with 60 MGD from the OCR and 27 MGD from groundwater. By operating the two strategies as a system, the combined yield increases by about 6 MGD (7,000 acre-feet per year) or about 7 percent. This operating plan uses groundwater to help meet demands during drought periods and minimizes the use of groundwater when surface water is plentiful.

The OCR site in Smith County was selected because of its proximity to the groundwater well fields. Supplies from the OCR and well fields are both delivered to the Lake Fork pump station for subsequent delivery to DWU's Eastside WTP via the Eastside pipeline. This second phase of the Sabine Conjunctive Use strategy is a recommended strategy for DWU'

FIGURE 5C.9 SABINE CONJUCTIVE USE PART 2



Source: 2024 Dallas Long Range Water Supply Plan Draft (Figure 7-17).

5C.2 Connection of Existing Supplies

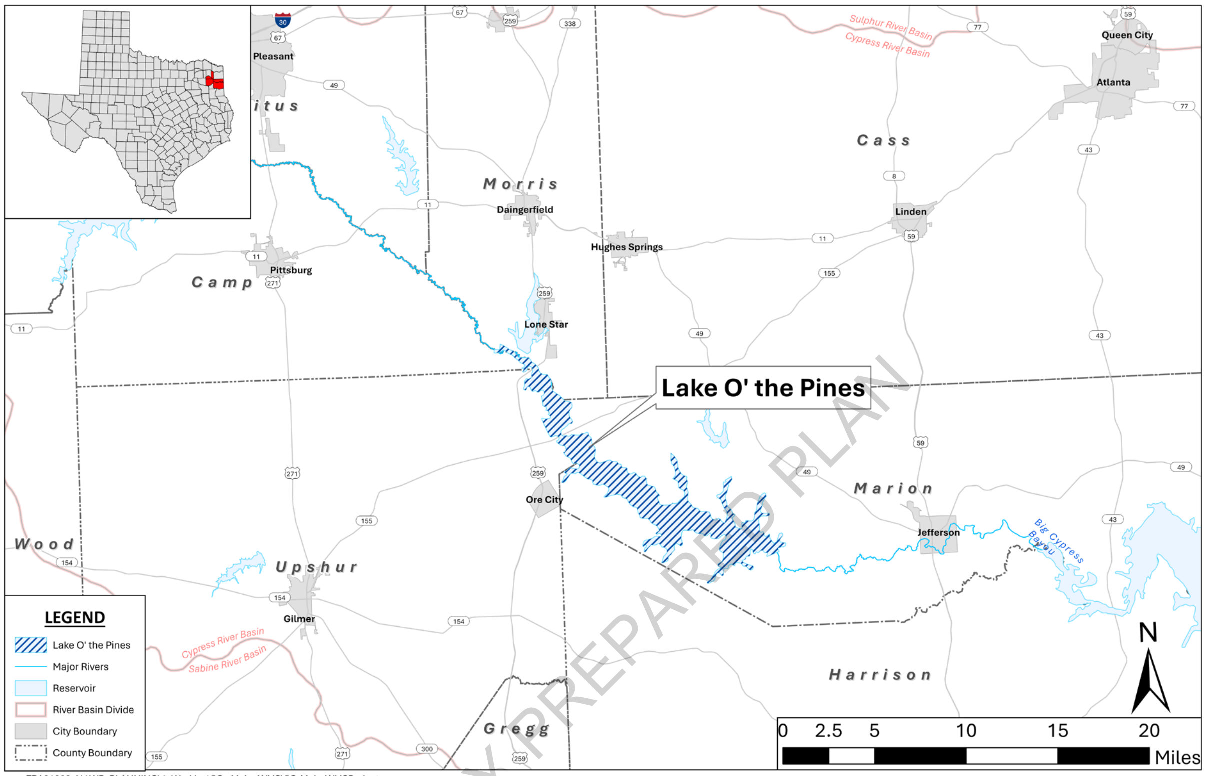
There are several existing water sources in Region C and surrounding areas that can potentially provide water supplies to Region C. Some of these sources have been developed by or have existing contracts with Region C providers and simply need infrastructure to move the water to these providers (such as Lake Palestine). Others require new contracts with the owner of the water source. Connection of existing supplies is an important part of the Region C water supply plan. There are nine major potentially feasible strategies that consider connections to existing supplies. Some of these strategies would be developed by a single water provider, while others would be developed jointly.

5C.2.1 Cypress Basin Supplies (Lake O' the Pines)

Lake O' the Pines is an existing Corps of Engineers reservoir, about 120 miles from the Metroplex, with Texas water rights held by the Northeast Texas Municipal Water District (NETMWD). The lake is on Cypress Creek in the Cypress Basin in Senate Bill One water planning Region D, the North East Texas Region. Some Metroplex water suppliers have explored the possibility of purchasing supplies in excess of local needs from the Cypress Basin for use in the Metroplex. Based on allocated water supplies and demands, the NETMWD has surplus supplies of about 40,000 acre-feet per year. In addition, the manufacturing demands in Morris County have significantly decreased due to the closing of some facilities. This provides an additional 32,000 acre-feet per year of supplies that may be available for sale to Metroplex providers. For planning purposes, the strategy is evaluated for 75,000 acre-feet per year and is recommended for NTMWD.

The water from Lake O' the Pines would be transported approximately 97 miles to the NTMWD Tawakoni WTP or a new southeast WTP. The capital cost for this strategy is $1.35 billion, with a unit cost of $4.05 per 1000 gallons during amortization and $1.07 after amortization.

FIGURE 5C.10 LAKE O' THE PINES



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

5C.2.2 GTUA Regional System

GTUA holds existing water rights in Lake Texoma. All of these rights are contracted to users in northern Collin, Cooke, northern Denton and Grayson counties, but most of these entities currently do not have access to this resource. Many rely on groundwater or other water sources. The cities of Sherman and Denison currently utilize some of their water rights from Lake Texoma and plan to fully develop the remaining supplies. These strategies are developed separately from the GTUA Regional System. The other entities either do not need the water at this time or plan to utilize their rights through a regional water provider, such as GTUA. In addition, Celina and Mustang SUD are actively looking for additional water supplies, which could be provided through this regional system.

This strategy assumes GTUA will develop a regional water treatment plant and distribution system to deliver treated water to eight customers in Grayson and Denton counties. The water source for the regional system will consist of existing water rights in Lake Texoma, brackish groundwater, and water from Lake Texoma from reallocation. Due to the higher level of TDS of these supplies, advanced treatment is necessary to achieve drinking water level standards.

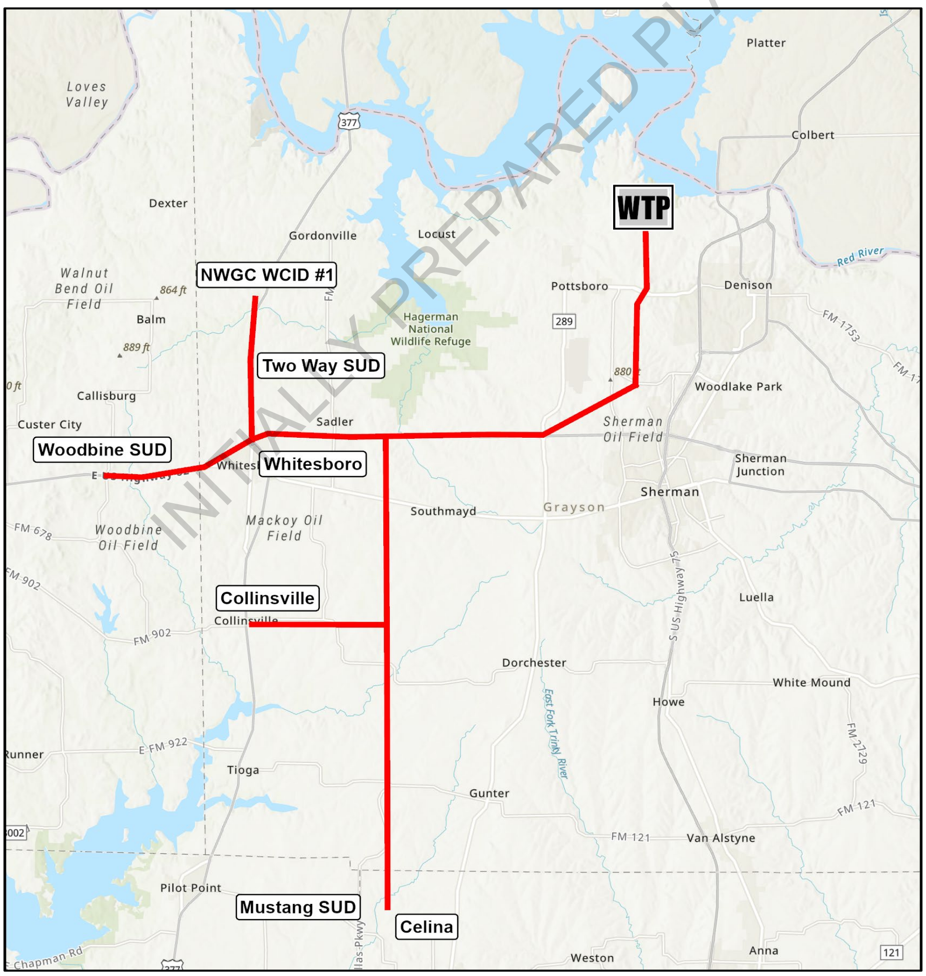
This regional system will be developed in two phases, with Phase 1 utilizing the current water rights of seven entities (8,300) acre-feet per year) and brackish groundwater in Grayson County (8,350).

The Phase 1 transmission system will deliver water to all eight participants. The total treated water supply for Phase 1 is 14,150 acre-feet per year.

Phase 2 would utilize water made available to Texas through reallocation of storage in Lake Texoma. It is assumed that GTUA would acquire the 25,000 acre-feet of storage allocated to Texas after reallocation (see **Section 5C.1.9**), which provides approximately 28,000 acre-feet per year of supply. The Phase 2 transmission system would parallel the pipeline to Celina and Mustang SUD only. The total amount of water available from both phases is 37,950 acre-feet per year after treatment losses (15 percent).

For siting of physical transmission infrastructure, delivery points are located at existing water system infrastructure where possible and transmission pipelines generally follow existing highways or county roads to minimize right-of-way impacts. This strategy includes construction of a new intake on Lake Texoma, new desalination water treatment plant, located near Lake Texoma, pipeline to transport the brine from the WTP, and the treated water transmission system.

FIGURE 5C.11 GTUA REGIONAL SYSTEM



This strategy provides a reliable source of additional supplies from Lake Texoma with limited impacts. Based on review of the hydrologic formation for brackish groundwater it is assumed that the quantity for this strategy is available. Additional studies would be needed to confirm the well capacities and water quality of this source. This strategy will enable several of the participating entities to begin using water that has been contracted. However, this strategy will be more expensive than current supplies. The total project capital cost is $1.6 billion. Unit costs of treated water are $13.50 during debt service and $6.46 after debt service. The strategy is costly mainly because of the advanced treatment required and the length of transmission pipeline required to connect the treated supplies to the end-users. Due to the transmission distance and relatively small quantities of water for each entity, this strategy would be best developed as a regional concept. Implementing the regional system requires commitment from the participants and a sponsor for the operation, maintenance, and administration of the system. For purposes of this study, it is assumed that GTUA will be the sponsor, and this is a recommended strategy for GTUA.

5C.2.3 Parker County Regional System

The County Commissioners in Parker County are currently seeking to form a regional water district to provide water to the fast-growing rural areas in Parker County. Parker County is split between the Trinity River Basin and the Brazos River Basin, with the Trinity River Basin to the east and the Brazos Basin in the western part of the county. This strategy has two distinct water systems, with one in the Trinity River Basin (east system) and the other in the Brazos River Basin (west system). Water to the Trinity River Basin portion of the county would be supplied through TRWD, while water to the Brazos River Basin would be supplied through entities in the Brazos River Basin, such as Brazos River Authority (BRA) and/or Mineral Wells.

Once the district is formed, the phasing and details of the regional system will be developed. The eastern system assumes TRWD water would be diverted from the western portion of TRWD's system and transported to a new regional water treatment plant in northeast Parker County. This system would deliver water to County-Other in eastern Parker County. The western system would serve County-Other in the Brazos Basin, and possibly Parker County SUD and North Rural WSC. The source water from the Brazos River Basin is brackish and would require advanced treatment at a new desalination plant or expanded Parker County SUD treatment plant.

The total quantity for the Trinity Basin distribution system is 22,000 acre-feet per year. The supply for the Brazos Basin system is unknown because the water providers in the Brazos Basin have not committed to supplying water to Parker County. As a result of the uncertainty of the future source of water, the western system is conceived as a potential strategy for 6,200 acre-feet per year that could be developed if agreements can be reached with the water providers.

This strategy provides a reliable source of additional supplies to eastern Parker County with limited impacts. The new regional water district provides a mechanism to develop surface water to address the growing population in Parker County and reduce its reliance on groundwater. There is considerable uncertainty with the development of the western system because there are limited water supplies and no commitments to serving this area from other water providers.

The total project capital cost for the Trinity Basin system is estimated at $593 million with unit costs at $7.40/1000 gallons during debt service and $2.90/1000 gallons after debt service. Unit costs for the Brazos Basin are $17.93/1000 gallons during debt service and $9.37/1000 gallons after debt service. The high costs for the Brazos Basin system are associated with advanced treatment and smaller quantities of water.

The Trinity Basin system is a recommended strategy for Parker County-Other in the Trinity River Basin. The Brazos Basin system is an alternative strategy for Parker County-Other in the Brazos Basin.

5C.2.4 Wise County Regional System

Several entities in Wise County are currently seeking to form a regional water district that would initially serve southeastern Wise County and expand to other parts of the county. Some of these entities have current contracts with TRWD, which would be the primary source of water for the regional water district. The phasing and details of the regional system will be developed once the district is formed. The Region C Water Plan considers a conceptual distribution system. This system assumes water from TRWD would be obtained from the western part of TRWD's system and transported to a new regional water treatment plant in southeast Wise County. This initial phase of the regional system will deliver water to entities in southeastern Wise County, including the cities of Boyd, Rhome, Newark, and New Fairview and rural users in County-Other. A future western system could serve Bridgeport, Runaway Bay, Paradise and other rural customers. Walnut Creek SUD could be served by the Wise County regional water district or a potential future regional water district in Parker County. The 2026 Region C Plan shows Walnut Creek SUD receiving water directly from TRWD.

The total quantity of water from this strategy is approximately 27,500 acre-feet per year. The reliability of water from TRWD is good, as TRWD is planning to develop additional supplies to meet their needs.

This strategy provides a reliable source of additional supplies to eastern Wise County with limited impacts. The strategy addresses the growing population in Wise County and recognizes that continued groundwater development is unsustainable. Developing the regional system requires commitment from the participants and a sponsor for the operation, maintenance, and administration of the system. For purposes of this study, it is assumed that the new regional water district will fill that role.

The total capital cost for the Wise County treated water system is estimated at $681 million. Unit costs are $6.92/1000 gallons during debt service and $2.79/1000 gallons after debt service.

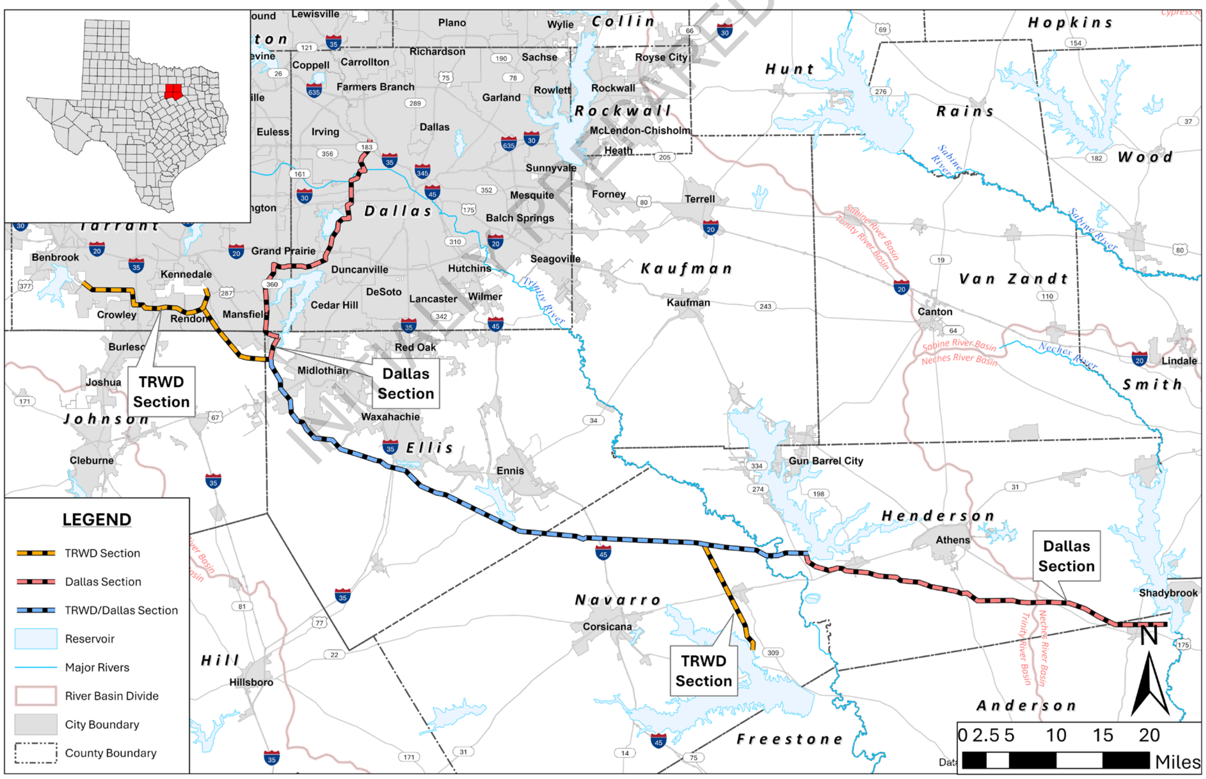
This strategy is recommended for the cities of Boyd, Rhome, Newark, and New Fairview and Wise County-Other.

5C.2.5 Integrated Pipeline (Tarrant Regional Water District and Dallas Water Utilities)

The Tarrant Regional Water District (TRWD) and Dallas Water Utilities (DWU) have partnered to construct and operate the Integrated Pipeline (IPL) Project. The IPL project is an integrated water delivery transmission system that extends from Lake Palestine to Benbrook Lake with connections to Cedar Creek and Richland-Chambers Reservoirs. The pipeline will have an ultimate capacity of approximately 350 MGD (200 MGD for TRWD and 150 MGD for DWU). Dallas's share of the project will deliver water from Lake Palestine and is discussed in **Section 5C.2.6**. TRWD's share will deliver surface water and reuse supplies from Cedar Creek and Richland-Chambers Reservoirs. A portion of the IPL has been constructed and is currently delivering raw water to TRWD customers. The current capacity for TRWD is 130 MGD, with buildout at 200 MGD by 2040. For DWU, the completion of the IPL portion from Lake Palestine and necessary pump station improvement to provide 150 MGD of capacity will be available before 2040. The infrastructure to transport DWU's supplies from Lake Palestine is currently under construction and expected to be completed by 2030. The Cedar Creek wetlands supply for TRWD has not yet been constructed although supplies from the wetlands will eventually be transported via the IPL as well.

The IPL provides the means to use existing water supplies that are currently not available to TRWD or DWU because of infrastructure limitations. The IPL also provides a means to share water resources between TRWD and DWU during emergencies or on an interim basis. The flexibility in operations provided by the IPL increases the resiliency of the water supplies. The IPL Project is partially constructed. This project is recommended by the Region C Regional Water Planning Group, and the capital cost for completion is approximately $1.5 billion. The IPL Project is sponsored by TRWD and DWU and will provide water to the customers of both providers.

FIGURE 5C.12 INTEGRATED PIPELINE (TRWD AND DWU)



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

While the original IPL will provide substantial capacity to transport supplies from TRWD's East Texas reservoirs and Lake Palestine to the Metroplex, by 2060 additional capacity may be needed to convey additional reuse and other new supplies (such as Lake Tehuacana and Carrizo-Wilcox groundwater). This additional transmission system is evaluated as a separate project and is not part of the IPL system.

5C.2.6 Lake Palestine

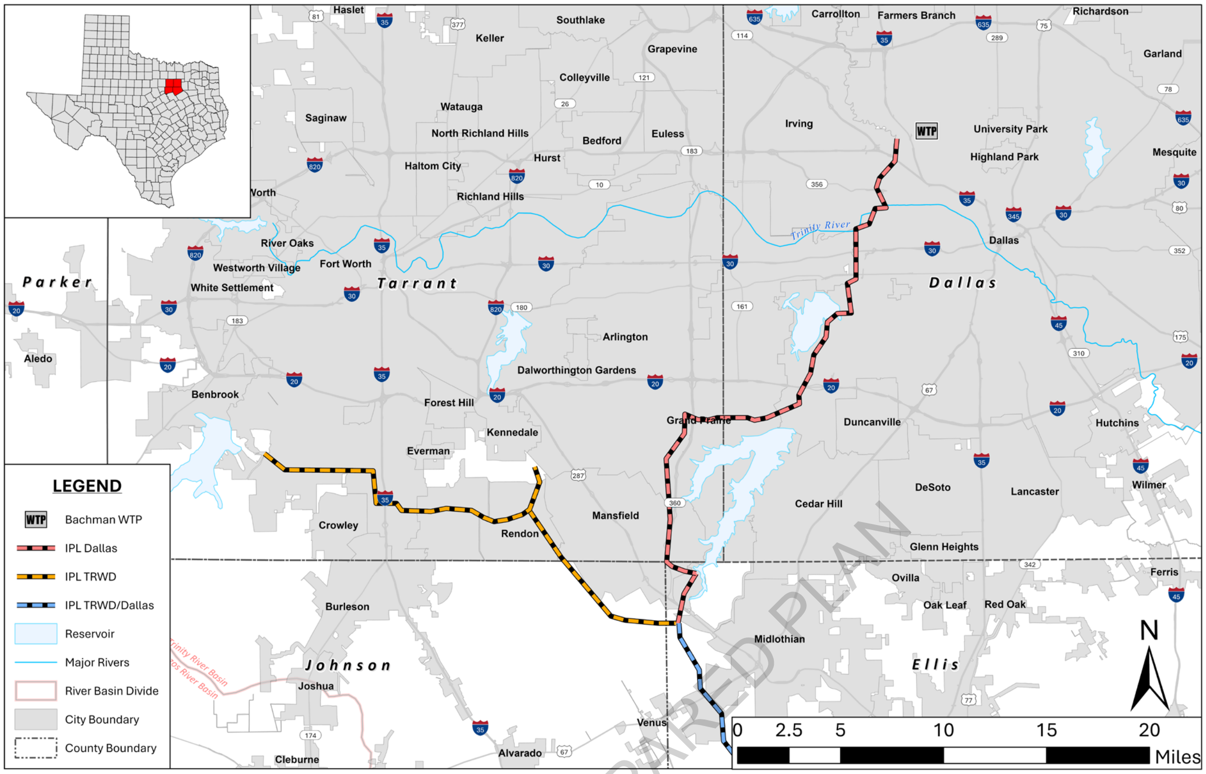
Lake Palestine is an existing reservoir located in the East Texas Region (Region I) on the Neches River. The lake is owned and operated by the Upper Neches River Municipal Water Authority (UNRMWA). The permitted diversion is 238,110 acre-feet per year. Dallas Water Utilities (DWU) has a contract with UNRMWA for 53.73% of the yield of the reservoir up to a maximum of 114,337 acre-feet per year (102 MGD). The Lake Palestine water right includes an interbasin transfer allowing the use of water from the lake in the Trinity River Basin.

To date, DWU has not used water from Lake Palestine because there is no infrastructure to transport the water to the Dallas area. DWU is working with TRWD to build the Integrated Pipeline (IPL), which would include a segment to move DWU's share of Lake Palestine to Dallas County. The infrastructure necessary to move the water from Lake Palestine to the existing IPL pump station at Cedar Creek Reservoir is under construction and expected to be completed by 2030. Expansions of the existing IPL to provide additional capacity to Joe Pool Lake is discussed in **Section 5C.2.5**. There will be a separate project to move the water from the IPL delivery point to the Bachman Water Treatment Plant. It is assumed that the water from the IPL will be delivered directly to the Bachman WTP by pipeline. However, alternative delivery points are being considered by DWU which could result in a change from this specific strategy.

Permits to use the water from Lake Palestine have already been obtained. Any permits associated with the transmission system to Joe Pool Lake are discussed under the IPL Project. Associated permits for the pipeline from the IPL delivery point to the Bachman WTP are discussed in the corresponding technical memorandum in **Appendix G**. The Lake Palestine strategy is sponsored by DWU and the strategy is recommended for DWU by the Region C Regional Water Planning Group.

Capital cost for the pipeline to the Bachman WTP is $587 million. The total capital cost for the IPL improvements is discussed in **Section 5C.2.5**.

FIGURE 5C.13 LAKE PALESTINE



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

5C.2.7 Lake Texoma

Lake Texoma is about 50 miles from the Metroplex and provides water to several North Texas providers. In Texas, the North Texas Municipal Water District (NTMWD), the Greater Texoma Utility Authority (GTUA), the City of Denison, and the Red River Authority (RRA) have contracts with the Corps of Engineers and Texas water rights allowing them to use water from Lake Texoma. Other users (including Sherman) have contracted with GTUA for Texoma water. GTUA and UTRWD have expressed interest in developing supplies from Lake Texoma through sales of existing contracted water or new water made available through reallocation. The City of Sherman is seeking a storage contract for the storage formerly contracted to Luminant. Luminant relinquished its storage contract after the power plant in Fannin County closed. The existing water rights holders intend to utilize more water from Texoma.

Water from Lake Texoma is brackish, which means that the use of Texoma water for municipal supply requires the water to be blended with a freshwater source or desalinated. Entities with other sources available for blending include NTMWD and Denison. Sherman currently desalinates its Texoma water by reverse osmosis. The amount of water available to the entities listed above, by new blending strategies, ranges from 25,000 to 95,368 acre-feet per year. For NTMWD, there are three potential sources of water for blending: Bois d'Arc Lake, Lake O' the Pines, and Marvin Nichols Reservoir. NTWMD already blends Texoma water with its current supplies (up to 68,500 acre-feet per year). NTMWD would blend additional Texoma water (111,700 acre-feet per year by 2080) with the three sources of water listed above. Including existing use, the total amount of

Texoma water for NTMWD would be 175,725 acre-feet per year in 2080. NTMWD would have 21,275 acre-feet per year of Texoma water available of its 197,000 acre-feet per year of water rights for future blending after 2080.

UTRWD has no water rights for water from Lake Texoma. The source would need to be acquired either through a sale from others or potential reallocation. If UTRWD secures Texoma water, the blending source for UTRWD could be any one of their existing and future fresh water supplies.

Desalination provides treated water, but it is a more expensive strategy and there are uncertainties in the long-term costs. There is some uncertainty regarding the ability to desalinate and dispose of large quantities of reject water. Lake Texoma desalination is discussed in **Section 5C.5.2**.

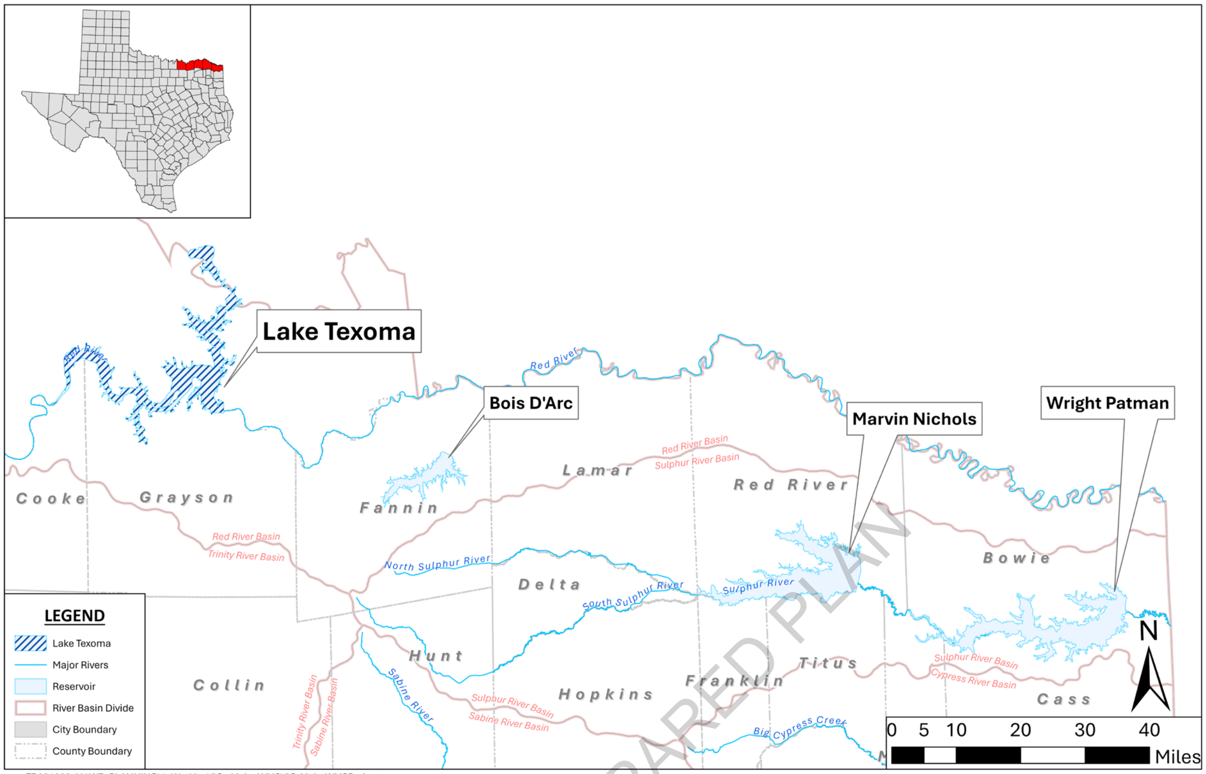
Lake Texoma supplies require a state water right and a contract with United States Army Corps of Engineers (USACE). For use in areas outside of the Red River Basin, it will also require an interbasin transfer. Existing Texoma water rights holders already have these requirements in place. New Texoma supplies obtained through reallocation and/or acquisition of relinquished storage will need to acquire the necessary contracts and water rights. Reallocation of Texoma water is discussed in **Section 5C.1.9**.

The State of Oklahoma does retain the right to a significant portion of unpermitted water that is allocated to municipal and industrial use. However, Oklahoma has a moratorium on exporting water. Development of this supply will require agreement between the water rights stakeholders in Texas, the state of Oklahoma and the USACE. Should agreements be reached, the water supplier would still need to acquire a storage contract with the USACE and a Texas water right. However, out-of-state water does not need an interbasin transfer right.

Lake Texoma is a recommended source of additional water supply by blending for the NTMWD (blending with Bois d'Arc Lake, Lake O' the Pines, and Marvin Nichols Reservoir. It is an alternative strategy by blending for UTRWD. It is a recommended strategy for GTUA, Sherman and Denison with desalination.

The total capital costs for blending depend on the quantity of water being blended and the location for blending. Costs for desalination are discussed in **Section 5C.5.2**.

FIGURE 5C.14 LAKE TEXOMA



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

5C.2.8 Out-of-State Water

Out-of-State water has gained interest in the Texas Legislature over the past decade with new legislation to make it easier to develop out-of-state water, such as not requiring interbasin transfers for out-of-state water. However, the availability of this water is still limited. Several wholesale water providers in the Metroplex have been pursuing the acquisition of water rights and/or the purchase of water from Oklahoma. At the present time, the Oklahoma Legislature has established a moratorium on the export of water from the state. Previously, the Tarrant Regional Water District (TRWD) pursued a case in Federal Court to determine whether this moratorium could be overturned, and the Supreme Court ruled in favor of Oklahoma. For the long term, Oklahoma remains a potential source of water supply for Region C. Since this strategy would not be implemented for several decades, the source of water is simply defined as Oklahoma water. For planning purposes, the strategy is evaluated for about 50,000 acre-feet per year.

Other potential sources of out-of-state water include sales from Arkansas and Louisiana. No North Texas water provider has actively pursued obtaining water from these states; however, should current legal impediments be resolved, some providers may be interested in developing out-of-state water. Out-of-state water could also be combined with other recommended strategies where appropriate, such as Wright Patman Reallocation. Water from Arkansas and Louisiana were considered by DWU in its Long-Range Water Supply Plan[4].

The public and political opposition to sales from Oklahoma limit development opportunities in the near future. Additional information on these challenges can be found in the corresponding technical memorandum in **Appendix G**. It is expected that this opposition will subside over time. Raw water from Oklahoma would have similar environmental impacts as the Red River OCR and other long transmission projects. Further study is needed on the potential for out-of-state water. However, if Texas secures water rights in adjoining states, water providers in Region C are interested in evaluating the potential use of this water. For this plan, water from Oklahoma is an alternative strategy for NTMWD, DWU, UTRWD and Irving. Raw water from Arkansas and/or Louisiana are alternative strategies for DWU.

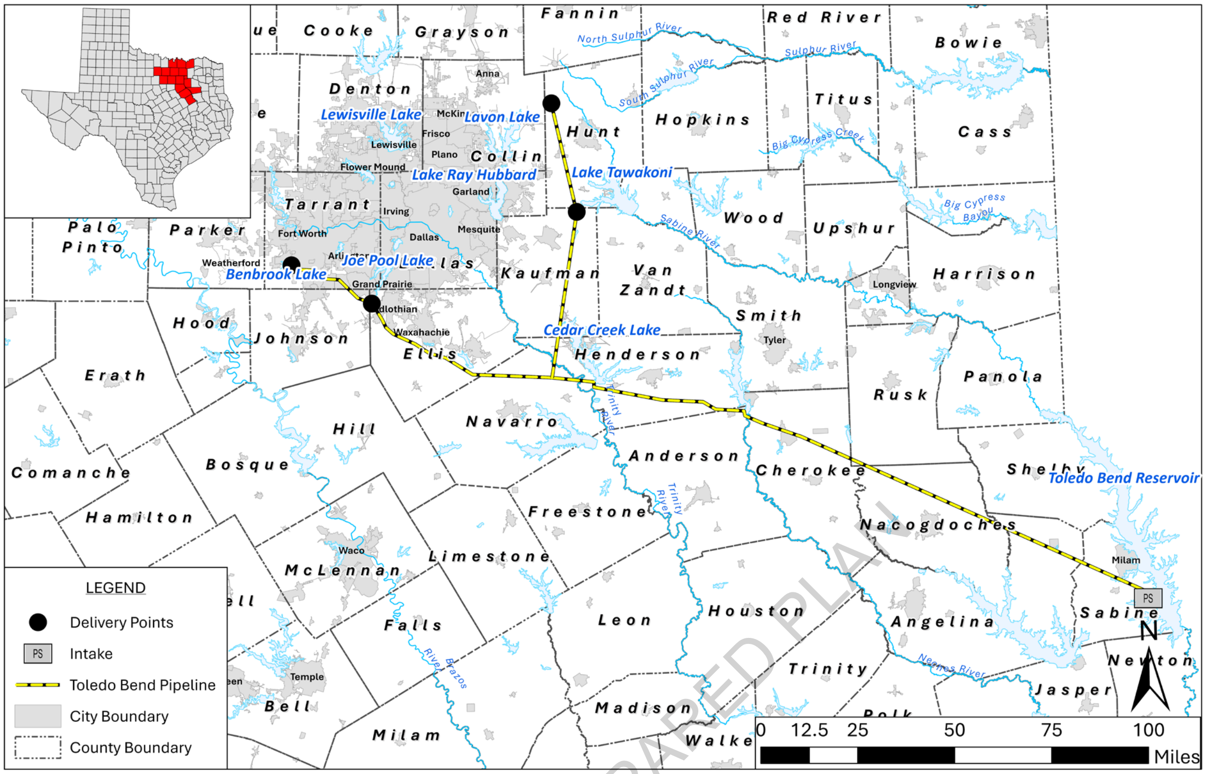
5C.2.9 Toledo Bend Reservoir

Toledo Bend Reservoir is an existing impoundment located in the Sabine River Basin on the border of Texas and Louisiana. It was built in the 1960s by the SRA and the Sabine River Authority of Louisiana. The yield of the project is split equally between the two states, and Texas' share of the yield is slightly over 1,000,000 acre-feet per year[(2)]. The SRA currently holds a Texas water right to divert 970,067 acre-feet per year from Toledo Bend for municipal, industrial, and irrigation purposes.

Several Region C Metroplex water suppliers have been investigating the possibility of developing substantial water supplies from Toledo Bend Reservoir, with up to 650,000 acre-feet per year delivered to Region C. Toledo Bend Reservoir is in Region I, the East Texas Region. The development of this supply will require an agreement among the SRA and Metroplex suppliers, an interbasin transfer permit from the Sabine River Basin to the Trinity River Basin, and possibly other basins, and development of water transmission facilities. Supply from Toledo Bend is identified as an alternative joint strategy for NTMWD, TRWD, DWU, and UTRWD. The strategy would be constructed in two phases. Phase 1 would supply 350,000 acre-feet per year and Phase 2 would provide the remaining 300,000 acre-feet per year. Phase 2 of this strategy would likely not occur until after the end of this planning cycle and is not included in this strategy evaluation.

Phase 1 would transport 350,000 acre-feet per year, with 100,000 acre-feet per year each to TRWD, DWU and NTMWD, and 50,000 acre-feet per year to UTRWD. This is a relatively expensive source of supply because Toledo Bend Reservoir is approximately 200 miles from Region C. Total capital costs are estimated at $7.7 billion. In addition to costs, the length of the pipelines increases concerns over line breakage or pump failure. This strategy does offer substantial water supply and environmental impacts would be limited since it is an existing source.

FIGURE 5C.15 TOLEDO BEND RESERVOIR



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

5C.3 New Groundwater

There are limited groundwater resources within Region C. Much of the groundwater has been developed, and the amount available for future development is approximately 55,000 acre-feet per year. About a third of this unallocated groundwater (17,800 acre-feet per year) is in Denton County. Some of this supply will be developed by smaller WUGs, but suppliers in this county have begun to move toward surface supplies as population has become denser. Another 22 percent of the unallocated groundwater (11,800 acre-feet per year) is in Cooke County. About 12 percent of the unallocated groundwater (6,700 acre-feet per year) is in Henderson County. The City of Athens plans to use over 2,000 acre-feet per year of this supply. The remaining unallocated groundwater supplies (18,700 acre-feet per year) are scattered through the remaining 13 counties of the region. Any major new groundwater development (over 50,000 acre-feet per year) is likely to occur outside of Region C.

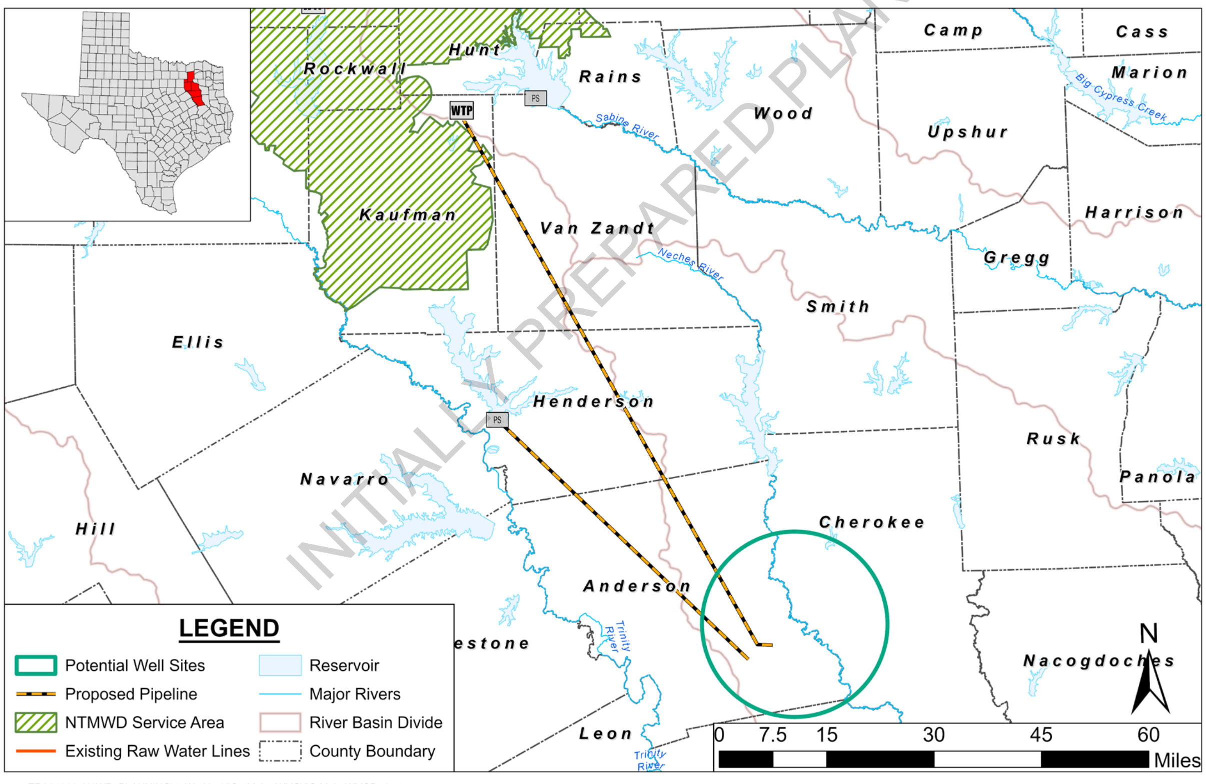
The Carrizo-Wilcox aquifer is a large aquifer system that spans from the East Texas-Louisiana border across northeast and central Texas to the border of Mexico. Three new groundwater development projects were identified in the Carrizo-Wilcox aquifer, two in east Texas and one partially in east Texas and partially in Region C.

5C.3.1 Carrizo-Wilcox Aquifer Groundwater in Anderson County

This strategy would develop a well field in southwestern Anderson County and pump the water approximately 90 miles to existing infrastructure near Lake Tawakoni for NTMWD or 53 miles to the Cedar Creek pump station for TRWD. Alternatively, the groundwater could be developed jointly with NTMWD and TRWD. The proposed groundwater supplies would provide up to 42,000 acre-feet per year of supply.

The additional infrastructure for this project includes a new well field, pump station and transmission system from the well field. For costing purposes, we assumed a total of 46 wells sites, supplying 56 MGD at peak day delivery for 50 years. The actual number of wells would be determined after further study. Each well site contains a well completed in the Carrizo Wilcox aquifer and one in the Queen City aquifer. From the well field, groundwater would be pumped to the respective delivery location.

FIGURE 5C.16 CARRIZO-WILCOX AQUIFER GROUNDWATER IN ANDERSON COUNTY



This strategy can provide additional supplies, but the reliability is uncertain. The strategy proposes to contract with holders of existing groundwater rights, which provides some level of certainty the water can be developed. However, changes in groundwater conservation district (GCD) operating rules and Desired Future Conditions (DFCs), as well as the Modeled Available Groundwater (MAG) may limit pumpage. This can affect the long-term reliability of this source.

There also may be political opposition to a large export of local groundwater. This could delay the project and increase costs. The total capital cost for delivery to the Lake Tawakoni water plant is approximately $1.25 billion. The capital cost to deliver to the Cedar Creek pump station is $823 million. The Carrizo-Wilcox Groundwater Project is an alternative strategy for NTMWD and TRWD.

5C.3.2 Carrizo-Wilcox Aquifer Groundwater in Wood, Van Zandt, Upshur, and Smith Counties

The Carrizo-Wilcox and Queen City aquifers cover a large portion of northeast Texas. This strategy evaluates the potential for groundwater development in Smith, Wood, Van Zandt and Upshur Counties in Region D for DWU in Region C. The groundwater development is Phase 1 of the Sabine Basin Conjunctive Use strategy. Phase 2 is the Sabin Basin OCR, which is discussed in **Section 5C.1.10**.

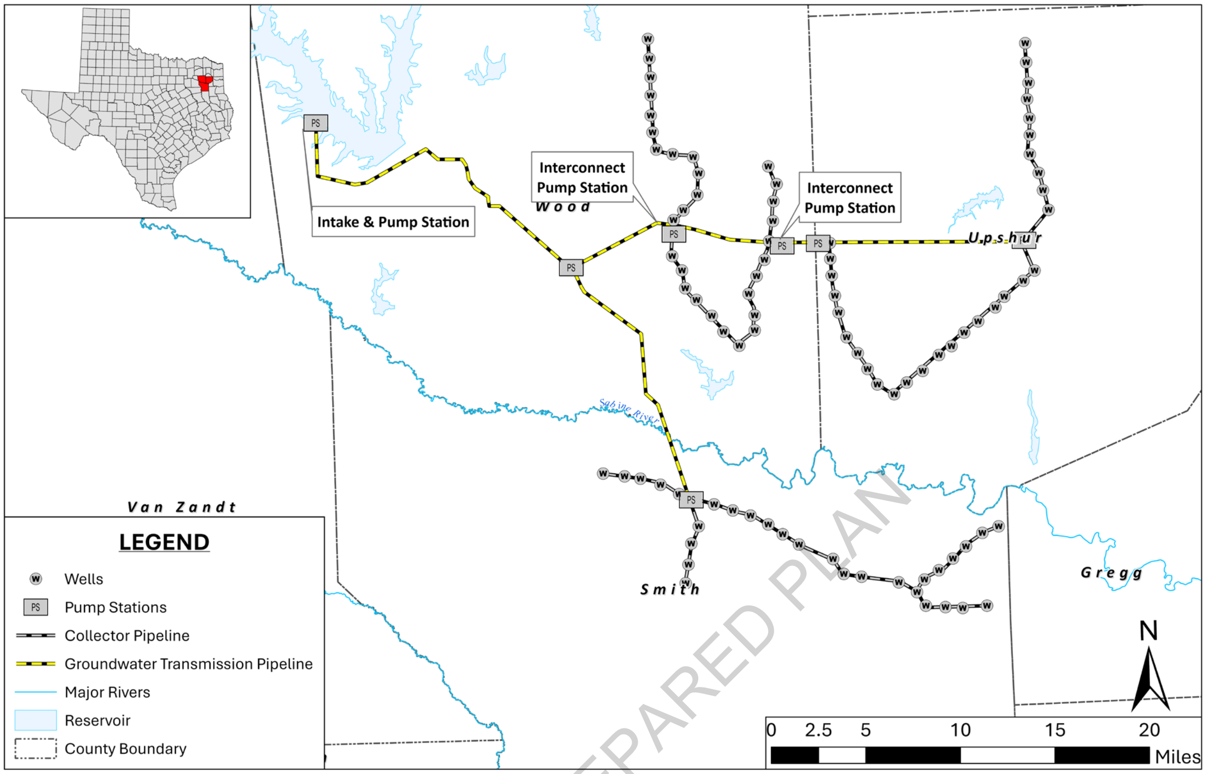
For the groundwater development, a series of well sites have been identified and are shown on **Figure 5C.7** in **Section 5C.1.10**. Where appropriate, the well sites would include two wells, one screened in the Carrizo-Wilcox and the other in the Queen City aquifers to provide the greatest amount of available supply. A series of wellfields and pump stations would be strategically located to transport the water to the Lake Fork intake and pump station. From this location, the groundwater would be transported to the DWU Eastside water treatment plant via existing infrastructure. After the OCR is constructed, some of the wells may discharge directly to the OCR and then transported to the Lake Fork pump station.

The quantity of water for this strategy is sized for 30,000 acre-feet per year (27 MGD). However, due to the MAG limitations developed by Region D, the amount of supply available is 25,000 acre-feet per year. With no GCDs in the targeted counties, there are no pumping regulations or limitations and DWU would likely be able to develop the full project amount. Securing sufficient groundwater rights would help protect the long-term productivity of the well fields, since groundwater is a property right and there could be competing development that may impact supplies. While there are few regulatory requirements with this strategy, there may be public opposition to a large groundwater project that exports the water outside of the county and region. This strategy could take 10 years to develop, considering acquisition of water rights, pilot tests, and final design and construction.

Groundwater provides a reliable water supply to DWU's portfolio of water resources and is considered Phase 1 of the Sabine River Basin Conjunctive Use strategy. This source is less susceptible to drought-related impacts, such as evaporation. The source of water is relatively near existing infrastructure and other DWU resources, and there are few development concerns. This groundwater component of DWU's Conjunctive Use strategy is a recommended strategy. The total capital cost is approximately $695 million.

Developing Carrizo-Wilcox supplies in this vicinity is also considered for UTRWD. The quantity evaluated is 10,000 acre-feet per year due to MAG limitations. If additional water is available, UTRWD would develop up to 45,000 acre-feet per year. This is an alternative strategy for UTRWD.

FIGURE 5C.17 CARRIZO-WILCOX AQUIFER GROUNDWATER IN WOOD, VAN ZANDT, UPSHUR, AND SMITH COUNTIES



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

5C.3.3 Carrizo-Wilcox Aquifer Groundwater – Tarrant Regional Water District

This strategy proposes to develop groundwater from the Carrizo-Wilcox and Queen City aquifers in Freestone and Anderson Counties. (Well fields in Navarro and Henderson Counties were initially considered but ruled out in TRWD's preliminary feasibility studies.) The groundwater would be transported approximately 28 miles to the Integrated Pipeline (IPL) near Cedar Creek Reservoir. The IPL would then be used to move the groundwater to TRWD's service area. This strategy assumes the groundwater is mixed directly in the IPL with surface water and/or reuse water.

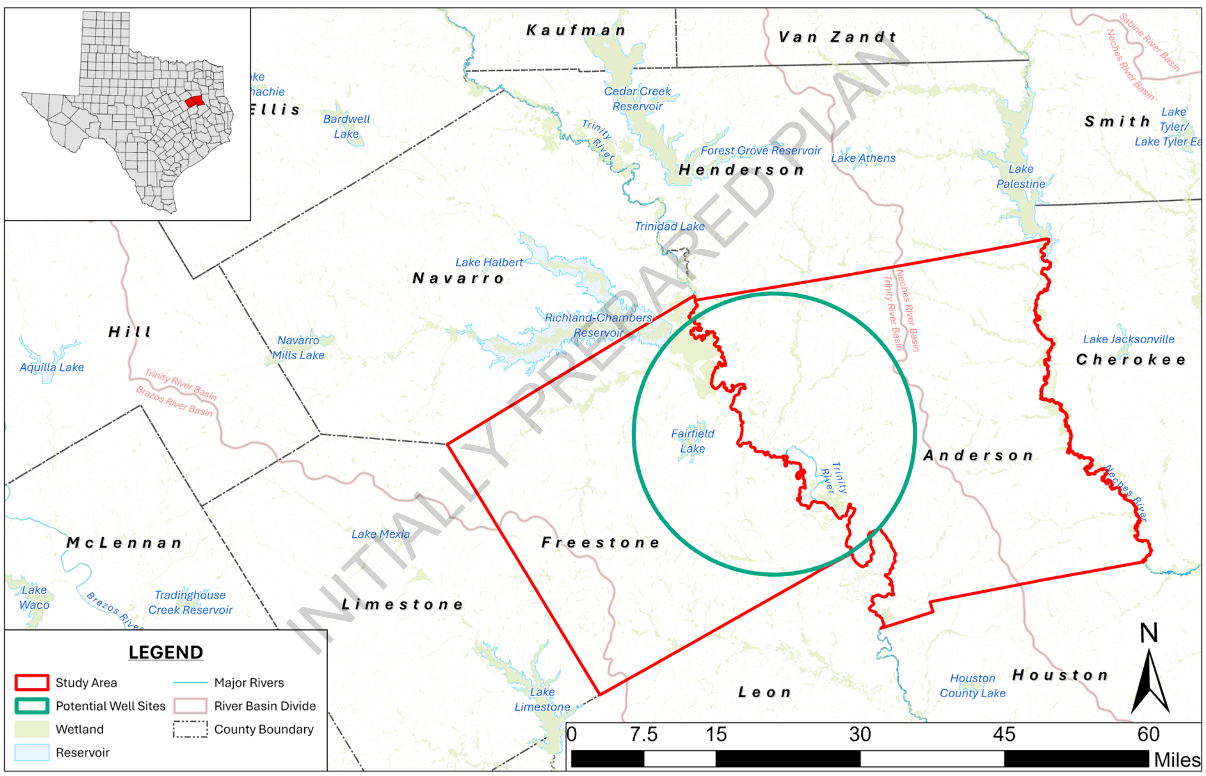
This groundwater supply would supplement TRWD's existing water sources and provide diversity to its existing portfolio. As a supplemental supply, TRWD may choose to operate the well system on a continual basis or seasonally to provide water during the higher demand periods. This strategy assumes the wells are operated continuously on an average annual basis. The Average Scenario assumes that up to 32,000 acre-feet per year could be developed from the targeted area, with the project operating year-round at a fairly steady level of production. However, due to MAG limitations, the supply available for regional water planning is limited to 26,800 acre-feet per year. Peak Scenario details can be found in the corresponding Technical Memorandum in **Appendix G**.

The infrastructure required for this strategy includes 39 wells (most likely distributed over multiple well fields), well field piping, ground storage, pump station, and 28 miles of 36- to 54-inch diameter transmission pipeline.

Development of a well field would require groundwater permits. The amount of water that could be permitted under the current Modeled Available Groundwater (MAG) value is near the proposed total quantity for this strategy. Additionally, large-scale groundwater export proposals could face public opposition, especially if perceived to affect neighboring wells. Further study is likely to address these potential concerns.

This strategy provides a new water source that provides a higher level of resistance to future droughts than current surface water sources. The proposed groundwater well fields are located near TRWD's existing water sources, and existing infrastructure can be used to transport the water to TRWD's service area. The quality of the water is generally good and likely would not require extensive treatment. The total capital cost is approximately $191 million. This strategy is recommended for TRWD by the Region C Regional Water Planning Group.

FIGURE 5C.18 CARRIZO-WILCOX AQUIFER GROUNDWATER – TRWD



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

5C.4 Reuse Strategies

Region C has a robust reuse program in place today that is expected to continue to grow with existing and future infrastructure. Many entities have permitted their return flows and developed strategies to either temporarily store and/or further treat this water, including wetlands and off-channel storage reservoirs. Reuse can have fewer environmental concerns in comparison to other strategies. Reuse water is generally a reliable supply. This section identifies additional sources of reuse and the infrastructure needed to develop these sources.

5C.4.1 Marty Leonard Wetlands (Cedar Creek Wetland Reuse) – TRWD

The Tarrant Regional Water District (TRWD) has water rights allowing the diversion of return flows of treated wastewater from the Trinity River. To utilize these flows, TRWD has developed a reuse project at Richland-Chambers Reservoir. Treated wastewater is discharged to the Trinity River and its tributaries, then flows downstream and is pumped from the Trinity River into the constructed George W. Shannon Wetlands. From there the treated water is pumped into Richland-Chambers Reservoir for transport to the TRWD service area. However, this project can only divert and treat a portion of the permitted reuse supplies. To fully utilize the available reuse, TRWD will develop a similar reuse project at Cedar Creek Reservoir, called the Marty Leonard Wetlands. The amount of permitted reuse supply at Cedar Creek Reservoir is 88,059 acre-feet per year.

This strategy addresses the development of a reuse project at Cedar Creek Reservoir, which includes a new diversion structure, constructed wetlands, and infrastructure necessary to discharge the treated return flows into Cedar Creek Reservoir. The wetlands will be constructed adjacent to the Trinity River, east of the City of Ennis. The reuse supply would then be diverted from the lake and transported by the Integrated Pipeline (see **Section 5C.2.5**).

Tarrant Regional Water District has already secured water right permits to develop the Marty Leonard Wetlands. A federal Section 404 permit would be needed to construct the intake pump station, pipelines, and wetlands because of possible impacts to waters of the U.S. TRWD acquired the property for the Marty Leonard Wetlands in 2014 and is in the process of acquiring the site and right-of-way for the pump station facilities and finished water pipeline. The Marty Leonard Wetlands is currently being designed. The total capital cost is approximately $673 million. The Marty Leonard Wetland Reuse Project is sponsored by TRWD, and the strategy is recommended for TRWD by the Region C Regional Water Planning Group. The water provided from the Marty Leonard Wetlands Reuse Project will be used by TRWD customers.

5C.4.2 Reuse from TRA Central WWTP – TRWD

The Tarrant Regional Water District (TRWD) entered into an agreement with the Trinity Regional Authority (TRA) to purchase a portion of the treated wastewater return flows from the TRA Central Regional Wastewater System (CRWS) Wastewater Treatment Plant (WWTP) for indirect reuse in the TRWD system. In combination with its existing reuse sources, this purchase of return flows will ensure that TRWD has enough available flow to meet its total permitted reuse supply of 188,524 acre-feet per year during this planning cycle.

Currently, TRWD does not have a direct way to access the purchased return flows from the TRA CWRS WWTP which are discharged into the Trinity River. Following completion of the Marty Leonard Wetlands (see Section 5C.4.1), these purchased return flows can be accessed via the intake on the Trinity River and treated in the Marty Leonard Wetlands. The water would then be pumped to Cedar Creek Reservoir and ultimately diverted from the reservoir and transported to TRWD's customers.

TRWD currently has certificates of adjudication for the reuse project that provide a total permitted reuse supply of 188,524 acre-feet per year. Amendments to the certificates of adjudication may be required to access the entire quantity of this supply following 2060. The infrastructure improvements for this project are included with the design and construction of the Marty Leonard

Wetlands, and there are no additional capital costs. This strategy is sponsored by both TRA and TRWD and is recommended for TRWD.

5C.4.3 Reuse from Mary's Creek WRF – TRWD

The City of Fort Worth is currently designing a new wastewater treatment plant, Mary's Creek Water Reclamation Facility (WRF), that is located in the western part of Fort Worth. The Mary's Creek WRF is expected to be online by 2028 and will discharge to Mary's Creek which flows into the Clear Fork of the Trinity River. Through a partnership with Fort Worth, TRWD is planning to divert available return flows from Mary's Creek to Eagle Mountain Lake via a pipeline system.

This strategy includes the construction of an intake pump station and 3.5 miles of pipeline. This strategy was assumed to connect to the existing TRWD conveyance system north of TRWD's Eagle Mountain Balancing Reservoir where it will tie into an existing pipeline and be delivered to Eagle Mountain Lake. Land acquisition for this strategy is not yet complete.

TRWD currently does not have water rights for the use of these return flows in Eagle Mountain Lake and would need an amendment to the existing Eagle Mountain Lake water right. A Section 404 permit may be required for the construction of this project depending on location of the intake pump station, route and construction methods of the pipeline. The total capital cost is approximately $69 million. This is a recommended strategy for TRWD.

5C.4.4 Indirect Reuse Implementation by DWU and NTMWD

Dallas has rights to the return flow for much of its water supply and plans to utilize those return flows through two projects on the Main Stem of the Trinity River. Those projects are the Main Stem Balancing Reservoir and the Elm Fork and Ray Hubbard Swaps with NTMWD. Both DWU and NTMWD are planning to maximize the opportunities for reuse through existing discharges and future wastewater treatment plants as their respective service areas grow. It is important to recognize that new source water is needed to develop reuse. Both DWU and NTMWD's water supply plans include the development of new supplies, which will become the source for reuse. To utilize these return flows, NTMWD is planning to expand its wetland treatment and secure the necessary permits for the return flows. More detail is provided on these two specific projects in **Section 5C.4.5** and **5C.4.6**. The Main Stem Balancing Reservoir is anticipated to be online in 2050 and provide as much as 114,342 acre-feet per year. The Expanded Wetland Reuse is anticipated to be online in 2030 and provide 33,809 acre-feet per year of supply.

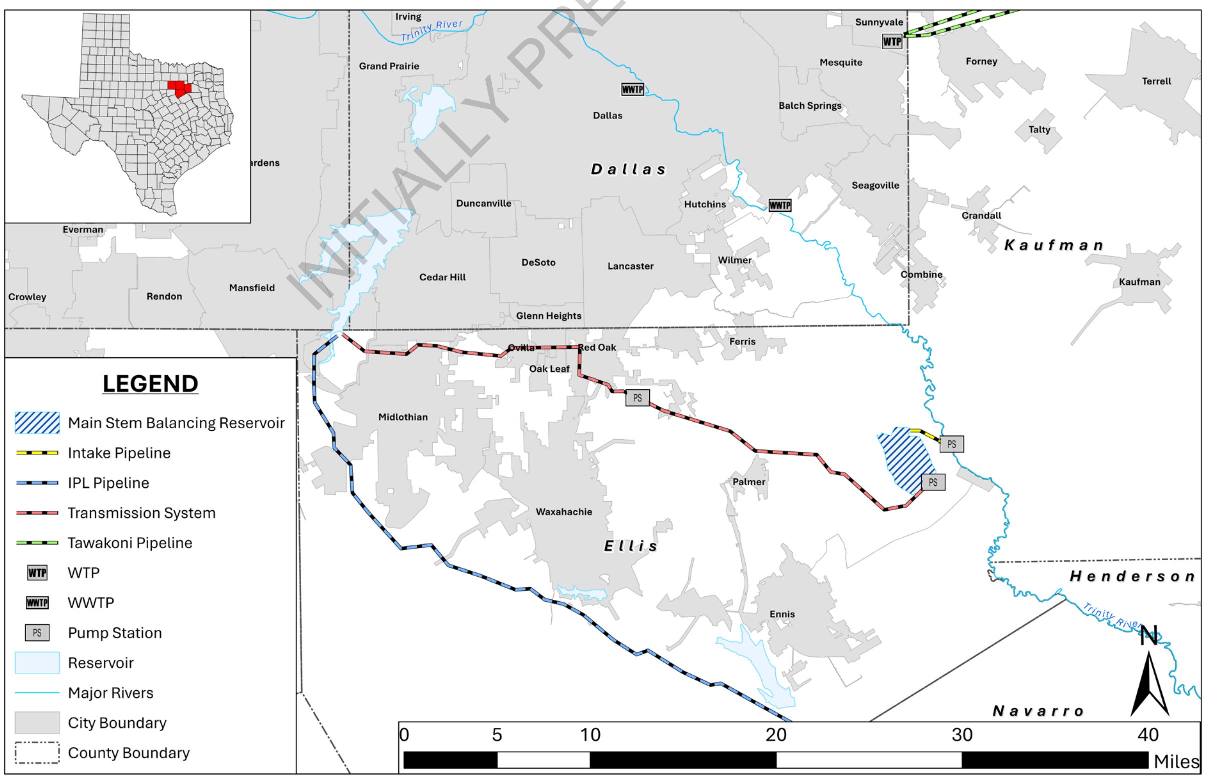
5C.4.5 Main Stem Balancing Reservoir

The project description for the Main Stem Balancing Reservoir is based on the information provided by the Dallas Long Range Plan[6]. Dallas would store return flows from the Central and Southside wastewater treatment plants in an off-channel reservoir, the Main Stem Balancing Reservoir. The Main Stem Balancing Reservoir would be located in Ellis County southeast of Bristol, Texas, and would divert water from the Trinity River. This project has a good amount of flexibility and different potential configurations require additional evaluation. For the configuration selected for Region C, reuse water is delivered from the balancing reservoir to Joe Pool Lake through a 36.5 mile transmission system.

The source of water for the Main Stem Balancing Reservoir is return flows from Dallas' Central and Southside wastewater treatment plants. However, total return flows available to be stored in the reservoir consider other commitments and an amendment to instream flow requirements. Other commitments are the proposed Elm Fork and Lake Ray Hubbard Swap, an agreement between Dallas Water Utilities (DWU) and the North Texas Municipal Water District (NTMWD). DWU will provide NTMWD with water from the Central and Southside WWTP in equal exchange for NTMWD's reuse flows into Lake Lewisville (above agreed upon historical amounts) and Lake Ray Hubbard. The return flows available for the Main Stem Balancing Reservoir, considering the agreement and amended instream flow requirements, total 102 MGD by 2060. More details can be found in the corresponding technical memorandum in **Appendix G**.

The Main Stem Balancing Reservoir would provide a means to store reuse water and manage water supplies across the DWU system. With the diversion pump station located downstream of the confluence of the Trinity River and East Fork of the Trinity River, water could be released from DWU's eastern supplies and moved to the western areas of its service area. Reuse water is a reliable supply, and this project does not require additional appropriation of state water. An off-channel reservoir is expected to have fewer environmental concerns than an on-channel reservoir. The Main Stem Balancing Reservoir strategy was evaluated for DWU and its customers. The total capital cost is approximately $1.8 billion. It is a recommended strategy in Dallas' Long-Range Water Supply Plan. This strategy is recommended for DWU by the Region C Regional Water Planning Group.

FIGURE 5C.19 MAIN STEM BALANCING RESERVOIR



TRA21862: H:\WR_PLANNING\1_Working\5C - Major WMS\5C-MajorWMSProject.aprx

5C.4.6 Expanded Wetland Reuse (NTMWD)

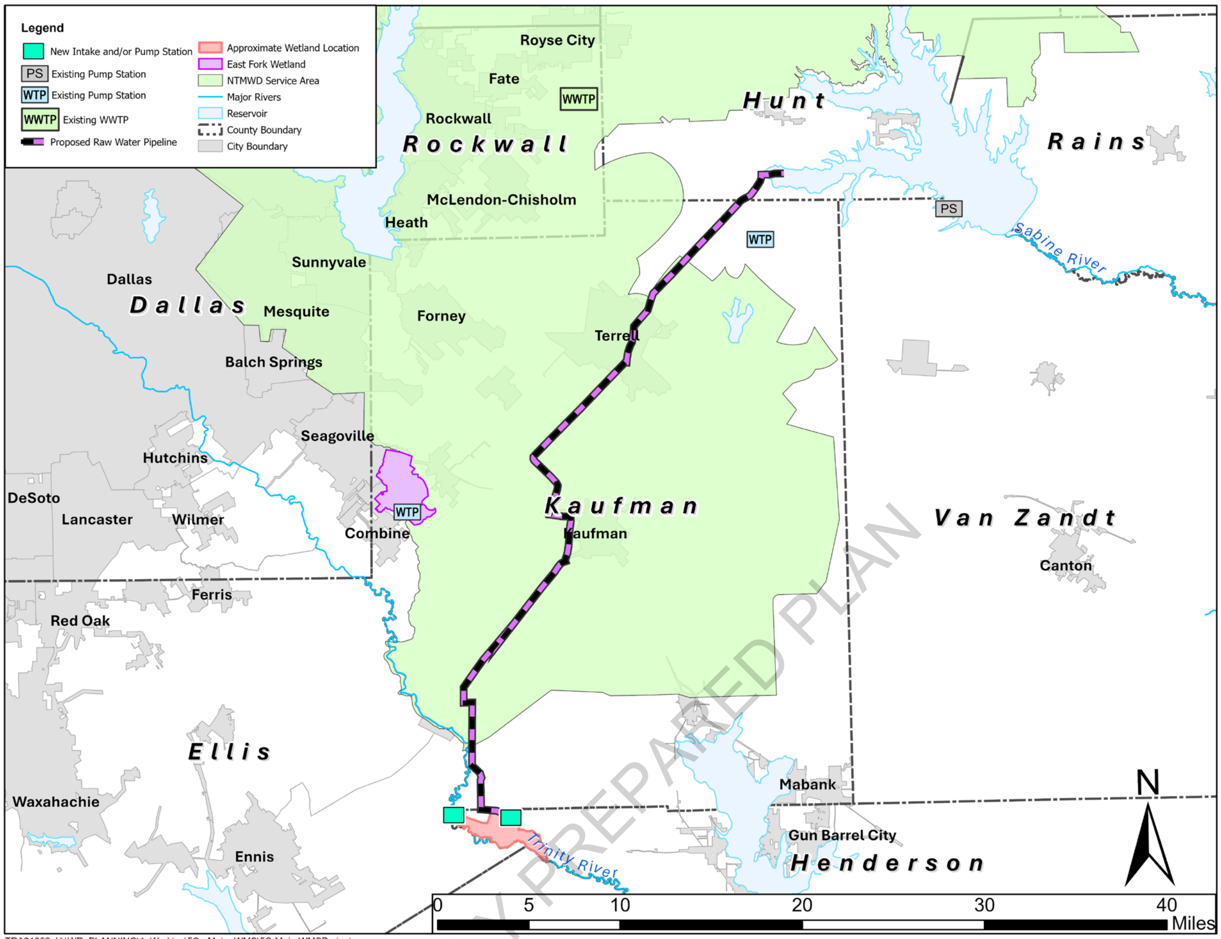
The proposed Expanded Wetland Reuse project will treat return flows from wastewater treatment plants owned and operated by NTMWD and the City of Dallas. The return flows will be pumped from a pump station on the Trinity River and delivered to a new constructed wetlands facility for nutrient removal before being blended with other raw water sources from the NTMWD system. The return flows would be diverted through the new wetlands located near the main stem of the Trinity River. The water would then flow through the wetlands and then conveyed through a new pump station and pipeline to Lake Tawakoni for blending with other sources.

The return flows for this project come from two sources. The first is through growth in return flows from plants owned and operated by NTMWD that discharge into the East Fork of the Trinity River. It is expected that the quantity of return flows available from this source will exceed the treatment capacity of the existing East Fork Wetlands by the year 2030. The second source of water for the project is return flows from Dallas' (DWU) Central and Southside wastewater treatment plants, provided through a swap agreement between DWU and NTMWD. This agreement provides NTMWD return flow from DWU's Central and Southside WWTP's in equal exchange for NTMWD's return flows into DWU's reservoirs. The total amount of water expected to be produced by the project is 33,809 acre-feet per year by 2080.

The reliability of the reuse supplies is high. There is the potential for the reuse supplies to develop at a faster or slower rate, depending on the volume of return flows. The water quality is expected to be good, as the wetlands will filter out excess nutrients and pollutants and trap natural sediment and organic matter, providing higher quality water than diverted from the Trinity River. The proposed project would require an amendment to the existing NTMWD reuse water rights for the additional return flows and the expanded wetlands.

The Expanded Wetland Reuse strategy provides NTMWD with water supply in an ecologically sustainable manner. The total capital costs are approximately $686 million. The Expanded Wetland Reuse strategy will provide water to NTMWD customers. This strategy is recommended for NTMWD by the Region C Regional Water Planning Group.

FIGURE 5C.20 EXPANDED WETLAND REUSE (NTMWD)



5C.4.7 Irving Reuse

Irving has contracted with TRA for 25 MGD of wastewater effluent from the TRA Central Regional Wastewater System (CRWS) that is discharged to the West Fork of the Trinity River. Currently a portion of this water is being used for irrigation. The remainder is intended for municipal use. There is no infrastructure in place to treat or deliver the reuse water. Irving has been in discussions with several other providers to utilize this reuse supply. There are currently four concepts:

- Divert contracted reuse at current diversion location and transport the reuse by pipeline to a discharge point on the Elm Fork of the Trinity River for subsequent diversion and treatment at the DWU Bachman water plant;
- Exchange the reuse supply with TRWD for additional supply to the TRA water plant that serves the Tarrant County Water Supply Project. Irving would need to construct a new pipeline to transport the treated supply to Irving;
- Participate in the DWU Main Stem Balancing Reservoir project and transport the water to DWU for treatment and delivery; and
- Develop a potable reuse project that would treat the reuse and deliver the water directly to Irving.

Of these concepts, only the direct potable reuse strategy is completely within Irving's control. The other concepts require cooperation with one or more other providers. Currently, the other providers have not committed to treating Irving's reuse water. Concerns include available capacity to treat and transport the water, as well as additional requirements and costs to treat the reuse water to drinking water standards. Pre-treatment of the effluent before discharging it to the Elm Fork may help alleviate the water quality concerns. The capital costs for each of these concepts range from approximately $160 million to $447 million, with the direct potable reuse project having the highest cost. Also, the available supply from the direct potable reuse project would be less due to treatment losses. The TRA reuse projects are alternative strategies for City of Irving.

5C.4.8 Lake Ralph Hall Indirect Reuse

Lake Ralph Hall is a new reservoir currently being constructed on the North fork of the Sulphur River in Fannin County. Construction of the reservoir began in June of 2021 with plans to deliver water by 2026. This project is sponsored by the Upper Trinity Regional Water District (UTRWD). UTRWD has a water right permit to impound and divert 45,000 acre-feet per year from Lake Ralph Hall. UTRWD will be seeking a state water right to reuse return flows up to 27,000 acre-feet per year from water originating from the project, providing an additional 20,007 acre-feet per year by 2080. The source of this reuse water will be various UTRWD WWTPs in the Lewisville Lake Basin, based on the amount of effluent that originates from Lake Ralph Hall. This reclaimed water would augment UTRWD's supply. There are no additional transmission facilities needed to utilize this Ralph Hall reuse.

UTRWD has been granted a state water right to impound, divert, and use water associated with the Lake Ralph Hall project. Additional authorizations will be needed for reuse of the water. UTRWD also has an interbasin transfer permit to move the water from the Sulphur River Basin to the Trinity River Basin. Lake Ralph Hall is expected to be constructed and supplying water by 2030. The development of the reuse supplies from Lake Ralph Hall source water will occur over time, beginning as early as 2030. No costs were associated with the project since UTRWD already has the infrastructure in place to divert return flows from Lewisville Lake. The sponsor of this strategy is UTRWD. This is a recommended strategy for UTRWD.

5C.5 Desalination

Region C has evaluated desalination as a potential strategy for potential future supplies, including the desalinization of sea water and brackish lake water. The desalinization of seawater from the Gulf of Mexico is evaluated in response to public comment during the Region C planning process. The desalinization of brackish water from Lake Texoma is evaluated as an alternative to blending Lake Texoma water with a freshwater source.

5C.5.1 Gulf of Mexico with Desalination

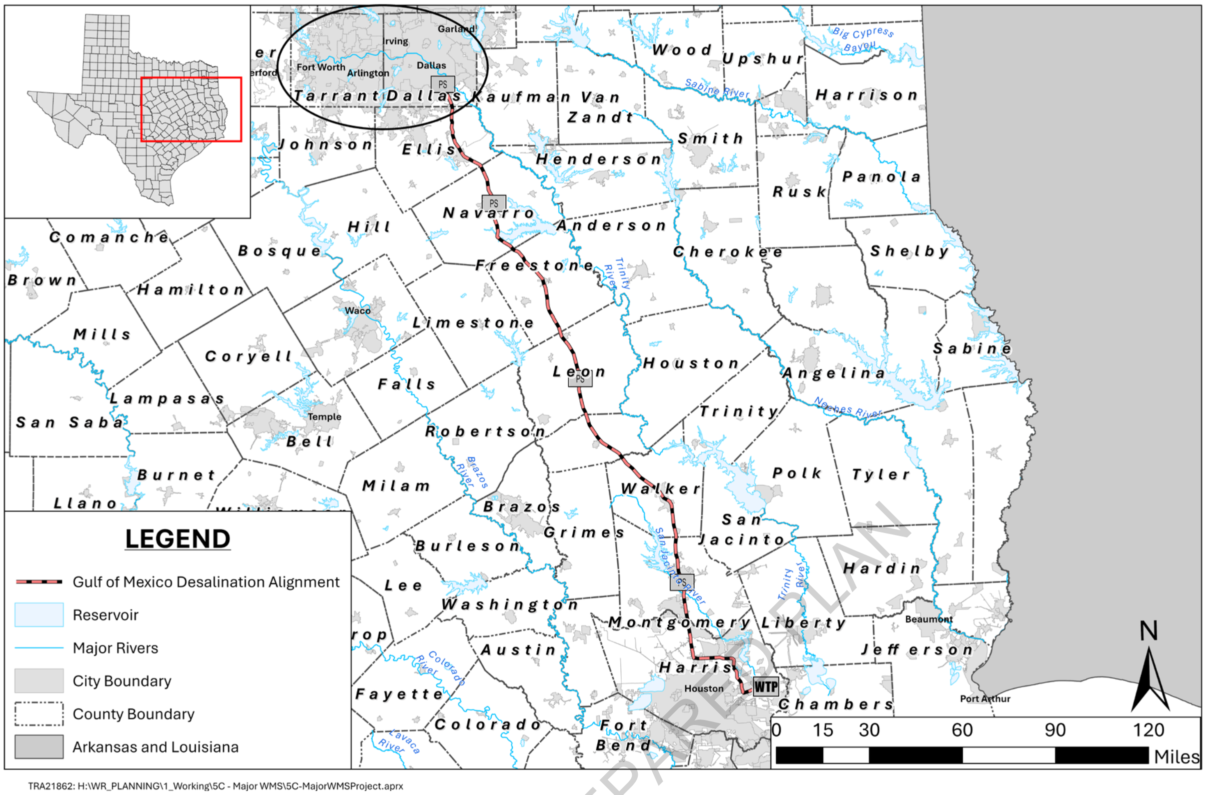
The cost of desalination has been decreasing in recent years, and some municipalities in Florida and California have been developing desalinated seawater as a supply source. The State of Texas has sponsored initial studies of potential seawater desalination projects[7], and this is seen as a potential future supply source for the state. Seawater desalination has been mentioned through public input during the Region C planning process, and it was evaluated in response to that input.

However, because of the cost of desalination and the distance to the Gulf of Mexico, seawater desalination is not currently a practical source of supply for Region C. This strategy assumes seawater would be taken from the Gulf of Mexico near Baytown, Texas, and desalinated within two miles of the diversion location. The water would be desalinated by reverse osmosis and the reject stream from the treatment process would be discharged back to the Gulf of Mexico. The treated water would be transported to the Metroplex generally following the I-45 corridor.

The supply from seawater desalination is essentially unlimited, but the cost is a great deal higher than the cost of other water management strategies for Region C. For this strategy evaluation, it is assumed that 200,000 acre-feet per year would be delivered to the Metroplex via one 132-inch pipeline (could alternatively use two parallel pipelines). Since this water would require desalination, the amount of source water would need to be 400,000 acre-feet per year and 200,000 acre-feet per year would be discharged as waste. (It is assumed that treatment losses for desalination of seawater are 50 percent.) The total capital cost is approximately $15 billion, with a unit cost of approximately $21/1000 gallons.

The major challenges for this strategy are the technical developments for a desalination project of this scale. Maintaining and operating a remote desalination water treatment plant and a 300-mile transmission system is costly and difficult for the water providers. Additionally, there are mixed views on seawater desalination and the project could face public opposition. Developing water from the Gulf of Mexico with desalination is not a recommended or alternative strategy for any water supplier in Region C.

FIGURE 5C.21 GULF OF MEXICO DESALINATION ALIGNMENT



5C.5.2 Lake Texoma with Desalination

As previously discussed, Lake Texoma is an existing Corps of Engineers reservoir on the Red River on the border between Texas and Oklahoma. In Texas, the North Texas Municipal Water District (NTMWD), the Greater Texoma Utility Authority (GTUA), the City of Denison, and the Red River Authority (RRA) have contracts with the Corps of Engineers and Texas water rights allowing them to use water from Lake Texoma. Other users, such as Sherman, have contracts with GTUA for Texoma water. DWU has expressed interest in obtaining water from Lake Texoma from a possible reallocation of storage.

Water from Lake Texoma is brackish, which means that the use of Texoma water requires blending with a freshwater source or desalinated for municipal use. This section discusses the strategies considered with desalination for NTMWD, GTUA, Sherman and Denison. The amount of treated water available to these entities, by desalination, ranges from 8,000 to 34,000 acre-feet per year. Desalination of Texoma water was also considered for DWU, which would provide up to 146,000 acre-feet per year. For desalination strategies, a portion of the Texoma source water would be discharged as waste. Loss amounts from the desalination process could range from 15 to 25 percent, depending on the quality of the incoming water. For this analysis, the loss from the treatment process is assumed to be 15 percent.

Desalination provides treated water, but it is a more expensive strategy, and there are uncertainties in the long-term costs. There is some uncertainty regarding the ability to desalinate and dispose of the large quantities of reject water. Lake Texoma is a recommended source of additional water supply by desalination for the GTUA and Denison. It is an alternative strategy for NTMWD and DWU. The total capital cost by user ranges from approximately $0.3 billion to $1.5 billion for the smaller desalination strategies. Capital cost for the larger desalination project for DWU is over $3.8 billion.

5C.6 Aquifer Storage and Recovery

Aquifer Storage and Recovery (ASR) is a water management solution that allows for storing surplus water in local aquifers during periods of high or surplus surface flows and withdrawing the stored water later during periods of drought or peak demands. It also can be used to temporarily store treated brackish groundwater or treated wastewater for use during high demand periods. ASR can provide a cost-effective and reliable alternative to the construction of above-ground storage reservoirs; however, identifying and securing suitable aquifer formations for storage and the geochemical evaluation of the mixed waters can be challenging. ASR in Texas is currently being studied to assess if it is a reliable and cost-effective technology that should be considered as part of a diversified portfolio of water supply options.

5C.6.1 Large-Scale Aquifer Storage and Recovery (ASR)

In Region C, the most likely application of ASR would be to store surplus surface water when lakes are full and spilling, store reuse water, increase operational flexibility of multiple sources, and serve as a short-term source to meet peak demands. ASR could reduce evaporative losses, store water that would have spilled downstream, maximize use of water rights, and possibly delay infrastructure improvements that would be needed to meet peak demands.

Detailed hydrogeological studies are needed to identify an appropriate receiving formation and size the infrastructure of the recharge system. There have been several recent studies conducted to define the storage and migration potential of the Trinity aquifer, and some regional water providers are currently in the process of confirming the information from the hydrogeological models by means of a pilot study. For these reasons, a generic ASR strategy for 50,000 acre-feet per year was developed for the purpose of this study.

Based on the available literature, this strategy assumes that an appropriate receiving site can be identified in the Trinity aquifer within 50 miles of the major water providers. The depth of this formation is about 2,000 feet below ground surface, and the migration potential is minimal to retain the stored water bubble. It is also assumed that there is existing infrastructure capacity to move water within 50 miles of the ASR site. Additional infrastructure would be needed to move the water to the recharge site. For this strategy, it is assumed that the recharge wells will also serve as recovery wells.

The WMS discussed is a region-wide strategy that benefits multiple major water providers in Region C. It is not a recommended strategy. Specific ASR strategies are considered for individual water users. The total capital cost associated with this strategy is $4.6 billion.

5C.7 Summary of Recommended Major Water Management Strategies

Table 5C.1 is a summary of the recommended major water management strategies for Region C. These projects represent most of the total supply from strategies. Much of the remaining cost of projects is associated with infrastructure projects to treat and/or deliver these supplies to water user groups.

TABLE 5C.1 RECOMMENDED MAJOR WATER MANAGEMENT STRATEGIES FOR REGION C

STRATEGY	SUPPLIER	SUPPLY (AC FT/YR)	SUPPLIER CAPITAL COST	SUPPLIER UNIT COST ($/1000 GALLON)	
				WITH DEBT SERVICE	AFTER DEBT PAID
New Surface Water					
Marvin Nichols Reservoir	TRWD, NTMWD, and UTRWD	320,160	$7,364,971,000	$4.62	$0.96
Neches River Run-of-the-River[a]	DWU	53,800	$719,027,000	$3.96	$0.59
Tehuacana Reservoir	TRWD	22,330	$457,095,000	$3.32	$0.27
Wright Patman Reallocation	TRWD and NTMWD	122,200	$4,760,029,000	$7.59	$1.39
Texoma Reallocation	GTUA	28,000	See GTUA Regional System – Phase 2		
Sabine River Off-Channel Reservoir	DWU	74,200	$903,296,000	$3.08	$1.03
Connection of Existing Supplies					
Lake O' the Pines	NTMWD	75,000	$1,345,792,000	$4.05	$1.07
GTUA Regional System	GTUA – Phase I	14,150	$779,925,000	$15.35	$6.15
	GTUA – Phase II	23,800	$827,790,000	$12.45	$6.65
Parker County Regional System	New water district	22,000	$593,307,000	$7.40	$2.90
Wise County Regional System	New water district	27,463	$680,554,000	$6.92	$2.79
Integrated Pipeline (IPL)	TRWD	N/A	$1,327,000,000	N/A	N/A
	DWU	N/A	$114,000,000	N/A	N/A
Lake Palestine (Connect to Bachman)	DWU	114,337	$586,902,000	$1.21	$0.10
Lake Texoma[b]	NTMWD – (Blending)	111,693	$1,232,712,000	$2.10 - $3.17	$0.42 - $0.48
New Groundwater					
Carrizo – Wilcox Aquifer Groundwater/ Queen City Aquifer[c]	TRWD	26,800	$356,209,000	$3.75	$1.89
	DWU	25,000	$694,882,000	$6.05	$1.05
Reuse Strategies					
Marty Leonard Wetland Reuse	TRWD	88,059	$673,381,000	$2.00	$0.73
Reuse from TRA Central RWS[d]	TRWD	60,000	$0	$.39	$0.39

STRATEGY	SUPPLIER	SUPPLY (AC FT/YR)	SUPPLIER CAPITAL COST	SUPPLIER UNIT COST ($/1000 GALLON)	
				WITH DEBT SERVICE	AFTER DEBT PAID
Reuse from Mary's Creek WWTP	TRWD (indirect)	25,928	$68,938,000	$0.64	$0.20
	Fort Worth (direct)	6,278	$66,155,000	$2.57	$0.82
Indirect Reuse Implementation	DWU and NTMWD	62,559	TBD	TBD	TBD
Main Stem Balancing Reservoir	DWU	114,000	$1,767,099,000	$3.71	$0.72
Expanded Wetland Reuse	NTMWD	37,510	$686,489,000	$5.05	$0.73
Lake Ralph Hall Indirect Reuse[e]	UTRWD	20,204	$0	NA	NA

[a]*The Neches River Run-of-the-River unit costs do not include the cost to transport water from Palestine to DWU through the IPL.*

[b]*Quantities vary by decade. The quantity shown is for 2080.*

[c]*Groundwater supplies are limited by the MAG.*

[d]*Capital costs for this strategy are included with the Marty Leonard Wetlands strategy. Only pumping and water purchase costs are shown.*

[e]*UTRWD will be seeking a state water right for return flows out of Lake Ralph Hall for up to 27,000 ac-ft/yr. The estimated available reuse during drought is slightly less.*

5C.8 Chapter 5C List of References

(1) HDR, Freese and Nichols, Brandes, Texas Water Development Board. *Report 370 Reservoir Site Protection Study*. Prepared for the Texas Water Development Board. 2008.

(2) Brown and Root, Inc., Yield Study Toledo Bend Reservoir, prepared for the Sabine River Authority of Texas and the Sabine River Authority of Louisiana, Houston, July 1991.

(3) Carollo, Inc., Hayes Engineering, Inc., WSP, Inc., RPS, Inc.: *2021 Initially Prepared Region D Regional Water Plan*, prepared for the Northeast Texas Water Planning Group, March 2019.

(4) HDR Engineering, Inc., Maddaus Water Management: *2024 Dallas Long Range Water Supply Plan*, prepared for Dallas Water Utilities, City of Dallas, December 2024.

5D RECOMMENDED WATER MANAGEMENT STRATEGIES FOR MAJOR WATER PROVIDERS AND REGIONAL WATER PROVIDERS

CHAPTER OUTLINE	
Section 5D.1	Major Water Provider Plans
Section 5D.2	Regional Water Provider Plans
RELATED APPENDICES	
Appendix G	Water Management Strategy Evaluations
Appendix H	Cost Estimates

The purpose of this chapter is to discuss the recommended water management strategies for both major and regional water providers. Major water provider strategies are discussed in **Section 5D.1** and regional water provider strategies are discussed in **Section 5D.2.** Evaluations of specific water management strategies are included in **Appendix G** and detailed costs are shown in **Appendix H**. Cost estimates for conservation strategies were developed for individual water user groups and are discussed in **Chapter 5B** and shown in **Appendix H.**

Most of the water supplied in Region C is provided by the major and regional water providers. Collectively, these entities meet approximately 90 percent of the total water needs in the region. These entities are expected to continue to provide most of the water supply for Region C through 2080, and they will also develop most of the new supplies for the region.

As part of the preparation of this regional water plan, consultants met with the major and regional water providers to develop the plans outlined in this chapter. In addition, published plans of these entities were considered in the preparation of this regional plan.

Infrastructure projects needed to deliver and/or treat water included in another strategy may be listed separately. Quantities for these projects have been shown in *gray italics* so they can be easily identified. To avoid double-counting quantities of supply, the quantities in gray italics are ***not*** included in the totals.

Six Major Water Providers

- Dallas Water Utilities
- City of Fort Worth
- North Texas Municipal Water District
- Tarrant Regional Water District
- Trinity River Authority
- Upper Trinity Regional Water District

Two Regional Water Providers

- City of Corsicana
- Greater Texoma Utility Authority

The recommended strategies for the major and regional wholesale water providers include conservation, new surface water, connections to existing supplies, new groundwater, reuse, desalination, and aquifer storage and recovery. These strategies are described for each major and regional water provider in the following sections. Recommended and alternative strategies are identified, along with a management supply factor that indicates a level of safety against future uncertainties.

Management Supply Factor

A management supply factor has been listed for each major and regional water provider. This management supply factor, commonly referred to as a safety factor, is calculated as the total water supply divided by total demand. Management supply factors vary with the timing of new supplies and provide a margin of safety for changed conditions.

BOIS D'ARC LAKE CONSTRUCTION AERIAL

5.1 Recommended Strategies for Major Water Providers

5.1.1 Dallas Water Utilities

Dallas Water Utilities (DWU) provides treated and raw water for most of Dallas County as well as several surrounding counties.

Table 5D.1 summarizes the projected demands for DWU and all existing and potential future customers. DWU is under no obligation to provide supplies for the potential future customers listed within the Region C Water Plan.

Dallas' supply is composed of several reservoirs and run-of-river diversions from the Elm Fork of the Trinity River. The system is divided into western and eastern subsystems. The western subsystem supplies Dallas' Elm Fork and Bachman water treatment plants, and the eastern subsystem supplies the Eastside water treatment plant.

In 2024, the City of Dallas completed an update to its Long Range Water Supply Plan(5). On December 11, 2024, Dallas City Council adopted the recommended and alternative strategies identified in the updated plan. At the direction of Dallas, the recommended and alternative water management strategies identified in Dallas' Long Range Water Supply Plan have been incorporated into this Region C Plan.

The recommended water management strategies for DWU are:

- Conservation
- Main Stem Pump Station – NTMWD Swap Agreement
- IPL Connection to the DWU System (Lake Palestine)
- Neches River Basin Supply (Neches Run-of-River or Lake Columbia)
- Sabine Basin Conjunctive Use (Carrizo Wilcox Groundwater and Sabine River Off-Channel Reservoir)
- Main Stem Balancing Reservoir (Reuse)

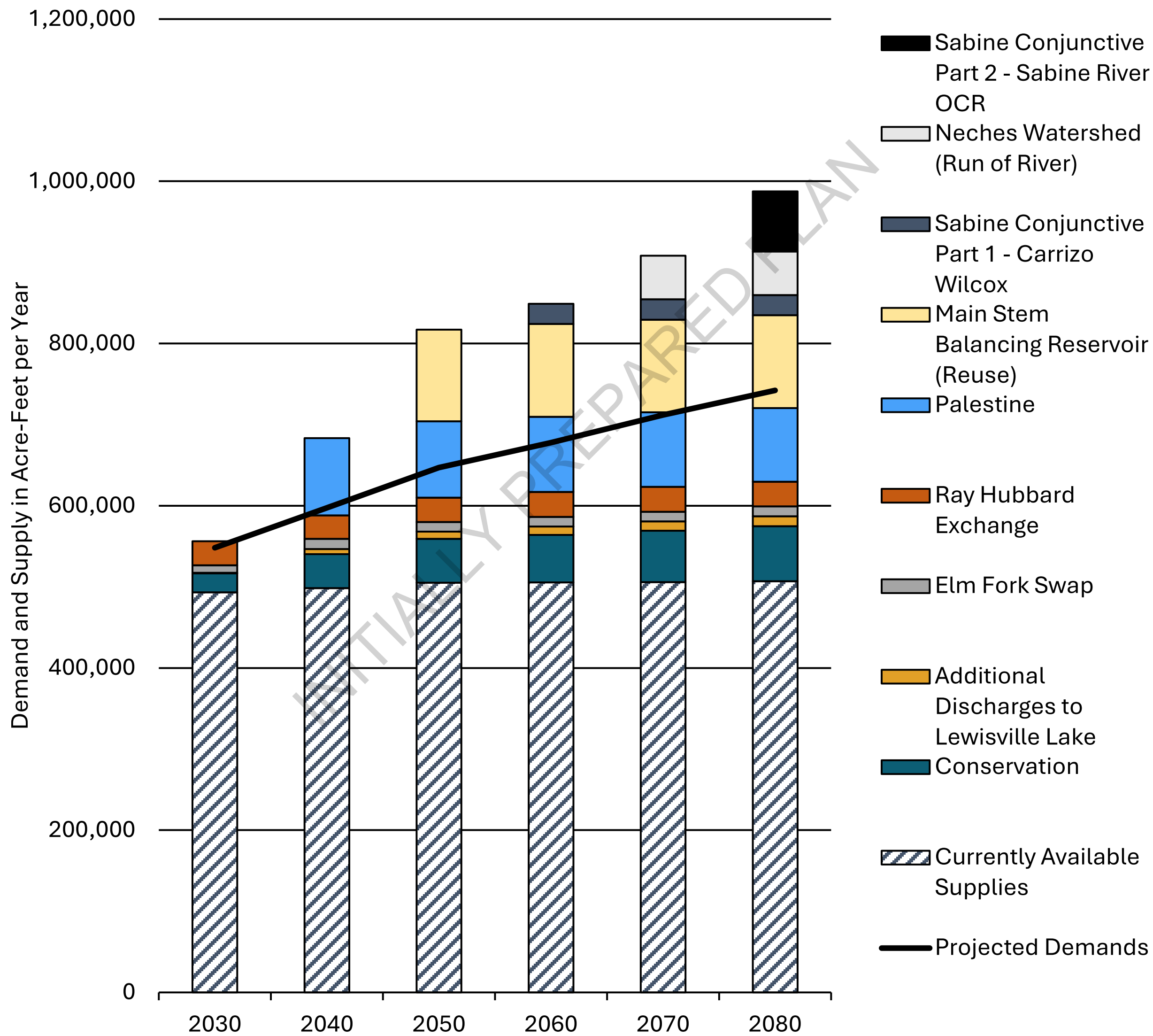
The alternative water management strategies for DWU are:

- Sulphur Basin Project (Marvin Nichols Reservoir or other Sulphur Basin sources)
- Out-of-State Supplies
- Arkansas (Little River Millwood Lake)
- Louisiana (Toledo Bend, SRA – Louisiana)
- Oklahoma (Kiamichi River)
- Toledo Bend Reservoir (SRA-Texas) to Dallas West System
- Red River OCR
- Lake Texoma Desalination

In addition to these strategies, Region C also considers increases in available supplies in Lake Lewisville through increased return flows. Due to the planning guidelines for existing supplies, no return flows are included in the yield of the reservoirs. DWU currently utilizes existing return flows to Lake Lewisville under its existing water rights and expects to continue with this practice.

Recommended water management strategies are shown in **Figure 5D.1**. It is important to note that the Dallas Long Range Plan shows a higher need compared to Region C due to higher demand projections and lower currently available supplies that account for climate change. Based on the Dallas Long Range Plan, all recommended strategies are needed to meet DWU's needs.

FIGURE 5D.1 RECOMMENDED WATER MANAGEMENT STRATEGIES – DALLAS WATER UTILITIES



Brief descriptions of the recommended strategies are discussed individually below.

Conservation: The conservation savings for DWU's retail and wholesale customers are based on the Region C recommended water conservation program. Not including savings from low-flow plumbing fixtures (which are built into the demand projections) and not including reuse, conservation by DWU retail and wholesale customers is projected to reach 67,631 acre-feet per year by 2080.

Share of Additional Discharges to Lewisville Lake: DWU's water right in Lewisville is larger than the yield which grants them access to additional discharges into the lake. For planning purposes, the additional supply available in Lewisville Lake is 12,476 acre-feet per year.

Main Stem Pump Station (Elm Fork Swap and Ray Hubbard Exchange): DWU and NTMWD are in discussions to swap reuse water from several wastewater treatment plants. DWU will receive NTMWD treated wastewater discharges into the Lewisville watershed and in return DWU will provide discharges from their WWTPs on the Main Stem of the Trinity River to NTMWD. (The amount of available supply is above historical levels.) NTMWD will divert the water provided by DWU to Lake Lavon using the Main Stem Pump Station. The projected supply from the Elm Fork Swap is based on wastewater flow projections for the purposes of regional and state planning – actual supplies are contingent on what is discharged.

Main Stem Balancing Reservoir: DWU's Long Range Water Supply Plan identified a 300,000 acre-foot off channel reservoir in Ellis County southeast of Bristol Texas as the Main Stem Balancing Reservoir. DWU has secured water rights to use the return flows from their Central and Southside wastewater treatment plants. These return flows would flow downstream in the Trinity River to a diversion location in Ellis County. The return flows would be diverted from the river to a sedimentation basin and then stored in the Main Stem Balancing Reservoir for transmission to the DWU service area.

The quantity of supplies available from this strategy is estimated at about 100 MGD (112,100 acre-feet per year), which is the amount of reuse available to DWU after the Elm Fork/Ray Hubbard Exchange strategy. Actual amounts of available reuse will depend upon the quantity of water discharged from the wastewater treatment plants. This strategy is expected to be online by 2050.

Connect Lake Palestine: DWU is currently working with Tarrant Regional Water District (TRWD) to develop integrated transmission facilities (Integrated Pipeline, or IPL) to connect Lake Palestine with the DWU system by 2040. DWU has a contract for 114,337 acre-feet per year (102 MGD) of water from Lake Palestine but cannot currently access this supply due to lack of infrastructure. The firm yield of Lake Palestine is estimated to be 177,110 acre-feet per year in 2030. This is a decrease from the authorized diversion, which reduces the supply available to DWU from Lake Palestine during drought conditions to 95,086 acre-feet per year. However, DWU intends to contract for excess supplies from UNRWA for the additional supply to make their 114,337 acre-feet per year contract whole. Most of the infrastructure necessary to move the water from Lake Palestine to a location near Joe Pool Lake is under construction or in place. Additional capacity improvements for the IPL are discussed in the IPL Project Technical Memorandum in **Appendix G**.

There is a separate project to move the water from the IPL delivery point to the Bachman Water Treatment Plant where the supplies will be treated before being distributed to customers. It is assumed that the water from the IPL will be delivered directly to the Bachman WTP by pipeline. However, water could be delivered to other locations within the DWU service area.

Both capital costs are associated with the quantity of water available from Lake Palestine.

Neches River Basin Supply (Run-of-River Supply or Lake Columbia): Dallas and the Upper Neches River Municipal Water Authority (UNRMWA) are long-term partners on Lake Palestine with their initial water sale contract being in place since 1972. DWU and UNRMWA are planning to develop additional water supplies in Neches River basin. There are two options for this supply: Neches Run-of-River diversion and Lake Columbia. Both options were evaluated but only one would be implemented within the planning horizon of this plan. For the *2026 Region C Regional Water Plan*, the Neches Run-of-River strategy is shown as being implemented by 2070. The other option, sales from Lake Columbia, is considered an alternative strategy to the Neches Run-of-River, or a recommended strategy implemented after 2080.

The Neches Run-of River strategy would divert up to 48 MGD of water from the Neches River near the SH 21 crossing. Water would be delivered through a 42-mile, 72-inch diameter pipeline to Dallas' pump station at Lake Palestine for delivery to Dallas through the IPL. Facilities include a small diversion dam on the Neches River, a river intake and pump station, and a transmission pipeline and booster pump station with delivery to the IPL pump station site near Lake Palestine.

Sabine Conjunctive Use Strategy: The Sabine Conjunctive Use strategy combines groundwater supplies from the Carrizo-Wilcox and Queen City aquifers with an off-channel reservoir (OCR) in Smith County that impounds surface water diverted from the Sabine River. The combination of the two projects has the potential to provide a significantly larger volume of water to DWU than the yields of stand-alone projects.

The Carrizo-Wilcox and Queen City aquifers cover a large portion of northeast Texas. This strategy would develop approximately 30,000 acre-feet per year of groundwater in Smith, Wood, and Upshur Counties in Region D. Where appropriate, the wells would be co-screened in both the Carrizo-Wilcox and Queen City aquifers to provide the greatest amount of available supply. A series of wellfields and pump stations would be strategically located to transport the water 58 miles to the Lake Fork intake and pump station. From this location, the groundwater would be transported to the DWU Eastside water treatment plant via existing infrastructure. This strategy is identified to be online by 2060.

To complete the Sabine Conjunctive Use Strategy, an off-channel reservoir (OCR) would be constructed in Smith County with a capacity of 78,000 acre-feet. This component allows the project to operate as a conjunctive-use resource utilizing groundwater to supplement the yield of an off-channel reservoir during times of low river flows. The OCR stores streamflow diverted from the Sabine River using a 400 cfs (258 MGD) intake and pump station and two 90-inch diameter short-distance transmission pipelines. Water that is stored in the OCR is subsequently diverted at a maximum rate of 93 MGD to the Lake Fork pump station through a 78-inch diameter pipeline. This

Phase 2 of the conjunctive use strategy would be implemented in 2080 and provide a reliable supply of 67,200 acre-feet per year.

Infrastructure to Treat and Deliver to Customers: In addition to securing raw water sources, Dallas must also treat the water and deliver the treated water to its wholesale customers. The infrastructure necessary to treat and deliver the water is a recommended strategy. Modifications to the components listed in the cost estimate are considered consistent with this strategy.

Strategy Unit Costs

Costs were developed for both recommended and alternative strategies. Costs are summarized in **Table 5D.1** and **Table 5D.2.**

FIGURE 5D.2 STRATEGY UNIT COSTS – DALLAS WATER UTILITIES

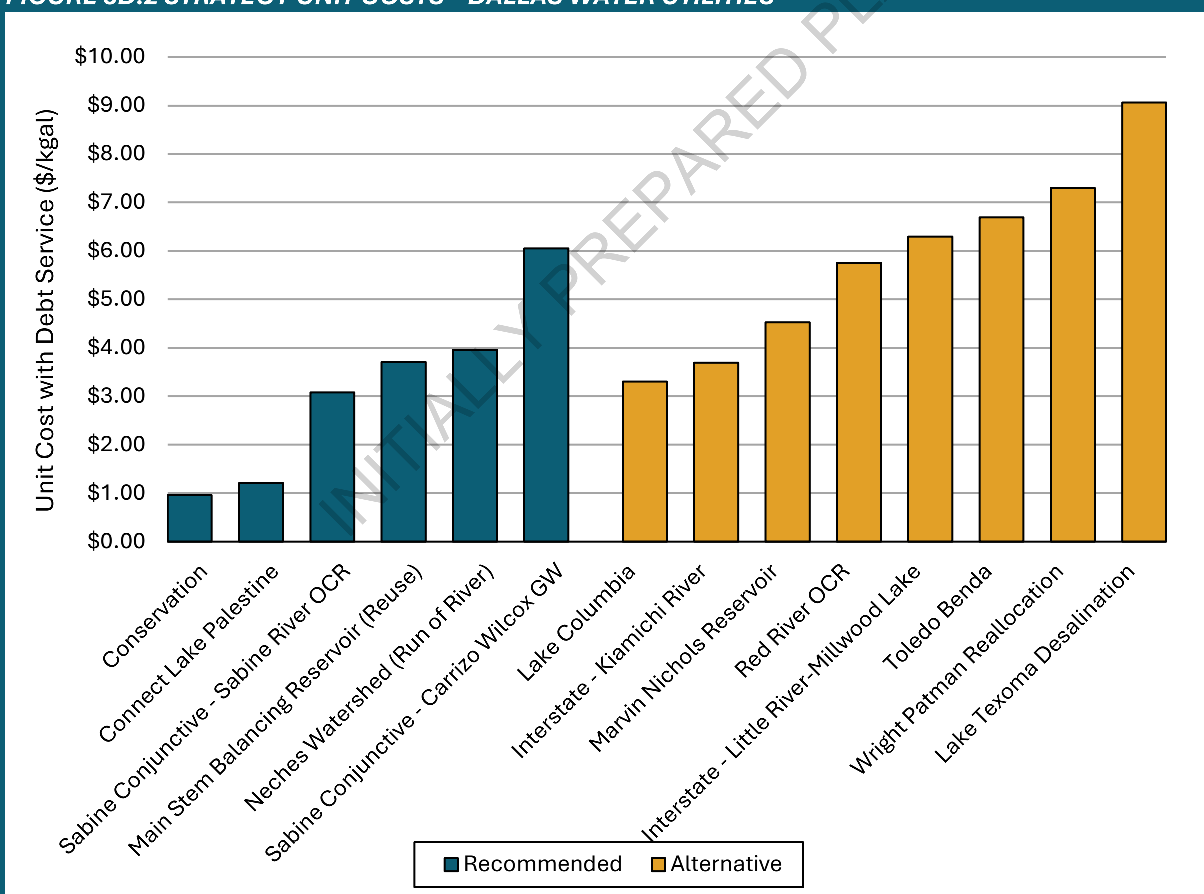


TABLE 5D.1 SUMMARY OF MAJOR WATER PROVIDER PLAN – DALLAS WATER UTILITIES

DALLAS WATER UTILITIES (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Addison	8,324	9,360	9,922	10,255	10,622	11,025
Balch Springs	2,854	3,033	3,316	3,614	3,993	4,191
Carrollton	25,669	27,059	28,648	30,330	32,110	32,233
Cedar Hill[a]	10,364	11,287	12,337	13,347	14,439	15,619
Cockrell Hill	525	489	471	460	447	433
Coppell	11,392	11,315	11,348	11,374	11,410	11,410
Dallas	296,261	308,913	323,564	338,933	355,192	372,319
County-Other, Dallas[a]	1,119	1,933	2,747	3,561	4,376	5,190
County-Other, Tarrant[a]	1,335	1,335	1,335	1,335	1,335	1,335
DeSoto	10,093	10,729	11,088	11,295	11,523	11,775
Duncanville	6,037	6,319	6,487	6,507	6,507	6,507
Farmers Branch	10,602	11,536	12,050	12,352	12,683	13,049
Flower Mound[a]	8,090	8,352	8,449	8,453	8,457	8,457
Glenn Heights[a]	2,269	2,656	3,010	3,339	3,699	4,096
Grand Prairie	22,439	23,084	26,758	27,721	29,037	29,057
Grapevine[a]	2,924	2,906	2,931	2,971	3,011	3,051
Hutchins	1,841	2,037	2,148	2,214	2,286	2,365
Irrigation, Collin	50	50	50	50	50	50
Irrigation, Dallas[a]	3,661	3,496	3,331	3,144	2,958	2,771
Irrigation, Denton[a]	1,000	1,000	1,000	1,000	1,000	1,000
Irrigation, Kaufman[a]	28	28	28	28	28	28
Irrigation, Rockwall	347	347	347	347	347	347
Irving[a]	5,000	5,000	5,000	5,000	5,000	5,000
Lancaster	8,516	9,101	9,433	9,627	9,839	10,073
Lewisville	19,405	19,446	20,787	21,068	21,478	21,478
Manufacturing, Dallas[a]	15,047	15,604	16,182	16,781	17,402	18,045
Manufacturing, Denton[a]	67	69	72	74	77	80
Ovilla	1,278	1,602	1,956	2,316	2,712	3,148
Red Oak	1,753	2,177	2,645	3,119	3,640	4,213
Seagoville	2,547	2,789	2,955	3,079	3,217	3,367
Steam Electric Power, Dallas[a]	1,000	1,000	1,000	1,000	1,000	1,000
The Colony[a]	5,423	5,924	6,773	6,773	6,773	6,773
UTRWD Current Contract[a]	48,397	57,522	67,248	68,788	70,138	70,675
Subtotal - Existing	***535,657***	***567,498***	***605,416***	***630,255***	***656,786***	***680,160***
Potential Future Customers						
Denton and Customers[a]	6,957	7,540	12,636	18,578	25,780	32,930
Irving Additional	5,605	11,210	17,936	17,936	17,936	17,936
UTRWD Additional[a]	0	11,210	11,210	11,210	11,210	11,210
Subtotal - Potential	***12,562***	***29,960***	***41,782***	***47,724***	***54,926***	***62,076***

DALLAS WATER UTILITIES (AC-FT/YR)	2030	2040	2050	2060	2070	2080
TOTAL PROJECTED DEMANDS	***548,219***	***597,458***	***647,198***	***677,979***	***711,712***	***742,236***
Currently Available Water Supplies						
Lake Ray Roberts/Lewisville/Elm Fork System	167,249	166,724	166,199	165,206	164,212	163,219
Grapevine Lake	7,650	7,385	7,120	6,853	6,587	6,320
Lake Ray Hubbard	46,239	45,450	44,660	43,927	43,194	42,461
Lake Tawakoni	180,991	179,634	178,278	176,922	175,565	174,208
Lake Fork	43,209	44,566	45,922	47,278	48,635	49,992
Direct Reuse (Golf courses)	1,121	1,121	1,121	1,121	1,121	1,121
White Rock Lake (Irrigation Only)	2,540	2,375	2,210	2,023	1,837	1,650
Indirect Reuse	44,265	51,332	59,790	62,160	64,842	68,097
TOTAL SUPPLIES	***493,264***	***498,587***	***505,300***	***505,490***	***505,993***	***507,068***
NEED (DEMAND-SUPPLY)	***54,955***	***98,871***	***141,898***	***172,489***	***205,719***	***235,168***
Water Management Strategies						
Conservation	23,472	41,835	53,836	58,522	63,202	67,631
DWU Retail	15,225	28,505	36,530	39,595	42,787	46,150
Wholesale Customers	8,247	13,330	17,306	18,927	20,415	21,481
Additional Indirect Reuse	39,683	47,681	163,932	167,213	168,468	169,417
Share of Additional Discharges to Lewisville Lake	*560*	*6,204*	*9,009*	*10,272*	*11,527*	*12,476*
Elm Fork Swap	*9,499*	*12,638*	*11,966*	*11,966*	*11,966*	*11,966*
Ray Hubbard Exchange	*29,624*	*28,839*	*29,960*	*30,633*	*30,633*	*30,633*
Main Stem Balancing Reservoir (Reuse)	*0*	*0*	*112,997*	*114,342*	*114,342*	*114,342*
Connect Lake Palestine (Dallas Portion of IPL and IPL to Bachman)	0	95,086	93,967	92,874	91,778	90,673
Neches Watershed (Run of River)	0	0	0	0	53,808	53,808
Sabine Conjunctive Use Part 1 - Carrizo Wilcox Groundwater	0	0	0	25,000	25,000	25,000
Sabine Conjunctive Use Part 2 - Sabine River Off Channel Reservoir	0	0	0	0	0	73,986
Treatment and Distribution (CIP)	*39,683*	*47,681*	*163,932*	*192,213*	*193,468*	*268,403*
TOTAL SUPPLIES FROM STRATEGIES	***63,155***	***184,602***	***311,735***	***343,609***	***402,256***	***480,515***
TOTAL SUPPLIES FROM STRATEGIES (CONSTRAINED)[c]	***63,155***	***184,602***	***311,735***	***343,609***	***346,201***	***424,460***
TOTAL SUPPLIES (CONSTRAINED)	***556,419***	***683,189***	***817,035***	***849,099***	***852,194***	***931,528***
RESERVE OR (SHORTAGE)	***8,200***	***85,731***	***169,837***	***171,120***	***140,482***	***189,292***
SUPPLY MANAGEMENT FACTOR	***1.01***	***1.14***	***1.26***	***1.25***	***1.20***	***1.26***

[a]Supplies from other sources.

[b] Includes return flows from Flower Mound, Lewisville, Denton, NTMWD, and UTRWD.

[c]Supplies constrained by the IPL. A parallel IPL to convey additional strategy water will be needed after the 2080 planning period.

TABLE 5D.2 SUMMARY OF COSTS FOR RECOMMENDED STRATEGIES – DALLAS WATER UTILITIES

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Conservation (DWU Retail)	2030	46,150	$150,000	$0.96	$0.82
Conservation (Wholesale Customers)	2030	21,481	Included under County Summaries in Section 5D.		
Share of Additional Discharges to Lewisville Lake	2030	12,476	No costs associated with this WMS.		
Elm Fork Swap	2030	12,638	To be determined.		
Ray Hubbard Exchange	2030	30,633			
Main Stem Balancing Reservoir (Reuse)	2050	114,342	$1,767,099,000	$3.71	$0.72
Connect Lake Palestine (Dallas Portion of IPL and IPL to Bachman)	2040	95,086	$700,902,000	$1.21	$0.10
Neches Watershed (Run of River)	2070	53,808	$719,027,000	$3.96	$0.59
Sabine Conjunctive Use Part 1 - Carrizo Wilcox Groundwater	2060	25,000	$694,882,000	$6.05	$1.05
Sabine Conjunctive Use Part 2 - Sabine River Off Channel Reservoir	2080	73,986	$903,296,000	$3.08	$1.03
Treatment and Distribution (CIP)	*2030*	*268,403*	*$5,230,807,000*	*N/A*	*N/A*
TOTAL DWU CAPITAL COSTS			***$10,016,163,000***		

TABLE 5D.3 SUMMARY OF COSTS FOR ALTERNATIVE STRATEGIES – DALLAS WATER UTILITIES

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Red River Off Channel Reservoir	2060	92,370	$2,062,385,000	$5.75	$1.18
Marvin Nichols Reservoir	2060	74,596	$1,690,464,000	$4.53	$0.93
Toledo Benda	2060	100,000	$3,009,692,000	$6.69	$1.53
Lake Texoma Desalination	2060	145,730	$3,823,824,000	$9.06	$3.42
Lake Columbia	2070	53,808	$685,022,000	$3.30	$0.96
Interstate - Little River-Millwood Lake	2080	300,428	$7,360,613,000	$6.29	$1.02
Interstate - Kiamichi River	2080	300,428	$4,258,261,000	$3.69	$0.64
Wright Patman Reallocation	2080	29,149	$1,102,983,500	$7.30	$1.35

[a]Source of water from Toledo Bend could be from SRA-Texas or SRA-LA.

5.1.2 City of Fort Worth

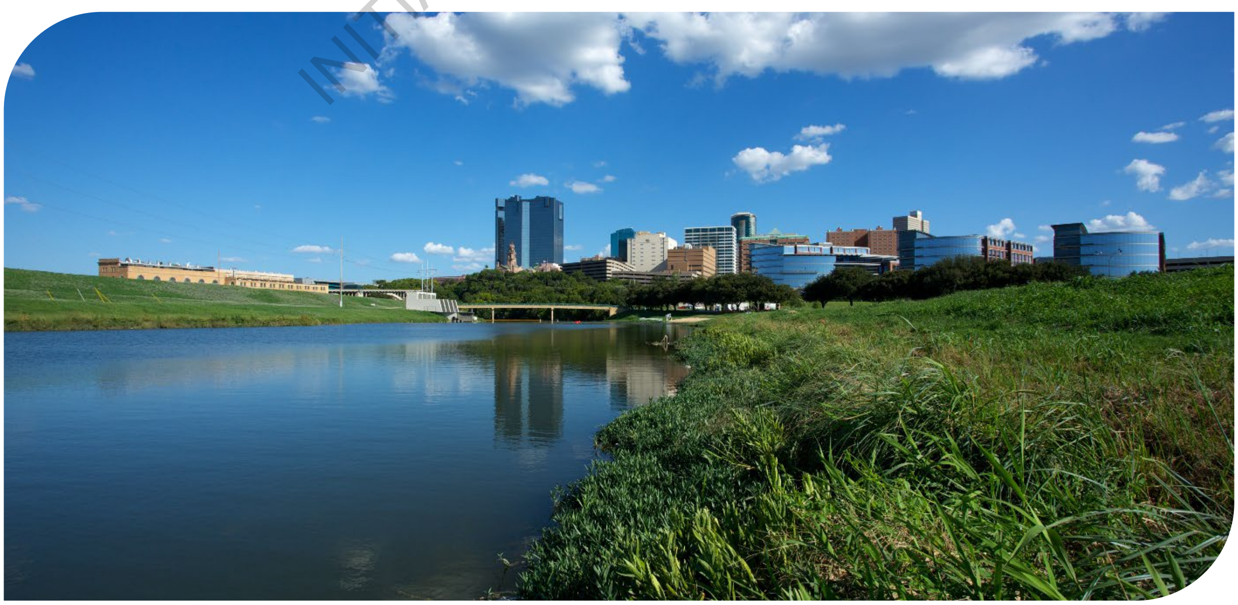
The City of Fort Worth obtains raw water from Tarrant Regional Water District (TRWD) and treats and distributes treated water to about 40 other water user groups in Tarrant County and surrounding counties.

The city also provides direct reuse water from Village Creek Wastewater Treatment Plant to meet non-potable water needs in the Cities of Arlington and Euless, Dallas-Fort Worth International Airport, and a few non-municipal customers within the City of Fort Worth. **Table 5D.1** shows the projected demands for Fort Worth and all customers.

The currently available supply to Fort Worth is limited by Fort Worth's current treatment capacity and by TRWD's raw water sources and transmission capacity. As Fort Worth increases treatment capacity and TRWD develops additional raw water supplies, Fort Worth's available supply will increase. The city also plans to implement additional direct reuse projects. Due to the city's ability to continue to purchase additional raw water supplies as needed, the management supply factor is kept at 1.00 in later decades. The City would not purchase supplies beyond their actual demands.

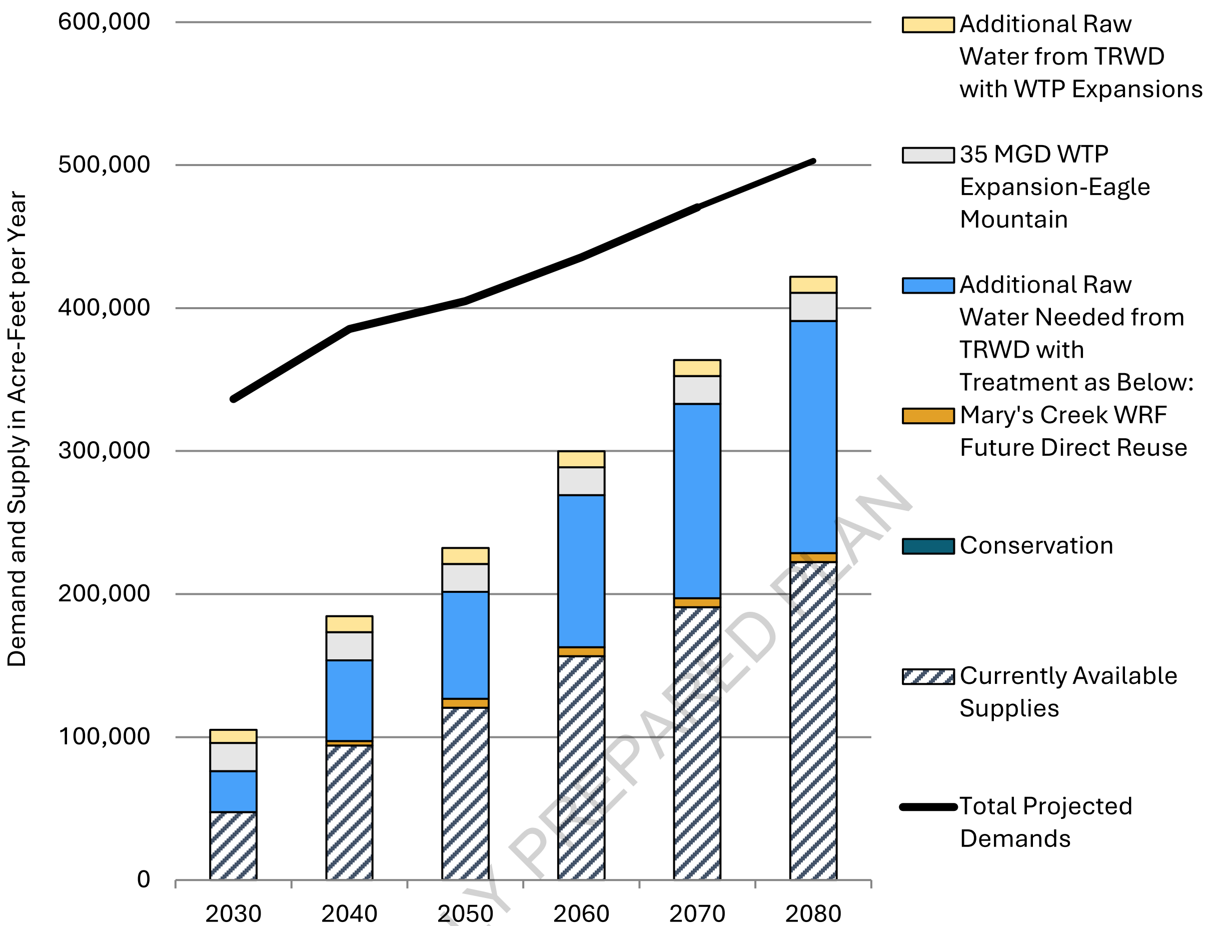
The recommended water management strategies for the City of Fort Worth are:

- Conservation
- Alliance Direct Reuse
- Village Creek Water Reclamation Facility (WRF) Future Direct Reuse
- Mary's Creek WRF Future Direct Reuse
- Additional supply from Tarrant Regional Water District
- Expansion of Water Treatment Plants



FORT WORTH SKYLINE

FIGURE 5D.3 RECOMMENDED WATER MANAGEMENT STRATEGIES – FORT WORTH



Alliance Direct Reuse: This project would involve a partnership between Fort Worth, TRA, and Hillwood Corporation to serve developments in the Alliance Airport area using effluent from TRA's Denton Creek Regional Wastewater System.

Village Creek and Mary's Creek Water Reclamation Facilities Future Direct Reuse: Fort Worth plans to further expand its direct reuse system by constructing additional conveyance and/or treatment facilities in other areas of the city.

Additional Supply from Tarrant Regional Water District: As the Tarrant Regional Water District develops new supplies and increases transmission capacity, Fort Worth's allocation of supply from the District will increase to meet projected demands.

Expansions of Water Treatment Plants: The City of Fort Worth has five water treatment plants: North Holly, South Holly, Rolling Hills, Eagle Mountain, and Westside. The current combined capacity of the existing water treatment plants is 525 MGD. In order to meet the projected demands, Fort Worth will expand water treatment plants to reach a total treatment capacity of 830 MGD by 2080. Due to uncertainty, expansions in later decades are listed as "General". Expansions at any of the city's water treatment plants are considered to be consistent with this strategy.

Strategy Unit Costs

Costs were developed for recommended strategies. Costs are summarized in **Table 5D.5.**

FIGURE 5D.4 STRATEGY UNIT COSTS – FORT WORTH

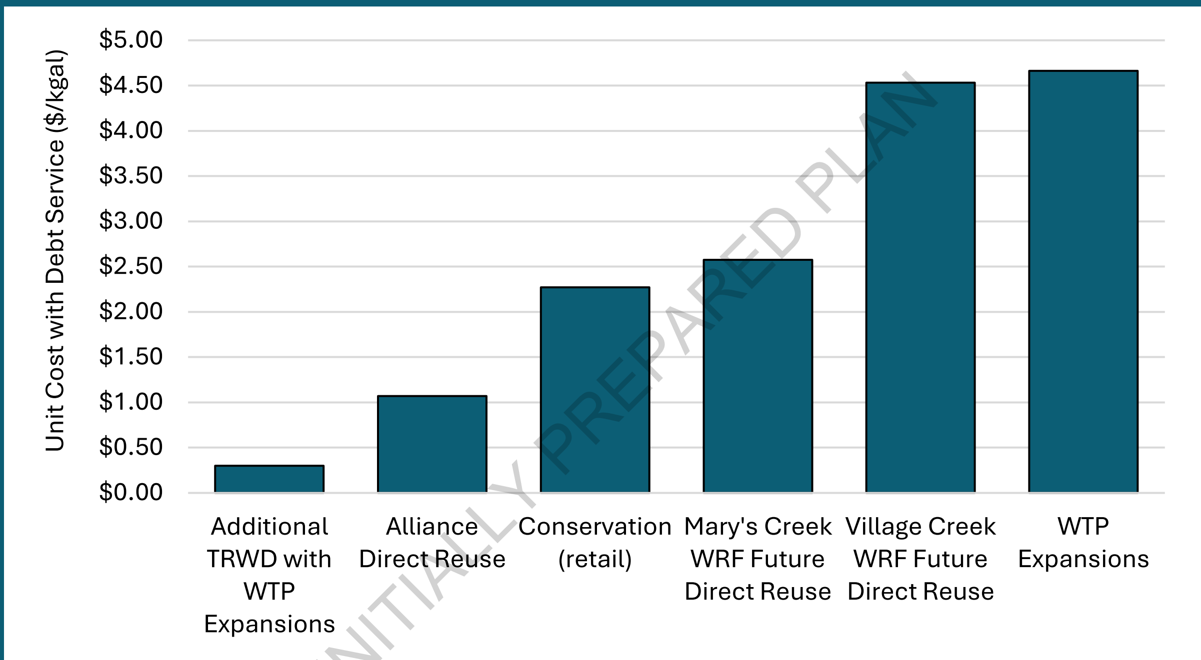


TABLE 5D.4 SUMMARY OF MAJOR WATER PROVIDER PLAN – FORT WORTH

FORT WORTH (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Fort Worth	217,247	256,762	264,004	284,499	306,781	330,866
Aledo	987	1,060	1,301	1,485	1,692	1,817
Bethesda WSC	3,341	4,087	4,851	5,542	6,319	7,191
Burleson	8,165	9,478	10,795	11,976	13,300	14,783
Crowley	3,228	3,826	4,336	4,750	5,205	5,704
County-Other, Dallas	518	518	518	518	518	518
County-Other, Tarrant	4,447	3,926	7,300	10,060	14,395	15,417
Dalworthington Gardens	541	545	549	549	550	551
Edgecliff	636	634	634	634	634	634
Everman	0	0	0	0	0	0
Forest Hill	1,595	1,755	1,895	2,004	2,124	2,256
Grand Prairie	2,803	2,803	2,803	2,803	2,803	2,803
Haltom City	5,335	5,303	5,303	5,303	5,303	5,303
Haslet	2,574	3,513	4,629	5,037	5,490	5,490
Hudson Oaks	1,472	1,534	1,587	1,653	1,740	1,808
Hurst	6,792	6,748	6,761	6,771	6,787	6,787
Keller	12,863	13,043	13,043	13,043	13,043	13,043
Kennedale	0	544	1,318	2,134	2,966	3,731
Lake Worth	1,089	1,202	1,287	1,359	1,429	1,492
Manufacturing, Tarrant	9,823	10,197	10,584	10,985	11,402	11,833
North Richland Hills	12,180	13,073	13,318	13,512	13,794	13,794
Northlake	1,715	1,902	2,368	2,786	3,209	3,524
Richland Hills	1,031	1,158	1,267	1,459	1,631	1,821
Roanoke	3,915	3,810	3,892	3,957	4,052	4,052
Saginaw	3,974	4,344	4,382	4,412	4,456	4,456
Sansom Park	0	0	0	0	0	0
Southlake	14,668	16,402	17,491	18,457	19,425	20,332
Trophy Club MUD 1	5,382	5,482	5,572	5,646	5,727	5,816
Westlake	3,519	4,611	5,521	6,271	7,090	7,990
Westover Hills	919	916	920	922	927	927
Westworth Village	442	451	479	504	528	550
White Settlement	1,790	2,026	2,231	2,391	2,567	2,761
Willow Park	538	781	1,060	1,354	1,678	2,034
Subtotal - Existing	***333,529***	***382,434***	***401,999***	***432,776***	***467,565***	***500,084***
Reuse Customers						
Arlington	178	178	178	178	178	178
County-Other, Dallas	150	150	150	150	150	150
County-Other, Tarrant	150	150	150	150	150	150
Euless	368	368	368	368	368	368
Irrigation, Tarrant	2,000	2,000	2,000	2,000	2,000	2,000
Subtotal - Reuse	***2,846***	***2,846***	***2,846***	***2,846***	***2,846***	***2,846***

FORT WORTH (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Potential Future Customers						
Pantego	35	35	35	35	35	35
Subtotal - Potential	***35***	***35***	***35***	***35***	***35***	***35***
TOTAL PROJECTED DEMANDS	***336,410***	***385,315***	***404,880***	***435,657***	***470,446***	***502,965***
- *Potable Demand*	*333,564*	*382,469*	*402,034*	*432,811*	*467,600*	*500,119*
- *Direct Reuse Demand*	*2,846*	*2,846*	*2,846*	*2,846*	*2,846*	*2,846*
Currently Available Water Supplies						
TRWD	285,947	288,339	281,618	276,291	276,768	277,808
Waterchase Golf Course Direct Reuse	550	550	550	550	550	550
Village Creek Direct Reuse	2,296	2,296	2,296	2,296	2,296	2,296
TOTAL SUPPLIES	***288,793***	***291,185***	***284,464***	***279,137***	***279,614***	***280,654***
NEED (DEMAND-SUPPLY)	***47,617***	***94,130***	***120,416***	***156,520***	***190,832***	***222,311***
Water Management Strategies						
Conservation (retail)	10,414	20,437	23,495	26,620	29,873	33,439
Conservation (wholesale)	3,767	5,870	7,152	7,995	9,023	9,813
Alliance Direct Reuse	3,134	7,840	7,840	7,840	7,840	7,840
Village Creek WRF Future Direct Reuse	2,442	2,442	2,442	2,442	2,442	2,442
Mary's Creek WRF Future Direct Reuse	0	3,139	6,278	6,278	6,278	6,278
Additional Raw Water Needed from TRWD with Treatment as Below:	28,890	56,978	75,785	107,921	137,952	165,075
35 MGD WTP Expansion-Eagle Mountain	*19,618*	*19,618*	*19,618*	*19,618*	*19,618*	*19,618*
20 MGD WTP Expansion-Westside	*9,272*	*11,210*	*11,210*	*11,210*	*11,210*	*11,210*
20 MGD WTP Expansion-Westside	*0*	*11,210*	*11,210*	*11,210*	*11,210*	*11,210*
30 MGD WTP Expansion-Eagle Mountain	*0*	*14,940*	*16,815*	*16,815*	*16,815*	*16,815*
50 MGD WTP Expansion-Rolling Hills	*0*	*0*	*16,932*	*28,025*	*28,025*	*28,025*
50 MGD WTP Expansion-General 1	*0*	*0*	*0*	*21,043*	*28,025*	*28,025*
50 MGD WTP Expansion-General 2	*0*	*0*	*0*	*0*	*23,049*	*28,025*
50 MGD WTP Expansion-General 3	*0*	*0*	*0*	*0*	*0*	*22,147*
TOTAL SUPPLIES FROM STRATEGIES	***48,438***	***96,192***	***122,008***	***157,546***	***191,285***	***222,311***
TOTAL SUPPLIES	***337,231***	***387,377***	***406,472***	***436,683***	***470,899***	***502,965***
RESERVE OR (SHORTAGE)	***821***	***2,062***	***1,592***	***1,026***	***453***	***0***
MANAGEMENT SUPPLY FACTOR	***1.00***	***1.01***	***1.00***	***1.00***	***1.00***	***1.00***

TABLE 5D.5 SUMMARY OF COSTS FOR RECOMMENDED STRATEGIES – FORT WORTH

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Conservation (retail)	2030	33,439	$150,000	$2.27	$0.71
Conservation (wholesale)	2030	9,813	Included under County Summaries in Section 5D.		
Alliance Direct Reuse	2030	7,840	$34,498,000	$1.07	$0.34
Village Creek WRF Future Direct Reuse	2030	2,442	$48,349,000	$4.53	$1.23
Mary's Creek WRF Future Direct Reuse	2040	6,278	$66,155,000	$2.57	$0.82
Additional Raw Water Needed from TRWD with Treatment as Below:	2030	162,499	$0	$0.30	$0.30
35 MGD WTP Expansion-Eagle Mountain	*2030*	*19,618*	*$247,056,000*	*$4.60*	*$1.88*
20 MGD WTP Expansion-Westside	*2030*	*11,210*	*$155,983,000*	*$5.14*	*$2.14*
20 MGD WTP Expansion-Westside	*2040*	*11,210*	*$155,983,000*	*$5.14*	*$2.14*
30 MGD WTP Expansion-Eagle Mountain	*2040*	*16,815*	*$218,335,000*	*$4.74*	*$1.94*
50 MGD WTP Expansion-Rolling Hills	*2050*	*28,025*	*$343,387,000*	*$4.42*	*$1.77*
50 MGD WTP Expansion-General 1	*2060*	*28,025*	*$343,387,000*	*$4.42*	*$1.77*
50 MGD WTP Expansion-General 2	*2070*	*28,025*	*$343,387,000*	*$4.42*	*$1.77*
50 MGD WTP Expansion-General 3	*2080*	*19,571*	*$343,387,000*	*$4.42*	*$1.77*
TOTAL FORT WORTH CAPITAL COSTS			***$2,300,057,000***		

5.1.3 North Texas Municipal Water District

The North Texas Municipal Water District (NTMWD) serves much of the rapidly growing suburban area north and east of Dallas, supplying water to over 95 cities and water suppliers including the cities of Plano, Allen, Frisco, McKinney, Garland, and Mesquite. The population served by NTMWD is expected to more than double over the next 50 years yet demands on NTMWD are only expected to increase by approximately 60 percent from 2030 to 2080. **Table 5D.6** shows the projected demands for NTMWD and all customers.

NTMWD's current primary sources of raw water are Lavon Lake, Chapman Lake, Lake Texoma, Bois d'Arc Lake, Lake Tawakoni and reuse. NTMWD has state water rights permits to store and divert water from these sources, but three of the lakes are managed and operated by the U.S. Army Corps of Engineers (USACE). Bois d'Arc Lake is the only reservoir that NTMWD solely owns and operates. NTMWD provides treated water and owns and operates four water treatment plants.

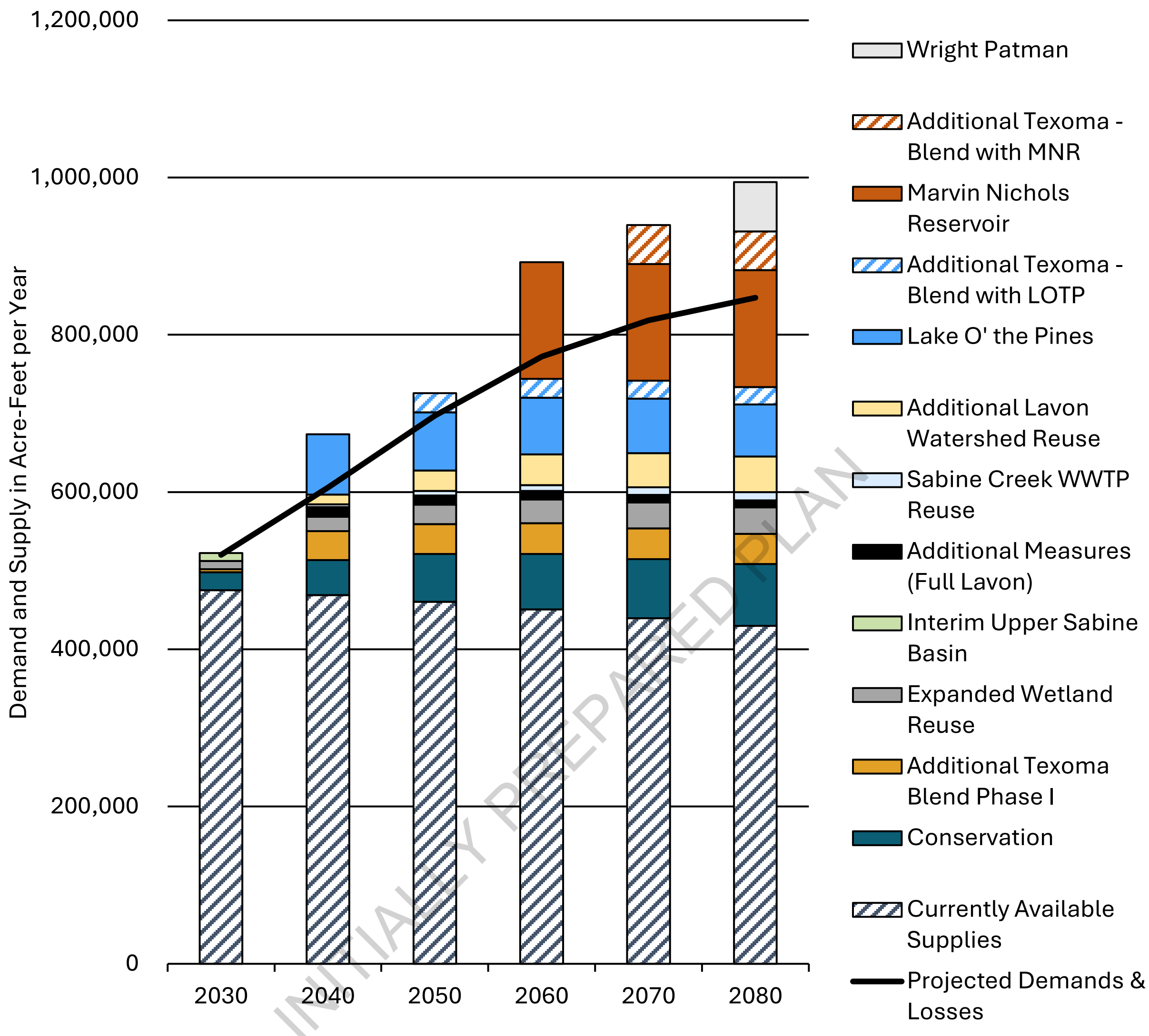
The recommended water management strategies for NTMWD are:

- Conservation
- Additional Lake Texoma Blend Phase I and II
- Additional Measure to Access Full Lavon Yield (Raw Water #4)
- Expanded Wetland Reuse
- Sabine Creek WWTP Reuse
- Additional Lavon Watershed Reuse
- Interim Upper Sabine Basin
- Lake O' the Pines
- Marvin Nichols Reservoir
- Wright Patman Reallocation
- Fannin County Water Supply System
- Infrastructure to Treat and Deliver to Customers

The alternative water management strategies are:

- Toledo Bend Reservoir
- Lake Texoma with Desalination at Leonard
- Carrizo-Wilcox Groundwater
- George Parkhouse Reservoir (North)
- George Parkhouse Reservoir (South)
- Aquifer Storage and Recovery
- Out-of-State water (Oklahoma)

FIGURE 5D.5 RECOMMENDED WATER MANAGEMENT STRATEGIES – NORTH TEXAS MUNICIPAL WATER DISTRICT



These strategies are discussed individually below.

Conservation: Conservation is the projected conservation savings for NTMWD's existing and potential customers, based on the Region C recommended water conservation program. Not including savings from low-flow plumbing fixtures (which are built into the demand projections) and not including reuse, conservation by NTMWD customers is projected to reach over 78,560 acre-feet per year by 2080.

Additional Lake Texoma Blend Phase I and II: NTMWD holds a Texas water right in Lake Texoma to divert and use up to 197,000 acre-feet per year from the lake. Water from Lake Texoma is brackish, which means that the use of Texoma water requires the water to be blended with a freshwater source or desalinated. For NTMWD, there are three potential sources of water for blending: Bois d'Arc Lake, Lake O' the Pines, and Marvin Nichols Reservoir. Blending with the Wright Patman Reallocation supplies is planned after 2080. All of these sources are expected to have good quality water with TDS levels at 300 mg/l or less. The anticipated blending ratio for NTMWD water from Lake Texoma with these sources is 3:1. Additional transmission capacity will be needed by 2050 to deliver additional Lake Texoma supply to be blended for Lake Texoma Blend Phase II.

Additional Measures to Access Full Yield of Lake Lavon (Raw Water #4): If necessary, in drought conditions, NTMWD will take emergency measures to access water in Lake Lavon below elevation 467 MSL. These measures may include but are not limited to: construction of raw water pump station #4, extension and/or dredging of the pump station intake channel and utilizing floating barges equipped with pumps. Any emergency measures deemed necessary at the time will be considered to be consistent with this plan.

Expanded Wetland Reuse: The proposed Expanded Wetland Reuse project will treat return flows from wastewater treatment plants owned and operated by NTMWD. The return flows for this project come from multiple sources, including the Elm Fork Swap (see below) and existing and new wastewater treatment plants owned and operated by NTMWD that discharge to the East Fork of the Trinity River. In addition, reuse is proposed for flows from the Sabine Creek WWTP, which flows into Lake Tawakoni. There are no capital costs associated with this strategy.

Elm Fork Swap: The first source of water for the project are return flows from Dallas' (DWU) Central and Southside wastewater treatment plants, provided through a swap agreement between DWU and NTMWD. This agreement provides NTMWD return flow from DWU's Central and Southside WWTPs in equal exchange for NTMWD's return flows into DWU's reservoirs.

Additional Reuse: Additional reuse will be made available through growth in return flows from plants owned and operated by NTMWD that discharge into the East Fork of the Trinity River. It is expected that the quantity of return flows available from this source will exceed the treatment capacity of the existing East Fork Wetlands by the year 2030.

Additional Lavon Watershed Reuse: NTMWD is currently permitted for 71,882 acre-feet per year from Wilson Creek WWTP, as well as 1.01 MGD from Farmersville No. 1 WWTP, Farmersville No. 2 WWTP, and Seis Lagos WWTP. This provides a permitted constraint of 73,014 acre-feet per year. This strategy is for reuse of projected return flows beyond the current permitted amount. The only costs associated with this strategy are for permitting. Any additional nutrient removal process is a part of the Treatment and Distribution Improvements strategy.

Interim Upper Sabine Basin: NTMWD has temporary supplies through a contract with the SRA in Lake Tawakoni and Lake Fork. The total temporary contract amount from SRA is up to 40,000 acre-feet per year through October 2025. NTMWD plans to pursue an extension of these temporary supplies of 10,000 acre-feet per year until 2035. This strategy has no associated cost since it is a contract extension.

Lake O' the Pines: This strategy assumes NTMWD can obtain a contract and/or water rights for 75,000 acre-feet per year of water from Lake O' the Pines. This water would be sent to the Tawakoni Water Treatment Plant for treatment through a transmission pipeline. This strategy would come online by 2040.

Marvin Nichols Reservoir: This strategy assumes that Marvin Nichols Reservoir will be constructed and deliver water to the Leonard WTP by 2060. This strategy is a joint recommended strategy for NTMWD, TRWD and UTRWD in Region C.

Wright Patman Reallocation: This strategy is assumed to come online in 2080. The USACE selected an increase of Lake Wright Patman to an elevation of 235 MSL to be the Tentatively Selected Plan (TSP) in February 2019. This is a joint recommended strategy for NTMWD and TRWD in Region C.

Infrastructure to Treat and Deliver to Customers:

Fannin County Water Supply System: NTMWD will cooperate with Fannin County entities to develop a treated water supply system for Fannin County water users by 2040.

Treatment and Distribution Improvements: In addition to securing raw water sources, NTMWD must also treat the water, and all infrastructure to deliver this treated water to its member cities is the responsibility of NTMWD. NTMWD has a schedule of projects necessary to do this. These projects are divided into decadal needs.

Strategy Unit Costs

Costs were developed for both recommended and alternative strategies. Costs are summarized in **Table 5D.7** and **Table 5D.8.**

FIGURE 5D.6 STRATEGY UNIT COSTS – NORTH TEXAS MUNICIPAL WATER DISTRICT

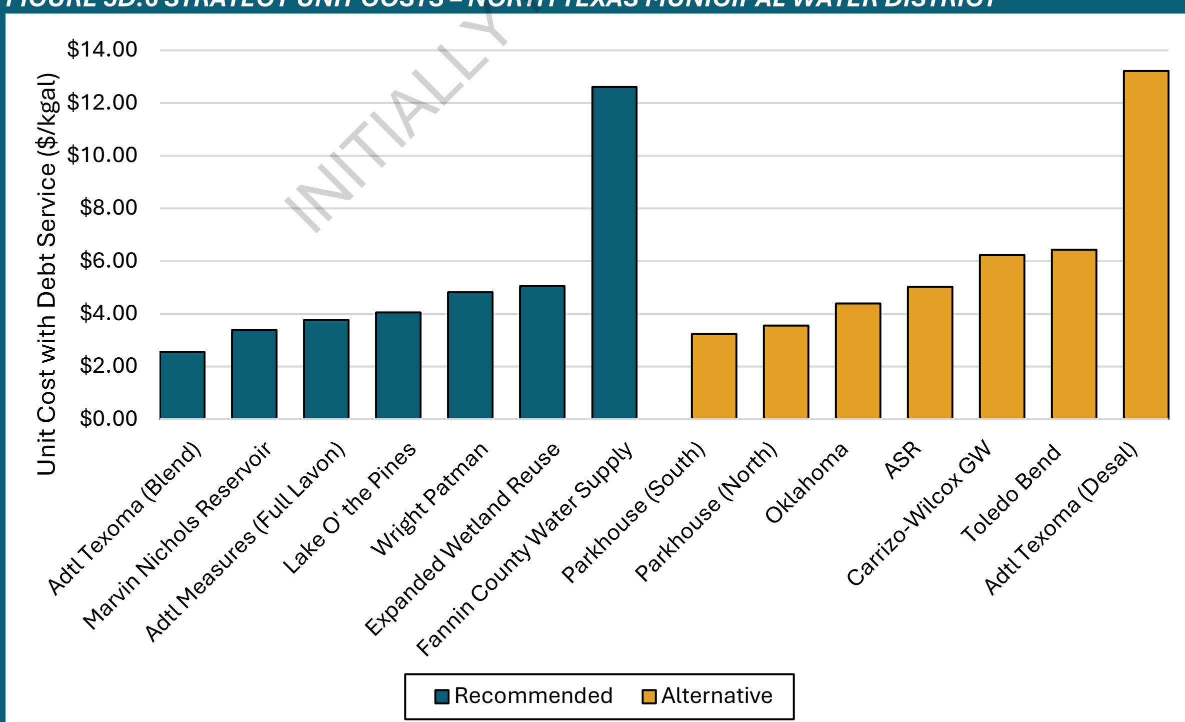


TABLE 5D.6 SUMMARY OF MAJOR WATER PROVIDER PLAN – NORTH TEXAS MUNICIPAL WATER DISTRICT

NORTH TEXAS MUNICIPAL WATER DISTRICT (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Ables Springs SUD	443	463	536	600	675	709
Allen	25,728	28,712	28,718	28,725	28,732	28,740
B H P WSC	568	656	736	811	887	963
Bear Creek SUD	3,207	5,598	6,401	6,971	7,642	7,642
Blackland WSC	916	950	1,024	1,188	1,279	1,376
Bonham	1,949	2,367	3,358	4,427	5,860	7,125
Caddo Basin SUD[a]	2,048	2,925	3,987	4,372	4,638	4,902
Cash SUD[a]	1,121	1,121	1,121	1,121	1,121	1,121
College Mound SUD[a]	645	717	970	1,501	2,047	2,593
Copeville WSC[a]	791	1,246	1,832	2,010	2,245	2,480
Crandall	992	2,121	3,548	5,153	7,277	8,725
East Fork SUD	2,940	3,491	4,143	4,714	5,206	5,752
Fairview	4,646	5,863	7,199	7,199	7,199	7,199
Farmersville	1,126	2,280	4,124	4,666	5,241	5,756
Fate	4,426	6,376	8,752	11,265	14,025	17,061
Forney	10,751	12,860	16,635	21,212	26,206	29,309
Forney Lake WSC	3,061	3,512	3,655	3,972	4,052	4,131
Frisco[a]	77,259	93,748	94,839	95,474	96,174	96,944
Garland	43,002	46,153	48,168	49,665	50,036	50,128
Gastonia Scurry SUD	1,430	1,666	2,235	3,763	5,570	6,838
Greater Texoma Utility Authority[a]						
Anna[a]	6,149	10,232	13,087	15,672	18,196	19,544
Howe[a]	206	290	363	435	513	648
Melissa[a]	1,929	2,852	3,822	4,739	5,180	5,180
Van Alstyne[a]	646	1,525	2,605	3,267	4,374	5,194
Irrigation, Collin[a]	1,640	1,640	1,640	1,640	1,640	1,640
Irrigation, Rockwall	672	0	0	0	0	0
Josephine	1,169	2,561	3,710	4,148	4,639	4,643
Kaufman	2,521	3,038	4,210	5,129	6,242	7,226
Little Elm	5,950	5,717	6,098	6,427	6,673	6,755
Lucas	3,226	3,681	3,771	3,771	3,771	3,771
McKinney	50,115	58,963	75,142	94,213	94,242	94,271
Melissa	7,015	10,710	14,586	18,255	20,020	20,020
Mesquite	27,361	28,407	31,418	35,234	39,488	43,038
Milligan WSC	387	404	474	553	641	714
Mount Zion WSC	403	415	430	443	458	476
Murphy	4,832	4,914	5,428	6,017	6,658	7,128
Nevada SUD	559	705	1,048	2,213	3,951	5,310
North Collin SUD	1,080	1,216	1,485	1,783	2,078	2,422

NORTH TEXAS MUNICIPAL WATER DISTRICT (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Parker	2,913	3,714	5,126	5,958	5,958	5,958
Plano	73,852	74,950	82,524	84,934	84,938	84,941
Princeton	6,401	12,286	16,433	18,378	20,081	20,323
Prosper	14,329	16,839	20,112	20,921	22,100	22,100
Richardson	36,313	37,811	40,116	41,376	41,678	41,992
Rockwall	15,941	19,529	25,829	32,152	33,837	34,692
Rose Hill SUD	410	492	581	668	738	815
Rowlett	11,550	12,098	14,053	14,893	15,517	15,517
Royse City	5,911	11,104	14,671	16,083	17,992	17,993
Sachse	5,250	5,599	6,348	6,630	6,815	6,815
Seis Lagos UD	656	633	665	691	707	709
Sunnyvale	3,010	3,782	4,488	4,680	4,750	4,750
Terrell	7,233	8,649	11,142	13,910	17,290	20,256
Wylie	6,935	6,830	7,157	7,372	7,372	7,372
Wylie Northeast SUD	1,851	2,278	2,807	3,006	3,086	3,086
Subtotal - Existing	***495,464***	***576,689***	***663,350***	***734,400***	***777,735***	***804,793***
Potential Future Customers						
Blue Ridge[a]	0	0	59	156	263	381
Bois d Arc MUD[a]	0	49	94	134	175	217
County-Other, Fannin[a]	0	0	0	74	168	242
Honey Grove	0	28	56	86	114	142
Leonard	0	67	182	303	452	627
Southwest Fannin County SUD	0	129	225	316	411	509
Trenton	0	0	0	0	0	0
Subtotal - Potential	***0***	***273***	***616***	***1,069***	***1,583***	***2,118***
Losses in Treatment & Delivery (5%)	*24,656*	*28,764*	*33,114*	*36,689*	*38,882*	*40,262*
TOTAL PROJECTED DEMANDS	***520,120***	***605,726***	***697,080***	***772,158***	***818,200***	***847,173***
Currently Available Water Supplies						
Bois d'Arc Lake	89,456	86,878	84,187	81,497	78,918	76,228
Lake Lavon	88,111	83,963	79,927	75,892	70,959	67,148
Lake Texoma	68,464	68,076	67,185	66,253	65,034	64,032
Lake Chapman	39,700	37,600	35,500	33,500	31,100	29,200
Lavon Watershed Reuse	69,402	73,008	73,008	73,008	73,008	73,008
Lake Bonham	1,949	2,367	3,358	3,533	3,467	3,400
East Fork Reuse (with Main Stem PS and Ray Hubbard Pass through)	102,000	102,000	102,000	102,000	102,000	102,000
Upper Sabine Basin	10,582	10,499	10,416	10,333	10,251	10,168

NORTH TEXAS MUNICIPAL WATER DISTRICT (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Direct Reuse for Irrigation (Collin & Rockwall Co)	5,350	4,678	4,678	4,678	4,678	4,678
TOTAL SUPPLIES	***475,014***	***469,069***	***460,259***	***450,694***	***439,415***	***429,862***
NEED (DEMAND-SUPPLY)	***45,106***	***136,657***	***236,821***	***321,464***	***378,785***	***417,311***
Water Management Strategies						
Conservation (Wholesale Customers)	22,895	44,335	60,965	70,459	75,346	78,621
Additional Texoma Blend Phase I	3,844	36,934	38,137	39,309	38,997	38,170
Leonard WTP	*0*	*28,959*	*28,062*	*27,166*	*26,306*	*25,409*
Wylie WTP	*3,844*	*7,975*	*10,075*	*12,143*	*12,691*	*12,761*
Additional measure to access full Lavon yield	0	12,667	11,771	10,762	9,865	8,968
Expanded Wetland Reuse	10,665	18,105	24,604	30,046	32,916	33,809
Elm Fork Swap	*9,499*	*12,638*	*11,966*	*11,966*	*11,966*	*11,966*
Additional Reuse	*1,166*	*5,467*	*12,638*	*18,080*	*20,950*	*21,843*
Sabine Creek WWTP Reuse	0	3,475	5,829	7,399	9,416	10,649
Additional Lavon Watershed Reuse	0	12,088	25,764	39,440	43,700	45,045
Interim Upper Sabine Basin	10,000	0	0	0	0	0
Lake O' the Pines	0	76,694	73,969	71,797	69,013	66,323
Additional Lake Texoma - Blend with Lake O' the Pines	0	0	24,656	23,932	23,004	22,108
Marvin Nichols Reservoir	0	0	0	148,555	148,555	148,555
Additional Lake Texoma - Blend with Marvin Nichols Supplies	0	0	0	0	49,518	49,518
Wright Patman	0	0	0	0	0	62,550
Fannin County Water Supply System	*0*	*256*	*513*	*890*	*2,463*	*3,916*
Treatment and Distribution (CIP)	*35,174*	*178,068*	*229,334*	*401,286*	*457,900*	*519,504*
TOTAL SUPPLIES FROM STRATEGIES	***47,404***	***204,298***	***265,695***	***441,699***	***500,330***	***564,316***
TOTAL SUPPLIES	***522,418***	***673,367***	***725,954***	***892,393***	***939,745***	***994,178***
RESERVE OR (SHORTAGE)	***2,298***	***67,641***	***28,874***	***120,235***	***121,545***	***147,005***
MANAGEMENT SUPPLY FACTOR	***1.00***	***1.11***	***1.04***	***1.16***	***1.15***	***1.17***

[a]Supplies from other sources.

TABLE 5D.7 SUMMARY OF COSTS FOR RECOMMENDED STRATEGIES – NORTH TEXAS MUNICIPAL WATER DISTRICT

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Conservation*	2030	78,621	Included under County Summaries in Section 5E.		
Additional Lake Texoma Blend Phase I	2030	39,309	$465,653,000	$2.46	$0.48
Additional measure to access full Lavon yield	2040	12,667	$209,348,000	$3.76	$1.00
Expanded Wetland Reuse	2030	33,809	$686,489,000	$5.05	$0.73
Sabine Creek WWTP Reuse	2040	10,649	$517,000	$0.01	$0.00
Additional Lavon Watershed Reuse	2040	45,045	$517,000	$0.00	$0.00
Interim Upper Sabine Basin	2030	10,000	No costs associated with this WMS.		
Lake O' the Pines	2040	76,694	$1,345,792,000	$4.05	$1.07
Marvin Nichols Reservoir	2060	148,555	$2,559,708,000	$3.39	$0.70
Wright Patman	2080	62,550	$1,632,513,500	$4.82	$0.91
Additional Lake Texoma Blend Phase II	2050	71,626	$997,393,000	$2.63	$0.43
Fannin County Water Supply System	*2040*	*3,916*	*$215,353,000*	*$12.61*	*$5.15*
Treatment and Distribution (CIP)	*2030*	*519,504*	*$4,684,770,000*	*N/A*	*N/A*
TOTAL NTMWD CAPITAL COSTS			**$12,798,053,500**		

[a]Conservation savings are reflected in NTMWD's customers' conservation savings. NTMWD has an extensive water conservation program, the costs for which are not reflected in this table.

TABLE 5D.8 SUMMARY OF COSTS FOR ALTERNATIVE STRATEGIES – NORTH TEXAS MUNICIPAL WATER DISTRICT

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Lake Texoma - Desalinate at Leonard	2030	33,630	$1,198,976,000	$13.22	$5.58
Carrizo-Wilcox Groundwater (Anderson County)	2040	42,000	$1,253,455,000	$6.23	$1.25
George Parkhouse Reservoir (North)	2050	94,460	$1,762,143,000	$3.56	$0.65
George Parkhouse Reservoir (South)	2050	80,472	$1,976,311,000	$3.23	$0.56
Aquifer Storage and Recovery	2050	26,456	$332,260,000	$5.02	$2.93
Toledo Bend Reservoir	2060	100,000	$2,930,008,000	$6.43	$1.43
Oklahoma	2080	50,000	$1,075,067,000	$4.39	$0.84

5.1.4 Tarrant Regional Water District

Tarrant Regional Water District (TRWD) owns and operates a system of reservoirs and a reuse facility in the Trinity River Basin. The TRWD system provides water either directly or indirectly to over 120 water user groups and is expected to provide water to additional water user groups in the future. **Table 5D.9** shows the projected demands for TRWD and all customers.

The total safe yield supply currently available from the TRWD system, accounting for delivery infrastructure limits, is about 484,000 acre-feet per year in 2030. The yield of the existing supply is expected to increase to about 491,000 acre-feet in 2040 due to additional indirect reuse and then decline to 481,500 acre-feet per year by 2080. This supply is based on the safe yield of the TRWD reservoirs, rather than the firm yield. TRWD operates its raw water system in accordance with the safe yield of the system. The firm yield available to TRWD, including reuse, is approximately 595,000 acre-feet per year in 2030.

The recommended water management strategies for TRWD are as follows:

- Conservation
- Aquifer Storage and Recovery
- Additional Richland Chambers Reuse
- Marty Leonard Wetlands
- Reuse from Fort Worth Mary's Creek Water Reclamation Facility (WRF)
- Reuse from TRA Central Regional Wastewater System (CRWS)
- Lake Tehuacana
- Carrizo-Wilcox Groundwater
- Marvin Nichols Reservoir
- Wright Patman Reallocation
- Additional Transmission Pipeline

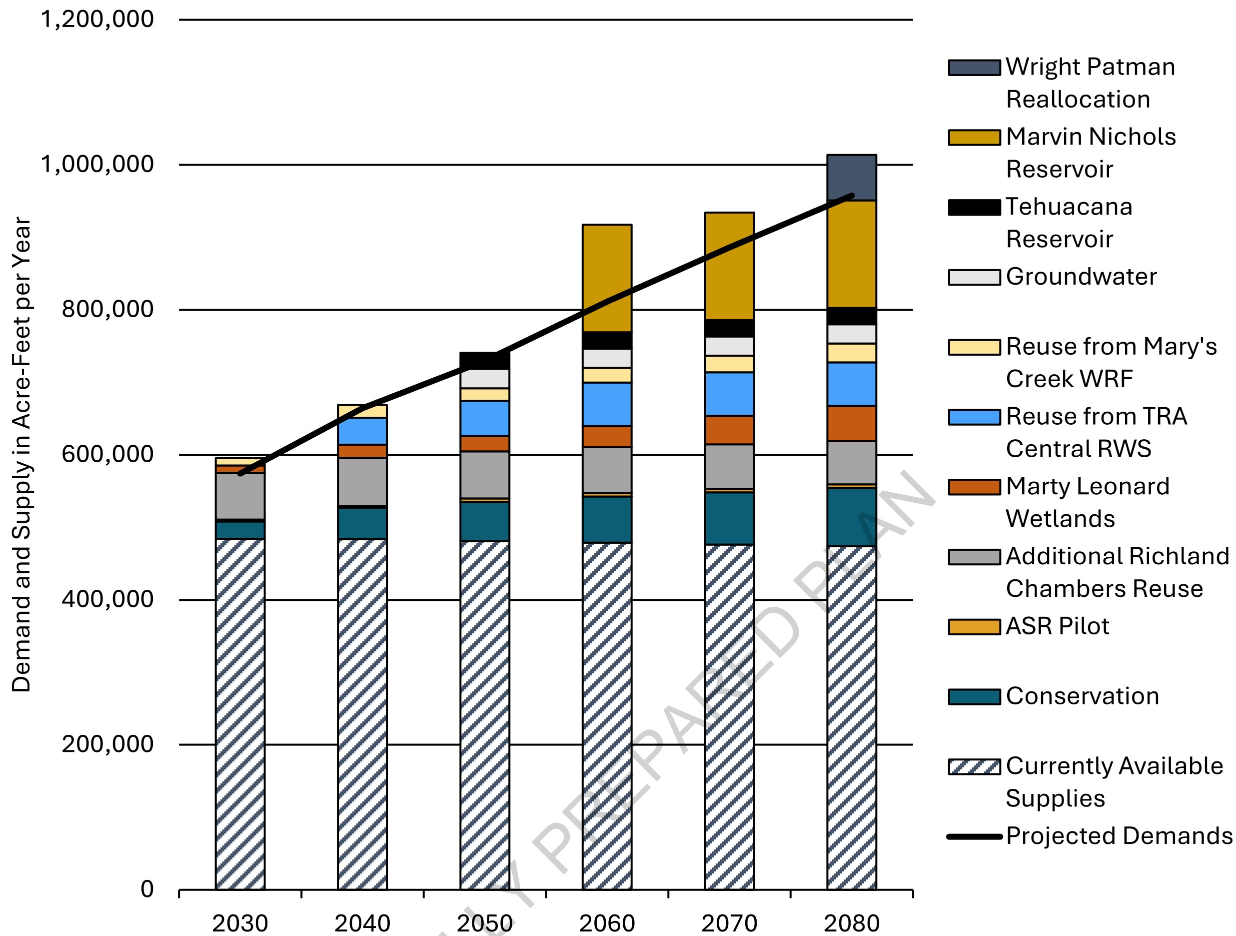
The alternative water management strategies for TRWD are:

- Toledo Bend
- Carrizo-Wilcox Groundwater (Anderson County)

Safe Yields

Safe yield is defined as the water that could have been supplied from a reservoir or reservoir system during a repeat of drought-of-record conditions, leaving some amount (in this case, one year's supply) in reserve at the minimum content.

FIGURE 5D.7 RECOMMENDED WATER MANAGEMENT STRATEGIES – TARRANT REGIONAL WATER DISTRICT



These strategies are discussed individually below and in more detail in **Appendix G**.

Conservation: Conservation for TRWD is the projected water savings from the Region C recommended water conservation program for TRWD's existing and potential customers. Not including savings from low-flow plumbing fixtures (which are built into the demand projections) and not including reuse, conservation by TRWD customers is projected to reach nearly 80,000 acre-feet per year by 2080.

Aquifer Storage and Recovery: TRWD has constructed a pilot ASR well at the TRA Tarrant County project site and is currently evaluating the potential quantities for injection and withdrawal operations. This study is on-going. Conceptually, the ASR project would treat excess surface water at an existing water treatment plant. The treated water would then be stored in the Trinity aquifer during low demand winter or spring months and normal to wet years. This could be a phased project in multiple locations.

Additional Richland Chambers Reuse (IPL): The Integrated Pipeline Project (IPL) is a joint pipeline with the City of Dallas which will deliver additional TRWD supplies from its east Texas reservoirs (Cedar Creek and Richland Chambers). This supply includes the portions of the yield from the

Richland Chambers reuse project that is currently not available due to delivery constraints. This pipeline will also have capacity to deliver the new supply created by the reuse wetlands project at Cedar Creek Reservoir described below.

Marty Leonard Wetlands (Cedar Creek Wetland) Reuse: TRWD has water rights allowing the diversion of return flows of treated wastewater from the Trinity River. TRWD has already developed a reuse project at Richland Chambers Reservoir, and a portion of the supply from this project is included in the currently available supply. The water is pumped from the Trinity River into the constructed George W. Shannon Wetlands for treatment and then pumped into Richland Chambers Reservoir. TRWD will be developing a similar reuse project at Cedar Creek Reservoir in the near future. The total permitted reuse diversion from the wetlands is 188,524 acre-feet per year, including 100,465 acre-feet per year at Richland Chambers and 88,059 acre-feet per year at Cedar Creek Reservoir. A portion of this permitted reuse will be diverted upstream as part of the Mary's Creek WRF strategy discussed below.

Reuse from Fort Worth Mary's Creek Water Reclamation Facility (WRF) Fort Worth is currently developing the Mary's Creek WWTP on the west side of Fort Worth. This facility is expected to discharge up to an average annual flow of 30 MGD of treated wastewater over the planning period. The facility is permitted for less than that amount but is expected to be expanded over time as wastewater flows increase. A portion of the wastewater effluent is planned for direct reuse by Fort Worth and its customers. The remainder will be provided to TRWD for discharge to its West Fork system and indirect reuse. This strategy utilizes reuse water already permitted by TRWD and will require transmission from Mary's Creek to the Benbrook-Eagle Mountain Connection for delivery to Eagle Mountain Lake.

Reuse from TRA Central Regional Wastewater System (CRWS): TRA will provide TRWD with reuse water from the Central RWS. These supplies will be sent to Marty Leonard Wetland, with expansions to the wetland and transmission facilities as needed.

Lake Tehuacana: Lake Tehuacana is a proposed water supply project on Tehuacana Creek in Freestone County within the Trinity River Basin. Tehuacana Creek is a tributary of the Trinity River and lies immediately south of and adjacent to Richland Creek on which the existing Richland Chambers Reservoir is located. Lake Tehuacana will connect to Richland Chambers Reservoir by a 9,000-foot channel and be operated as an integrated extension of that reservoir. The project would have a firm yield of 26,400 acre-feet per year and a safe yield of 22,330 acre-feet per year. The reservoir would store approximately 338,000 acre-feet and inundate approximately 15,000 acres. The existing spillway for Richland Chambers Reservoir was designed with enough discharge capacity to accommodate the increased flood flows from Lake Tehuacana for the probable maximum flood event. Therefore, it is assumed that the dam for Lake Tehuacana can be constructed without a spillway and can function to increase storage for the Richland Chambers-Tehuacana Reservoir and capture Tehuacana Creek flows. Developing this site will require obtaining a new water right and constructing the dam and reservoir.

Carrizo-Wilcox Groundwater: This strategy proposes to develop groundwater from the Carrizo-Wilcox and Queen City aquifers in Freestone and Anderson Counties. The groundwater would be transported approximately 28 miles to the Integrated Pipeline (IPL) near Cedar Creek Reservoir. The

IPL would then be used to move the groundwater to TRWD's service area. This strategy assumes the groundwater is mixed directly in the IPL with surface water and/or reuse water. This groundwater supply would supplement TRWD's existing water sources and provide diversity to its existing portfolio. The infrastructure required for this strategy includes 39 wells (most likely distributed over multiple well fields), well field piping, ground storage, pump station, and 28 miles of 36- to 54-inch diameter transmission pipeline.

Marvin Nichols Reservoir: This strategy assumes that Marvin Nichols Reservoir (at 328 MSL) will come online in 2060. This strategy is a joint recommended strategy for NTMWD, TRWD and UTRWD in Region C. Additionally, 20% of the supplies from Marvin Nichols Reservoir will be reserved for water users in Region D.

Wright Patman Reallocation: This strategy is assumed to come online in 2080. The USACE selected an increase of Lake Wright Patman to an elevation of 235 MSL to be the Tentatively Selected Plan (TSP) in February 2019. This is a joint recommended strategy for NTMWD and TRWD in Region C.

Additional Transmission Pipeline: As demand grows, TRWD will need to develop additional transmission infrastructure to transport raw water supplies. This strategy assumes an additional transmission pipeline with enough capacity to transport the remaining recommended strategy supplies. However, any improved system operation or additional infrastructure for TRWD is consistent with the Region C Water Plan.

RICHLAND CHAMBERS RESERVOIR

Strategy Unit Costs

Costs were developed for both recommended and alternative strategies. Costs are summarized in **Table 5D.10** and **Table 5D.11.**

FIGURE 5D.8 STRATEGY UNIT COSTS – TARRANT REGIONAL WATER DISTRICT

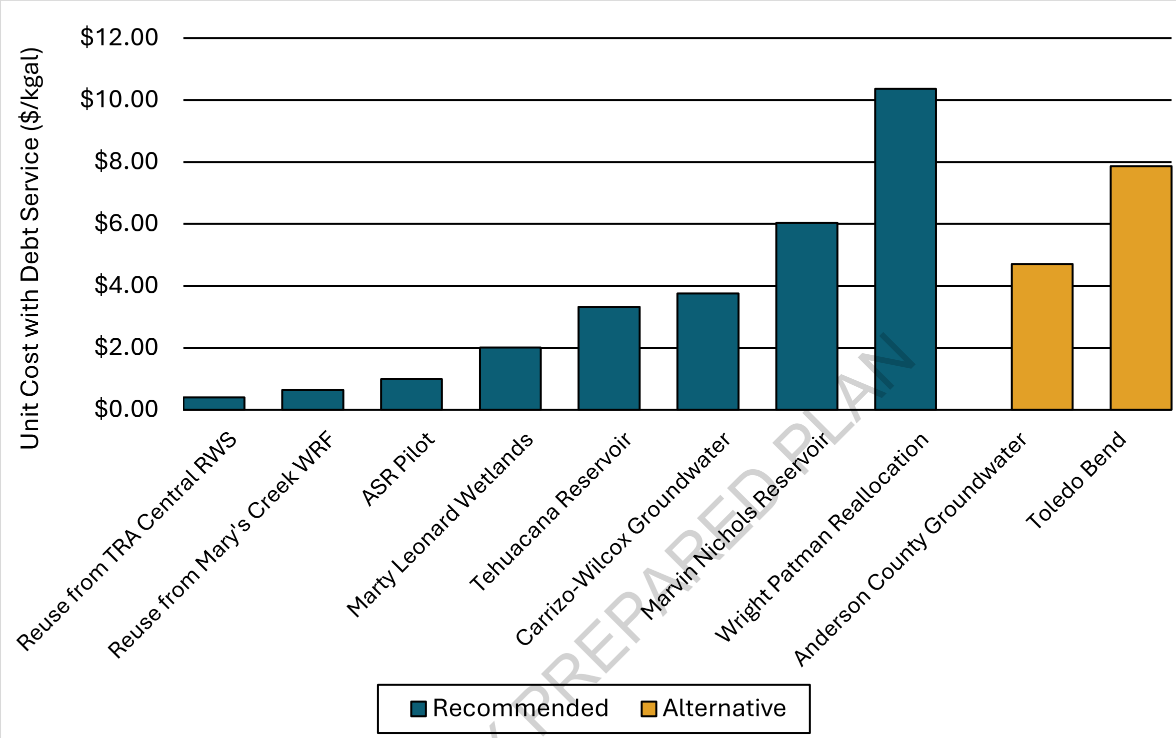


TABLE 5D.9 SUMMARY OF MAJOR WATER PROVIDER PLAN – TARRANT REGIONAL WATER DISTRICT

TARRANT REGIONAL WATER DISTRICT (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Arlington	80,032	86,767	92,519	97,212	103,524	106,911
Azle	2,497	2,860	3,210	3,529	3,880	4,266
Benbrook Water Authority	5,537	5,970	6,412	6,853	7,295	7,737
Bridgeport	986	1,006	1,029	1,041	1,055	1,070
Community WSC	1,065	1,222	1,372	1,510	1,654	1,802
East Cedar Creek FWSD	3,591	3,799	3,829	3,914	4,007	4,111
Ennis	0	0	0	0	68	627
Fort Worth	333,529	382,434	401,999	432,776	467,565	500,084
Irrigation, Kaufman	125	125	125	125	125	125
Irrigation, Tarrant	1,003	1,003	1,003	1,003	1,003	1,003
Irrigation, Wise	164	164	164	164	164	164
Kemp	281	290	303	315	329	345
Mabank	2,075	2,157	2,159	2,193	2,234	2,283
Malakoff	270	285	299	303	308	312
Mansfield	45,618	50,433	58,599	74,182	75,397	76,286

TARRANT REGIONAL WATER DISTRICT (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Midlothian	9,339	11,378	13,196	14,886	16,650	18,060
Mining, Wise	890	880	1,456	2,052	2,999	4,469
River Oaks	882	874	880	885	891	891
Rockett SUD	6,442	7,340	8,449	9,464	11,013	12,298
Runaway Bay	726	879	1,066	1,297	1,579	1,926
Springtown	1,064	1,415	1,959	2,388	2,771	3,061
Steam Electric Power, Freestone	4,761	6,652	6,652	6,652	6,652	6,652
Steam Electric Power, Jack	3,772	3,772	3,772	3,772	3,772	3,772
Steam Electric Power, Tarrant	78	3,170	3,170	3,170	3,170	3,170
Steam Electric Power, Wise	2,894	2,894	2,894	2,894	2,894	2,894
Trinidad	159	161	167	170	173	177
Tarrant County Project						
Bedford	9,288	10,000	10,169	10,708	10,708	10,708
Colleyville	10,775	10,758	10,758	10,758	10,758	10,758
Euless	7,366	7,327	7,327	7,327	7,327	7,327
Grapevine	11,535	11,535	11,535	11,535	11,535	11,535
North Richland Hills	4,484	4,484	4,484	4,484	4,484	4,484
Walnut Creek SUD	4,482	5,042	7,063	10,423	14,489	18,516
Waxahachie	843	3,567	6,487	9,449	12,684	16,222
Weatherford	5,365	6,973	8,814	10,736	12,850	15,173
West Cedar Creek MUD	1,086	1,022	1,136	1,152	1,168	1,186
West Wise SUD	659	700	739	769	801	837
Wise County WSD	2,940	3,476	4,671	5,747	7,262	8,411
Subtotal - Existing	***566,603***	***642,814***	***689,866***	***755,838***	***815,238***	***869,653***
Potential Future Customers						
Alvord	184	281	368	438	514	599
Avalon Water Supply & Sewer Service	0	25	50	100	200	300
County-Other, Tarrant	1,395	5,044	4,816	5,202	4,013	6,137
Fairfield	1,007	973	944	883	822	762
Files Valley WSC	0	0	0	0	0	0
Grand Prairie	0	2,242	2,242	2,242	2,242	2,242
Mountain Peak SUD	4,592	7,128	9,939	12,916	16,247	20,016
Newark	6	41	115	226	397	541
Pantego	69	69	69	69	69	69
Pelican Bay	0	0	0	0	143	362
Sardis Lone Elm WSC	0	1,150	2,567	2,935	2,935	2,935
South Ellis County WSC	117	230	352	474	610	758
County-Other, Jack	49	46	43	41	39	37

TARRANT REGIONAL WATER DISTRICT (AC-FT/YR)	2030	2040	2050	2060	2070	2080
County-Other, Wise	0	3,000	8,000	15,000	22,000	27,000
County-Other, Kaufman	73	84	113	132	170	193
County-Other, Parker	0	1,000	10,000	15,000	20,500	26,000
Subtotal - Potential	***7,492***	***21,313***	***39,618***	***55,658***	***70,901***	***87,951***
TOTAL PROJECTED DEMANDS	***574,095***	***664,127***	***729,484***	***811,496***	***886,139***	***957,604***
Currently Available Water Supplies						
West Fork System	96,161	95,561	94,961	94,428	93,894	93,361
Benbrook Lake	3,371	3,371	3,371	3,371	3,371	3,371
Lake Arlington	7,500	7,385	7,270	7,157	7,043	6,930
Cedar Creek Lake	157,150	155,340	153,530	151,797	150,063	148,330
Richland Chambers Reservoir	190,000	188,266	186,531	184,781	183,030	181,280
Richland Chambers Reuse	30,148	33,774	35,510	37,261	39,013	40,764
TOTAL SUPPLIES	***484,330***	***483,697***	***481,173***	***478,795***	***476,414***	***474,036***
NEED (DEMAND-SUPPLY)	***89,765***	***180,430***	***248,311***	***332,701***	***409,725***	***483,568***
Water Management Strategies						
Conservation (Wholesale Customers)	23,720	43,166	53,741	63,576	71,762	80,253
Aquifer Storage and Recovery Pilot	2,500	2,500	5,000	5,000	5,000	5,000
Additional Richland Chambers Reuse	64,436	66,691	64,955	63,204	61,452	59,701
Marty Leonard Wetlands (Cedar Creek Wetland Reuse)	10,167	18,085	20,969	29,037	38,956	48,455
Reuse from Mary's Creek WRF	10,405	17,547	17,288	20,168	23,048	25,928
Reuse from TRA Central WWTP	0	37,000	48,500	60,000	60,000	60,000
Tehuacana Reservoir	0	0	22,330	22,330	22,330	22,330
Carrizo-Wilcox Groundwater	0	0	26,800	26,800	26,800	26,800
Marvin Nichols Reservoir	0	0	0	148,555	148,555	148,555
Wright Patman Reallocation	0	0	0	0	0	62,550
Complete IPL	*0*	*60,086*	*60,086*	*60,086*	*60,086*	*60,086*
Additional Transmission	*0*	*0*	*44,486*	*60,313*	*66,452*	*72,166*
TOTAL SUPPLIES FROM STRATEGIES	***111,228***	***184,989***	***259,583***	***438,670***	***457,903***	***539,572***
TOTAL SUPPLIES	***595,558***	***668,686***	***740,756***	***917,465***	***934,317***	***1,013,608***
RESERVE OR (SHORTAGE)	***21,463***	***4,559***	***11,272***	***105,969***	***48,178***	***56,004***
MANAGEMENT SUPPLY FACTOR	***1.04***	***1.01***	***1.02***	***1.13***	***1.05***	***1.06***

TABLE 5D.10 SUMMARY OF COSTS FOR RECOMMENDED STRATEGIES – TARRANT REGIONAL WATER DISTRICT

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Conservation (Wholesale Customers)	2030	80,253	Included under County Summaries in Section 5E		
Aquifer Storage and Recovery Pilot	2030	5,000	$14,932,000	$0.98	$0.49
Additional Richland Chambers Reuse	2030	66,691	No costs associated with this WMS.		
Marty Leonard Wetlands (Cedar Creek Wetland Reuse)	2030	48,455	$673,381,000	$2.00	$0.73
Reuse from Mary's Creek WRF	2030	25,928	$68,938,000	$0.64	$0.20
Reuse from TRA Central RWS[1]	2040	60,000	$0	$0.39	$0.39
Tehuacana Reservoir	2050	22,330	$457,095,000	$3.32	$0.27
Carrizo-Wilcox Groundwater	2050	26,800	$356,209,000	$3.75	$1.89
Marvin Nichols Reservoir	2060	148,555	$4,389,997,000	$6.04	$1.29
Wright Patman Reallocation	2080	62,550	$3,127,515,500	$10.36	$1.87
Complete IPL	*2040*	*60,086*	*$1,327,000,000*	*N/A*	*N/A*
Additional Transmission Pipeline	*2050*	*72,166*	*$1,322,706,000*	*N/A*	*N/A*
TOTAL TRWD CAPITAL COSTS			***$11,737,773,500***		

1. Capital costs for wetland treatment of TRA CRWS reuse are included in the Marty Leonard Wetlands costs.

If any of the projects identified in the recommended plan are not implemented, TRWD may pursue obtaining water from Toledo Bend Reservoir or Carrizo-Wilcox Groundwater in Anderson County. These strategies are recommended as alternative strategies for TRWD.

Toledo Bend: Toledo Bend Reservoir is an existing impoundment located in the Sabine River Basin on the border of Texas and Louisiana. It was built in the 1960s by SRA and SBRA of Louisiana. The yield of the project is split equally between Texas and Louisiana. This is a joint alternative strategy to supply NTMWD, DWU, TRWD and UTRWD.

Carrizo-Wilcox Groundwater (Anderson County): This strategy proposes to develop groundwater in Anderson County and transport the water to the IPL pump station at Cedar Creek Reservoir. This alternative strategy may be pursued solely by TRWD or as a joint strategy with NTMWD.

TABLE 5D.11 SUMMARY OF COSTS FOR ALTERNATIVE STRATEGIES – TARRANT REGIONAL WATER DISTRICT

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Toledo Bend	2060	100,000	$3,526,584,000	$7.87	$1.82
Carrizo-Wilcox Groundwater (Anderson County)	2040	42,000	$823,439,000	$4.71	$1.23

5.1.5 Trinity River Authority

The Trinity River Authority (TRA) currently provides water to Region C users in several ways:

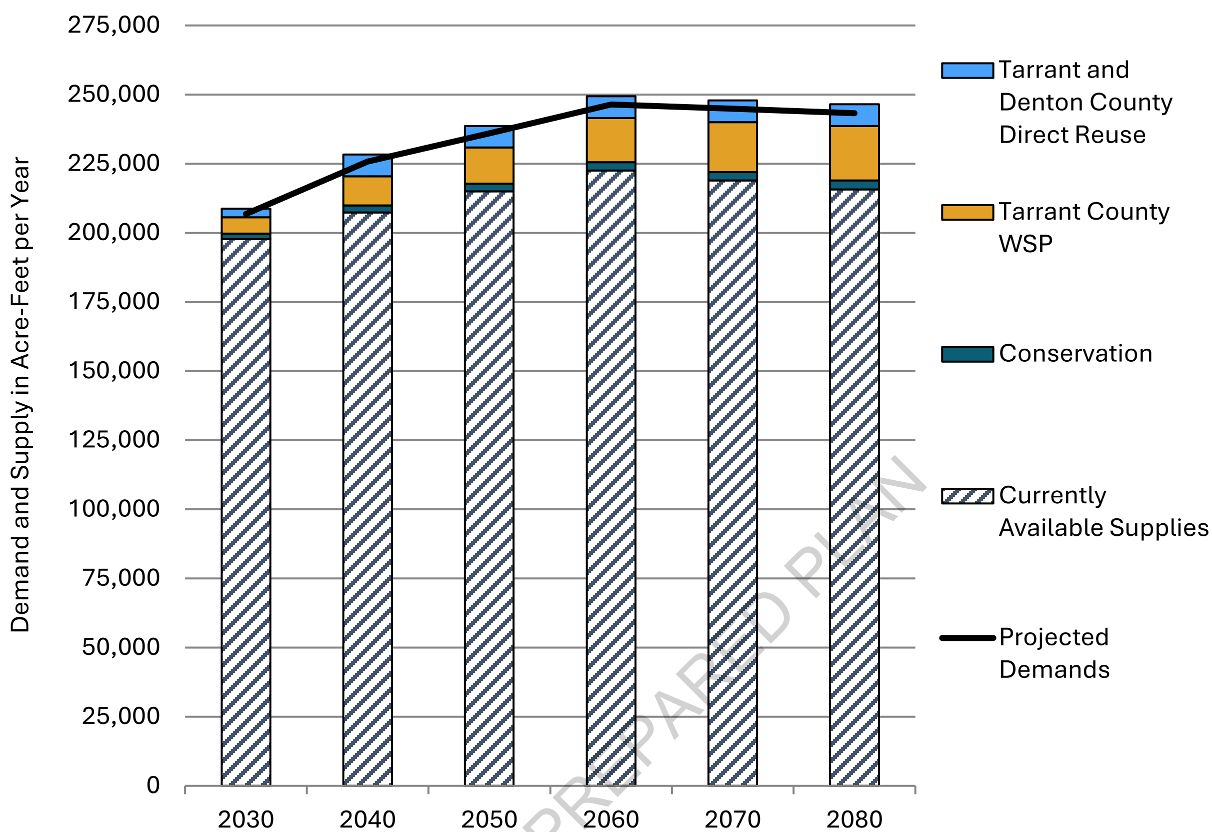
- TRA provides water from its own water rights in four different lakes (Lakes Bardwell, Navarro Mills, Joe Pool, and Livingston).
- TRA purchases and treats water from the Tarrant Regional Water District (TRWD) and supplies Tarrant County cities through the Tarrant County Water Supply Project.
- TRA contracts with TRWD and provides raw water to water users in Ellis and Freestone Counties.
- TRA provides reuse water to entities in Collin, Dallas, Denton, Ellis, Kaufman, and Tarrant Counties.

TRA also owns and operates several wastewater treatment plants. **Table 5D.12** shows the projected demands for TRA and all customers.

The following water management strategies are recommended for TRA:

- Conservation
- Tarrant County Water Supply Project
- Tarrant and Denton County Direct Reuse

FIGURE 5D.9 RECOMMENDED WATER MANAGEMENT STRATEGIES – TRINITY RIVER AUTHORITY



Trinity River Authority has no alternative water management strategies. The recommended strategies are discussed individually below. Costs were developed for recommended strategies. Costs are summarized in **Table 5D.13**.

Conservation: Conservation is the projected conservation savings for existing and potential customers of the TRA, based on the Region C recommended water conservation program. Not including savings from low flow plumbing fixtures (which are built into the demand projections) and not including reuse, conservation by TRA customers is projected to reach over 3,100 acre-feet per year by 2080.

Tarrant County Water Supply Project: As mentioned above, TRA purchases and treats water from the Tarrant Regional Water District (TRWD) and supplies Tarrant County cities through the Tarrant County Water Supply Project.

Tarrant and Denton County Direct Reuse (Alliance Corridor): The source of this reuse water would be the TRA Denton Creek RWS. TRA customers could potentially use this water for irrigation and municipal use in Denton and Tarrant Counties. It is currently shown in the plan as a joint project between TRA and the City of Fort Worth.

TABLE 5D.12 SUMMARY OF MAJOR WATER PROVIDER PLAN – TRINITY RIVER AUTHORITY

TRINITY RIVER AUTHORITY (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Ellis County Demands - Direct from TRA (Bardwell & Joe Pool)						
Ennis and Customers (Bardwell)	5,175	4,955	4,735	4,558	4,380	4,202
Waxahachie and Customers (Bardwell)	4,235	4,055	3,875	3,729	3,583	3,438
Grand Prairie (Joe Pool - Raw Water Only)	300	300	300	300	300	300
Midlothian and Customers (Joe Pool)	5,506	5,379	5,251	5,147	5,043	4,938
Ennis and Customers (Bardwell)	5,175	4,955	4,735	4,558	4,380	4,202
Subtotal – Ellis County	***15,216***	***14,689***	***14,161***	***13,734***	***13,306***	***12,878***
Navarro County Demands - Direct from TRA (Navarro Mills)						
Corsicana & Customers	17,000	15,975	14,950	13,817	12,683	11,550
Subtotal – Navarro County	***17,000***	***15,975***	***14,950***	***13,817***	***12,683***	***11,550***
Tarrant County Water Supply Project Demands						
Bedford	9,288	10,000	10,169	10,708	10,708	10,708
Colleyville	10,775	10,758	10,758	10,758	10,758	10,758
Euless	7,366	7,327	7,327	7,327	7,327	7,327
Grapevine	11,535	11,535	11,535	11,535	11,535	11,535
North Richland Hills	4,484	4,484	4,484	4,484	4,484	4,484
Subtotal - Tarrant County Project	***43,448***	***44,104***	***44,273***	***44,812***	***44,812***	***44,812***
Reuse Demands						
Central Ten Mile Red Oak Reuse to Irving	28,025	28,025	28,025	28,025	28,025	28,025
Central Ten Mile Red Oak Reuse to NTWMD	56,050	56,050	56,050	56,050	56,050	56,050
Central Ten Mile Red Oak Reuse to TRWD	25,500	37,000	48,500	60,000	60,000	60,000
Las Colinas Reuse	8,000	8,000	8,000	8,000	8,000	8,000
Mountain Creek WWTP Reuse to Midlothian	10,089	13,452	13,452	13,452	13,452	13,452
Central Ten Mile Red Oak Reuse to Irving	28,025	28,025	28,025	28,025	28,025	28,025
Central Ten Mile Red Oak Reuse to NTWMD	56,050	56,050	56,050	56,050	56,050	56,050
Subtotal - Reuse	***128,011***	***143,208***	***154,708***	***166,208***	***166,208***	***166,208***

TRINITY RIVER AUTHORITY (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Potential Future Customers						
Alliance Corridor Reuse Project (Denton Creek WWTP)	3,134	7,840	7,840	7,840	7,840	7,840
Haslet	*269*	*672*	*672*	*672*	*672*	*672*
Roanoke	*179*	*448*	*448*	*448*	*448*	*448*
Westlake	*1,209*	*3,024*	*3,024*	*3,024*	*3,024*	*3,024*
Fort Worth	*1,477*	*3,696*	*3,696*	*3,696*	*3,696*	*3,696*
Subtotal – Potential	***3,134***	***7,840***	***7,840***	***7,840***	***7,840***	***7,840***
TOTAL PROJECTED DEMANDS	***206,809***	***225,816***	***235,932***	***246,411***	***244,849***	***243,288***
Currently Available Water Supplies						
Bardwell Lake	9,410	9,010	8,610	8,287	7,963	7,640
Ennis	*5,175*	*4,955*	*4,735*	*4,558*	*4,380*	*4,202*
Waxahachie	*4,235*	*4,055*	*3,875*	*3,729*	*3,583*	*3,438*
Joe Pool Lake	14,050	13,725	13,400	13,133	12,867	12,600
Midlothian	*5,506*	*5,379*	*5,251*	*5,147*	*5,043*	*4,938*
Grand Prairie (Not Connected)	*1,184*	*1,149*	*1,115*	*1,087*	*1,059*	*1,031*
Grand Prairie (Raw Water for Irrigation)	*300*	*300*	*300*	*300*	*300*	*300*
Cedar Creek (Not Connected)	*6,071*	*5,931*	*5,790*	*5,675*	*5,560*	*5,444*
Duncanville (Not Connected)	*989*	*966*	*944*	*924*	*905*	*887*
Navarro Mills Lake	17,000	15,975	14,950	13,817	12,683	11,550
TRWD (Tarrant County Water Supply Project)	37,482	33,509	31,243	28,822	26,706	25,071
Current Reuse	128,011	143,208	154,708	166,208	166,208	166,208
Central Ten Mile Red Oak Reuse to Irving	*28,025*	*28,025*	*28,025*	*28,025*	*28,025*	*28,025*
Central Ten Mile Red Oak Reuse to NTWMD	*56,050*	*56,050*	*56,050*	*56,050*	*56,050*	*56,050*
Central Reuse to TRWD	*25,500*	*37,000*	*48,500*	*60,000*	*60,000*	*60,000*
Denton Creek RWS Reuse to Flower Mound	*222*	*556*	*556*	*556*	*556*	*556*
Direct Reuse through Ten Mile WWTP to Dallas County Irrigation	*125*	*125*	*125*	*125*	*125*	*125*
Las Colinas Reuse	*8,000*	*8,000*	*8,000*	*8,000*	*8,000*	*8,000*
Mountain Creek WWTP Reuse to Midlothian	*10,089*	*13,452*	*13,452*	*13,452*	*13,452*	*13,452*
TOTAL SUPPLIES	***197,709***	***207,381***	***215,062***	***222,581***	***218,903***	***215,707***
NEED (DEMAND -SUPPLY)	***9,100***	***18,435***	***20,870***	***23,830***	***25,946***	***27,581***

TRINITY RIVER AUTHORITY (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Waer Management Strategies						
Conservation	1,982	2,529	2,746	2,940	3,061	3,190
Tarrant County WSP	3,134	7,840	7,840	7,840	7,840	7,840
Tarrant and Denton County Direct Reuse	11,082	20,964	23,616	26,770	29,007	30,771
TOTAL SUPPLIES FROM STRATEGIES	***208,791***	***228,345***	***238,678***	***249,351***	***247,910***	***246,478***
TOTAL SUPPLIES	***1,982***	***2,529***	***2,746***	***2,940***	***3,061***	***3,190***
RESERVE OR (SHORTAGE)	***1.0***	***1.0***	***1.0***	***1.0***	***1.0***	***1.0***
MANAGEMENT SUPPLY FACTOR	***1,982***	***2,529***	***2,746***	***2,940***	***3,061***	***3,190***

TABLE 5D.13 SUMMARY OF COSTS FOR RECOMMENDED STRATEGIES – TRINITY RIVER AUTHORITY

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Conservation[a]	2030	3,190	Included under County Summaries in Section 5D.		
Tarrant County WSP	2030	19,741	$0	$1.50	$1.50
Tarrant and Denton County Direct Reuse	2030	7,840	Included in Fort Worth costs in Section 5D.		
TOTAL TRA CAPITAL COSTS			***$0***		

[a]TRA has no retail sales, so conservation savings are reflected in their customers' conservation savings.

5.1.6 Upper Trinity Regional Water District

The Upper Trinity Regional Water District (UTRWD) currently supplies treated water to users in Denton, Collin, and Tarrant County. The UTRWD also provides direct reuse for irrigation in Denton County. **Table 5D.14** shows the projected demands for UTRWD and all customers.

The currently available supplies for UTRWD include Lake Ralph Hall, water purchased from Commerce out of Chapman Lake, purchased raw water from DWU and reuse. Changes in supply over time are due primarily to changes in water availability from DWU and sedimentation of reservoirs. UTRWD owns and operates two water treatment plants. The Thomas E. Taylor Regional Water Treatment Plant and the Tom Harpool Regional Water Treatment Plant.

In addition to conservation, UTRWD considered multiple strategies to meet its projected long-term water needs. These include:

- Lake Ralph Hall Indirect Reuse
- Purchase water from Dallas County Park Cities MUD
- Purchase Lake Chapman water from Sulphur Springs for up to 6 MGD

- Marvin Nichols Reservoir
- George Parkhouse North
- George Parkhouse South
- Red River Off-Channel Reservoir
- Water from Oklahoma
- Additional Supplies from the Sulphur River Basin
- Develop new groundwater
- Aquifer Storage and Recovery
- Wright Patman Reallocation
- Lake Texoma
- Toledo Bend

The recommended water management strategies for UTRWD include the following:

- Conservation
- Additional Supplies from DWU (up to current contracts)
- Additional supplies from Park City MUD (through exchange with DWU)
- Additional supplies from Lake Chapman through Sulphur Springs
- Additional DWU (Contract Increase)
- Lake Ralph Hall Indirect Reuse
- Additional Direct Reuse
- Marvin Nichols Reservoir
- Additional Indirect Reuse
- Treatment and Distribution System Improvements

Brief descriptions of the recommended strategies are discussed individually below.

Conservation: Conservation is the projected conservation savings for UTRWD's existing and potential customers, based on the Region C recommended water conservation program. Not including savings from low-flow plumbing fixtures and not including reuse, conservation by UTRWD customers is projected to reach nearly 30,600 acre-feet per year by 2080.

Additional Supplies from DWU (Up to Current Contracts): UTRWD's current contracts with DWU indicate that DWU will supply (1) water needed for several specific water suppliers in Denton County plus an additional 10 MGD and (2) an additional amount equal to 40 percent of UTRWD's supplies from Chapman Lake. Based on projected demands, the contracts would provide up to an additional 18,221 acre-feet per year in 2080. UTRWD is currently using less than the amount in this contract (due to the availability of other water supplies) but plans to eventually use the full contracted amount.

Additional DWU (Contract Increase): UTRWD plans to increase its contracted amount with DWU, the increased contracts could provide up to 11,210 acre-feet per year in 2080.

Additional Supplies from Park City MUD (Grapevine Lake – Lewisville Lake Exchange): UTRWD has a contract with Dallas County Park Cities MUD to purchase up to 16,000 acre-feet per year of Park Cities water from Grapevine Lake and exchange it for DWU water from Lewisville Lake. UTRWD is negotiating with DWU on a contract for this exchange. It is assumed that no new infrastructure will be needed to access the water from Lake Lewisville. The reliable supply of the Park Cities' water in Lake Grapevine is approximately 5,500 acre-feet per year based on the yield of Lake Grapevine. The capital costs associated with this strategy are assumed at $0. The impacts of this project are negligible to none since the water is already permitted and the strategy is using existing infrastructure.

Additional Supplies from Lake Chapman: UTRWD has a contract with Sulphur Springs for up to 6 MGD from Lake Chapman. UTRWD will be seeking an interbasin transfer permit to deliver the water to its service area in the Trinity River Basin. The reliable quantity of water is estimated at approximately 3,000 acre-feet per year based on the firm yield of Lake Chapman. It is assumed that the existing infrastructure from Lake Chapman can move the water to UTRWD's service area. The capital costs associated with this strategy are assumed at $0. The impacts of this project are negligible to none since the water is already permitted and the strategy is using existing infrastructure.

Lake Ralph Hall Indirect Reuse: UTRWD will be seeking a state water right to reuse return flows up to 27,000 acre-feet per year from water originating from Lake Ralph Hall, providing approximately 20,000 acre-feet per year available by 2080. The source of this reuse water will be various UTRWD WWTPs in the Lewisville Lake Basin, based on a percentage of effluent that originates from Lake Ralph Hall. This reclaimed water would augment UTRWD's supply.

Additional Direct Reuse: UTRWD plans to develop up to an additional 2,240 acre-feet per year of direct reuse in Denton County. The specific location of this supply is uncertain and will depend on demands in UTRWD's service area.

Marvin Nichols Reservoir: This strategy assumes that Marvin Nichols Reservoir (at 328 feet MSL) will come online in 2060. This strategy is a joint recommended strategy for NTMWD, TRWD and UTRWD in Region C.

Additional Indirect Reuse: The source for this strategy will be the maximum allowable indirect reuse made available from implementation of new water supplies, including additional water from Lake Chapman, Marvin Nichols Reservoir, and other sources that may become available to UTRWD.

Water Treatment and Distribution Improvements: UTRWD will need to make improvements to its water treatment and distribution system to meet the demands of its customers. UTRWD has developed a capital improvement plan with specific projects through 2039. These projects will not provide additional supplies to UTRWD but are necessary to implement the water supply strategies included in this plan. Estimated costs for improvements after 2040 are also included.

FIGURE 5D.10 RECOMMENDED WATER MANAGEMENT STRATEGIES – UPPER TRINITY REGIONAL WATER DISTRICT

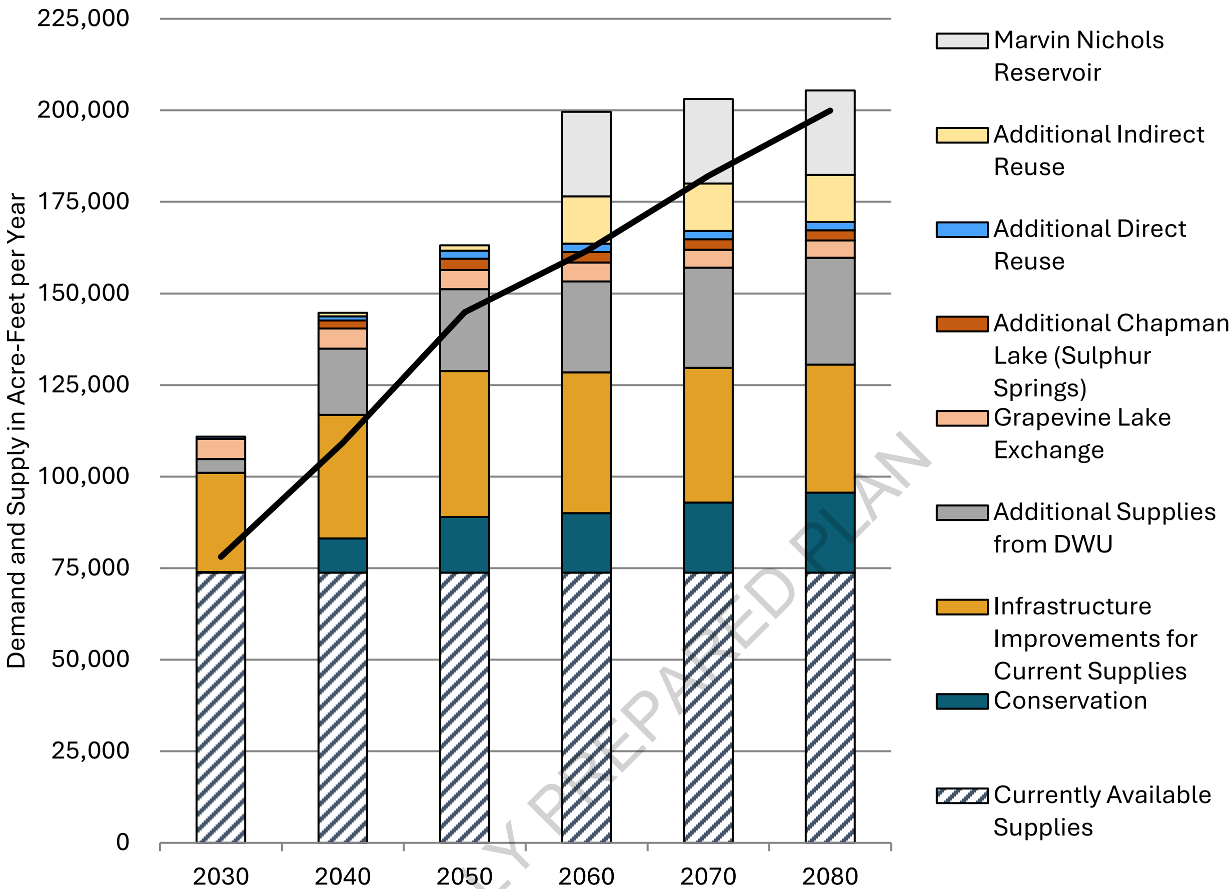


TABLE 5D.14 SUMMARY OF MAJOR WATER PROVIDER PLAN – UTRWD

UPPER TRINITY REGIONAL WATER DISTRICT (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Argyle WSC	2,059	2,877	4,037	5,152	5,980	6,597
Aubrey	190	660	1,700	3,082	3,707	3,707
Celina	10,279	16,728	25,898	24,950	28,236	31,046
Corinth	4,884	5,255	6,543	6,732	7,008	7,008
Cross Timbers WSC	1,262	1,712	2,239	2,828	3,561	4,349
Denton County FWSD 7	3,194	3,367	3,367	3,367	3,367	3,367
Denton County FWSD 10	324	323	323	323	323	323
Denton County FWSD 11-C	363	569	786	1,006	1,248	1,515
Flower Mound	15,473	20,820	27,050	27,061	27,076	27,076
Highland Village	2,256	2,644	2,827	2,974	3,112	3,112
Irrigation, Denton	1,457	2,018	3,137	3,137	3,137	3,137
Justin	1,196	1,671	2,342	3,284	4,603	6,452
Krum	0	1,424	2,117	3,041	4,273	5,917
Lake Cities Municipal Utility Authority	2,411	2,913	3,050	3,082	3,102	3,102
Lewisville	3,979	5,348	5,717	5,794	5,907	5,907

UPPER TRINITY REGIONAL WATER DISTRICT (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Manufacturing, Denton	30	31	33	34	35	36
Mustang SUD	17,081	23,742	30,369	36,941	42,216	46,764
Northlake	3,418	3,792	4,721	5,557	6,404	7,033
Pilot Point	84	434	1,123	1,879	2,173	2,318
Ponder	173	368	698	917	1,178	1,487
Providence Village WCID	909	904	904	904	904	904
Sanger	0	1,057	1,460	2,147	2,929	3,915
Subtotal - Existing	***71,022***	***98,657***	***130,441***	***144,192***	***160,479***	***175,072***
Potential Future Customers						
Bolivar WSC	356	685	1,023	1,361	1,851	2,480
County-Other, Denton	3,060	4,820	6,592	8,364	11,022	12,793
County-Other, Wise	0	0	0	0	0	0
Ladonia	0	14	62	153	226	226
Subtotal - Potential	***3,416***	***5,519***	***7,677***	***9,878***	***13,099***	***15,499***
Losses in Treatment and Delivery	*3,649*	*5,108*	*6,749*	*7,547*	*8,522*	*9,372*
TOTAL PROJECTED DEMANDS	***78,087***	***109,284***	***144,867***	***161,617***	***182,100***	***199,943***
Currently Available Water Supplies						
DWU[a]	44,665	50,622	56,172	55,174	54,001	52,631
Lake Chapman	11,292	11,023	10,755	10,486	10,217	9,948
Chapman Reuse	3,388	4,409	5,378	5,243	5,109	4,974
Direct Reuse	897	897	897	897	897	897
Ralph Hall	40,580	40,525	40,470	40,393	40,317	40,240
TOTAL SUPPLIES	***100,822***	***107,476***	***113,672***	***112,193***	***110,541***	***108,690***
TOTAL SUPPLIES LIMITED BY WTP CAPACITY (65 MGD AVERAGE ANNUAL PLUS DIRECT REUSE)	***73,762***	***73,762***	***73,762***	***73,762***	***73,762***	***73,762***
NEED (DEMAND-SUPPLY)	***4,325***	***35,522***	***71,105***	***87,855***	***108,338***	***126,181***
Contracted Amount from DWU	***48,397***	***57,522***	***67,248***	***68,788***	***70,138***	***70,675***
Water Management Strategies						
Conservation (Wholesale Customers)	215	9,353	15,186	16,287	19,175	21,845
Additional Supplies from DWU	3,732	18,110	22,286	24,824	27,347	29,254
Up to Current Contracts[a]	3,732	6,900	11,076	13,614	16,137	18,044
Contract Increase	0	11,210	11,210	11,210	11,210	11,210
Ralph Hall Indirect Reuse	12,174	16,204	20,204	20,120	20,046	20,007
Additional Direct Reuse	560	1,121	2,240	2,240	2,240	2,240

UPPER TRINITY REGIONAL WATER DISTRICT (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Grapevine Lake Exchange	5,536	5,480	5,309	5,109	4,909	4,709
Additional Chapman Lake (Sulphur Springs)	0	2,242	2,994	2,919	2,844	2,770
Additional Indirect Reuse	0	897	1,497	12,985	12,947	12,910
Marvin Nichols Reservoir	0	0	0	23,050	23,050	23,050
Infrastructure Improvements for Current Supplies	27,060	33,714	39,910	38,431	36,779	34,928
Treatment and Distribution (CIP)	*48,502*	*76,647*	*92,200*	*127,438*	*127,922*	*127,628*
TOTAL SUPPLIES FROM STRATEGIES	***49,277***	***87,121***	***109,626***	***145,965***	***149,337***	***151,713***
TOTAL SUPPLIES	***123,039***	***160,883***	***183,388***	***219,727***	***223,099***	***225,475***
RESERVE OR (SHORTAGE)	***44,952***	***51,599***	***38,521***	***58,110***	***40,999***	***25,532***
MANAGEMENT SUPPLY FACTOR	***1.58***	***1.47***	***1.27***	***1.36***	***1.23***	***1.13***

[a]UTRWD's current contracts with DWU indicate that DWU will supply 1) water needed for several specific water suppliers in Denton County + 10 MGD and 2) an additional amount equal to 40% of UTRWD's supplies from Chapman.

TABLE 5D.15 SUMMARY OF COSTS FOR RECOMMENDED STRATEGIES – UPPER TRINITY REGIONAL WATER DISTRICT

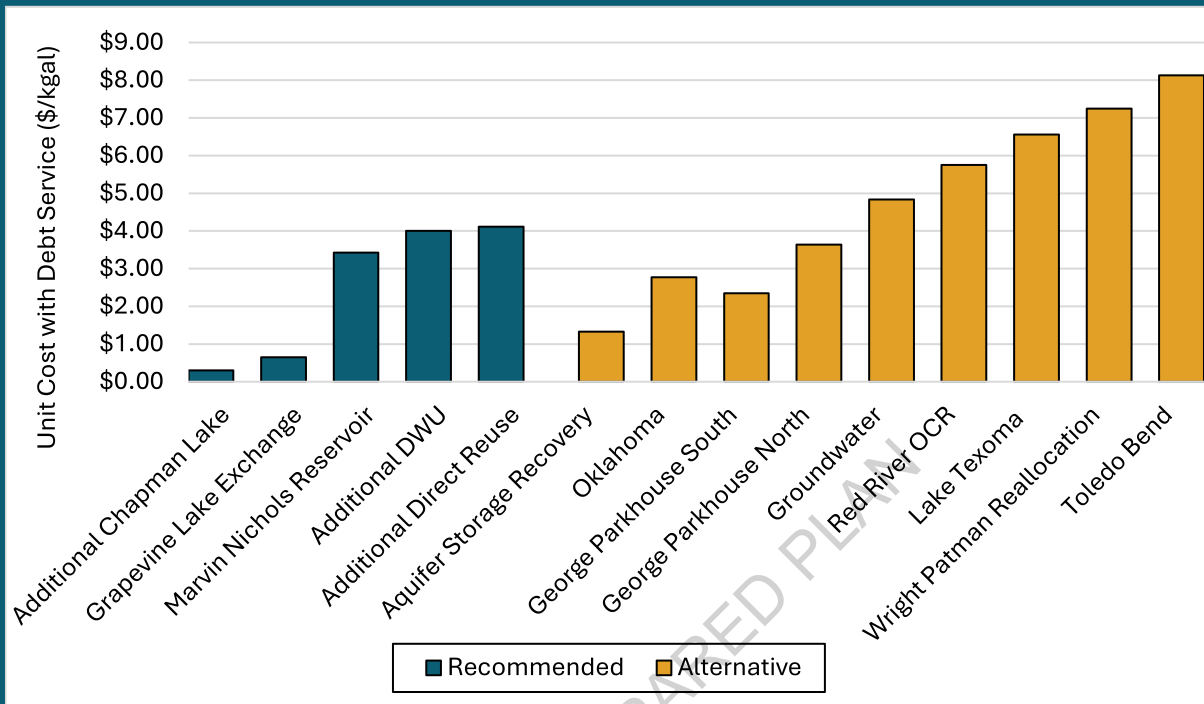
STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Conservation[a]	2030	21,845	Included under County Summaries in Section 5D.		
Additional Supplies from DWU Up to Current Contracts[b]	2030	18,044	$0	$4.00	$4.00
Additional Supplies from DWU Contract Increase	2040	11,210	$0	$4.00	$4.00
Ralph Hall Indirect Reuse	2030	20,204	No costs associated with this WMS.		
Additional Direct Reuse	2030	2,240	$45,536,000	$4.11	$0.72
Grapevine Lake Exchange	2030	5,536	$0	$0.65	$0.65
Additional Chapman Lake (Sulphur Springs)	2040	2,994	$0	$0.30	$0.30
Additional Indirect Reuse	2040	12,985	No costs associated with this WMS.		
Marvin Nichols Reservoir	2060	23,050	$415,266,000	$3.42	$0.60
Infrastructure Improvements for Current Supplies	2030	39,910	Included in Treatment and Distribution (CIP) costs.		
Treatment and Distribution (CIP)	*2030*	*127,922*	*$3,442,807,000*	*N/A*	*N/A*
TOTAL UTRWD CAPITAL COSTS			***$3,903,609,000***		

[a]UTRWD has no retail sales, so conservation savings are reflected in their customers' conservation savings.

[b]UTRWD's current contracts with DWU indicate that DWU will supply 1) water needed for several specific water suppliers in Denton County + 10 MGD and 2) an additional amount equal to 40% of UTRWD's supplies from Chapman.

Strategy Unit Costs

FIGURE 5D.11 STRATEGY UNIT COSTS – UPPER TRINITY REGIONAL WATER DISTRICT



If any of the projects identified in the recommended plan are not implemented, UTRWD may wish to pursue alternative strategies. The following alternative water management strategies are recommended for UTRWD:

- George Parkhouse Reservoir (North)
- George Parkhouse Reservoir (South)
- Red River Off-Channel Reservoir
- Lake Texoma
- Toledo Bend
- Oklahoma
- Additional Reuse
- Aquifer Storage and Recovery
- New Groundwater
- Wright Patman Reallocation

Developing Additional Supplies from the Sulphur River Basin, which is not listed as a recommended or alternate strategy, may be developed with other strategies should water become available through purchase or acquisition. Such a modification to a recommended strategy is considered consistent with the Region C Water Plan.

TABLE 5D.16 SUMMARY OF COSTS FOR ALTERNATIVE STRATEGIES – UPPER TRINITY REGIONAL WATER DISTRICT

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Lake Texoma	2030	25,000	$809,697,000	$6.55	$1.18
Oklahoma	2040	55,000	$645,268,000	$2.77	$0.82
Groundwater	2040	10,000	$209,091,000	$4.84	$1.35
Aquifer Storage Recovery	2040	2,500	$11,232,000	$1.32	$0.57
George Parkhouse North	2050	94,460	$1,811,487,000	$3.64	$0.64
George Parkhouse South	2050	34,488	$446,934,700	$2.34	$0.33
Red River Off Channel Reservoir	2060	15,000	$334,802,000	$5.75	$1.18
Toledo Bend	2060	50,000	$1,877,953,000	$8.13	$1.75
Wright Patman Reallocation	2080	9,007	$251,428,700	$7.24	$1.27

Lake Ralph Hall Spillway Construction

5.2 Recommended Strategies for Regional Water Providers

5.2.1 City of Corsicana

The City of Corsicana provides municipal and manufacturing water to the majority of Navarro County and portions of Dallas, Ellis, Hill, and Limestone Counties. Future projected demands include municipal and manufacturing demands. **Table 5D.17** lists the projected demands for Corsicana and customers.

The city's current water sources include Lake Halbert, Richland Chambers Reservoir, and Navarro Mills Lake. The city has a water right for 13,650 acre-feet per year from Richland Chambers Reservoir and they are authorized to divert and use 4,003 acre-feet of water from Lake Halbert.

The supply currently available to Corsicana from Navarro Mills Reservoir is limited to 11,210 acre-feet per year because of the existing water treatment plant capacity. The supply from Lake Halbert and Richland Chambers is limited to 2,242 acre-feet per year for the same reason.

The recommended strategies to meet the needs of Corsicana and its customers include:

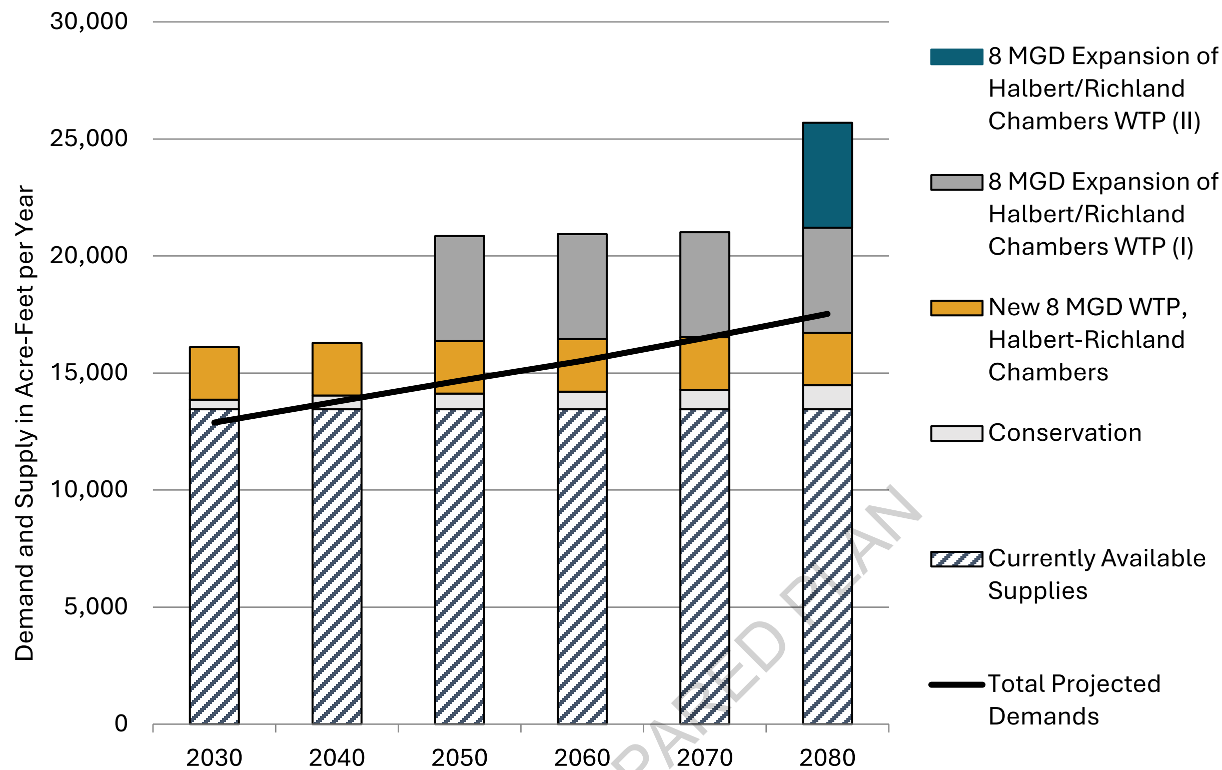
- Conservation
- New Halbert/Richland Chambers WTP
- Expansions of Halbert/Richland Chambers WTP

Conservation: Conservation is the projected conservation savings for the City of Corsicana and its existing and potential customers, based on the Region C recommended water conservation program. Not including savings from low-flow plumbing fixtures (which are built into the demand projections), conservation by Corsicana and its customers is projected to reach 1,029 acre-feet per year by 2080.

New Water Treatment Plant to treat water delivered from Richland Chambers Lake to Lake Halbert: The existing Water Treatment Plant at Lake Halbert has a peak capacity of 4 MGD. The facilities are aging, and Lake Halbert has no reliable supply. Corsicana has already built a pipeline and a 4 MGD pump station from Richland Chambers reservoir to Lake Halbert. In order to increase the reliable water supply, the city will increase the capacity of the Richland Chambers pump station and construct a new 8 MGD water treatment plant, taking the existing 4 MGD plant out of service.

Water Treatment Plant Expansions: As demands for treated water increase, Corsicana will expand the Lake Halbert Water Treatment Plant twice (by an additional 8 MGD during each expansion). This expansion will require an expansion of the pump station at Richland Chambers Reservoir to deliver the additional water to the Halbert treatment plant.

FIGURE 5D.12 RECOMMENDED WATER MANAGEMENT STRATEGIES – CORSICANA



Strategy Unit Costs

Costs were developed for both recommended strategies. Costs are summarized in **Table 5D.18** and **Table 5D.19**.

FIGURE 5D.13 STRATEGY UNIT COSTS – CORSICANA

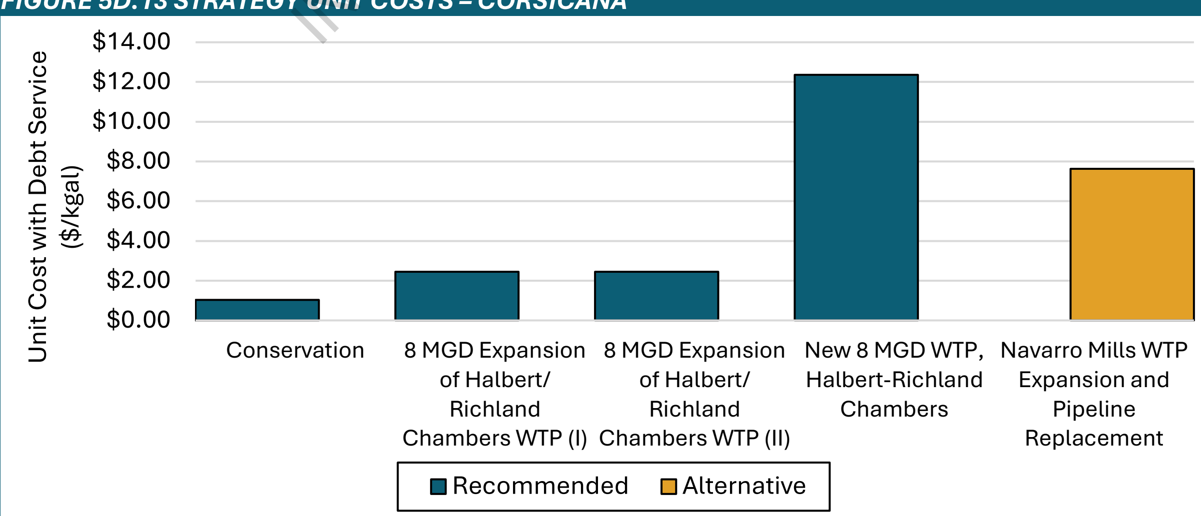


TABLE 5D.17 SUMMARY OF MAJOR WATER PROVIDER PLAN – CORSICANA

CORSICANA (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Corsicana	6,265	6,688	7,053	7,368	7,716	8,098
B and B WSC	307	337	363	387	413	442
Blooming Grove	170	176	191	204	221	239
Chatfield WSC	344	368	389	408	429	452
Corbet WSC	211	225	238	249	261	275
County-Other, Hill	235	241	245	250	255	261
Dawson	134	135	137	136	136	135
Kerens	169	155	143	133	123	114
M E N WSC	512	589	654	718	789	866
Manufacturing, Navarro	1,629	1,688	1,750	1,814	1,880	1,949
Navarro Mills WSC	288	308	325	341	357	376
Corsicana	6,265	6,688	7,053	7,368	7,716	8,098
Post Oak SUD	870	884	902	919	931	935
Rice Water Supply and Sewer Service	1,106	1,316	1,559	1,821	2,121	2,463
TOTAL PROJECTED DEMANDS	***12,883***	***13,779***	***14,666***	***15,522***	***16,498***	***17,526***
Currently Available Water Supplies						
Lake Halbert and Richland Chambers System	13,843	13,833	13,823	13,803	13,783	13,763
Navarro Mills Reservoir	17,000	15,975	14,950	13,817	12,683	11,550
TOTAL SUPPLIES	***30,843***	***29,808***	***28,773***	***27,620***	***26,466***	***25,313***
TOTAL SUPPLIES LIMITED BY WTP (20 MGD Navarro Mills, 4 MGD Halbert)	***13,452***	***13,452***	***13,452***	***13,452***	***13,452***	***13,452***
NEED (DEMAND - SUPPLY)	***0***	***327***	***1,214***	***2,070***	***3,046***	***4,074***
Water Management Strategies						
Conservation (retail)	327	459	513	558	611	671
Conservation (wholesale)	87	128	158	191	227	358
New 8 MGD Halbert/Richland Chambers WTP (4 MGD increase from current plant)	2,242	2,242	2,242	2,242	2,242	2,242
8 MGD Expansion of Halbert/Richland Chambers WTP (I)	0	0	4,484	4,484	4,484	4,484
8 MGD Expansion of Halbert/Richland Chambers WTP (II)	0	0	0	0	0	4,484
TOTAL SUPPLIES FROM STRATEGIES	***2,656***	***2,829***	***7,397***	***7,475***	***7,564***	***12,239***
TOTAL SUPPLIES	***16,108***	***16,281***	***20,849***	***20,927***	***21,016***	***25,691***
SURPLUS OR (SHORTAGE)	***3,225***	***2,502***	***6183***	***5,405***	***4,518***	***8,165***
MANAGEMENT SUPPLY FACTOR	***1.25***	***1.18***	***1.42***	***1.35***	***1.27***	***1.47***

TABLE 5D.18 SUMMARY OF COSTS FOR RECOMMENDED STRATEGIES – CORSICANA

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Conservation (retail)	2030	671	$150,000	$1.04	$0.65
Conservation (wholesale)	2030	358	Included under County Summaries in Section 5D.		
New 8 MGD WTP, Halbert/ Richland Chambers	2030	2,242	$87,223,000	$12.36	$5.87
8 MGD Expansion of Halbert/ Richland Chambers WTP (I)	2050	4,484	$34,694,000	$2.46	$1.16
8 MGD Expansion of Halbert/ Richland Chambers WTP (II)	2080	4,484	$34,694,000	$2.46	$1.16
TOTAL CORSICANA CAPITAL COSTS			***$156,761,000***		

If any of the projects identified in the recommended plan are not implemented, Corsicana may wish to pursue alternative strategies.

The following alternative water management strategies are recommended for Corsicana:

- Navarro Mills WTP Expansion and Pipeline Replacement

TABLE 5D.19 SUMMARY OF COSTS FOR ALTERNATIVE STRATEGIES – CORSICANA

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Navarro Mills WTP Expansion and Pipeline Replacement	2050	5,605	$194,881,000	$7.63	$1.83

5.2.2 Greater Texoma Utility Authority

The Greater Texoma Utility Authority (GTUA) is a political subdivision of the State and is governed by a Board of Directors. GTUA provides its member cities with assistance in financing and construction of water and wastewater facilities. GTUA may also be requested to provide operations services for water and wastewater facilities by member cities and others.

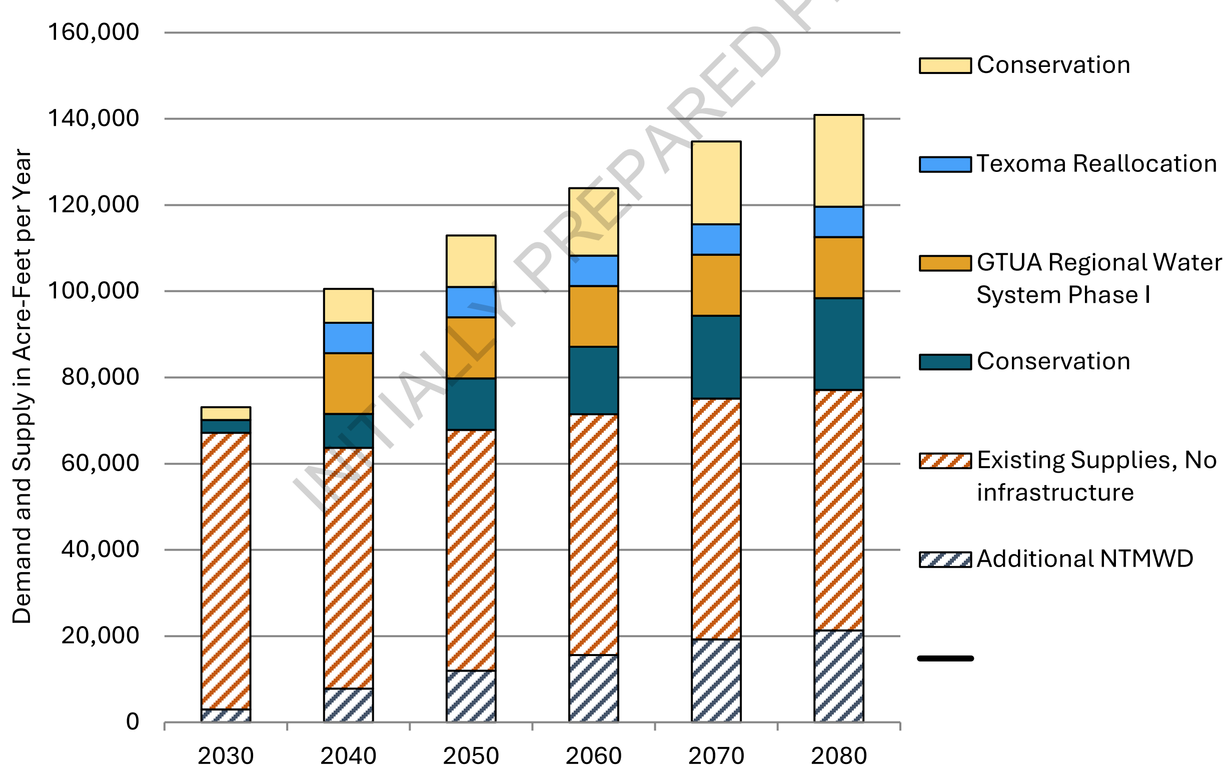
An example of such services is the Collin-Grayson Municipal Alliance (CGMA). The CGMA is a pipeline to deliver water from NTMWD to Anna, Howe, Melissa and Van Alstyne in southern Grayson and northern Collin Counties.

The GTUA has a water right for 83,200 acre-feet per year from Lake Texoma, which includes several water users in the surrounding Cooke, Collin, Denton, and Grayson counties. Of this amount, approximately 19,000 acre-feet per year is currently available through existing infrastructure. Other users with contracted water rights in Lake Texoma have no infrastructure to transport or treat the supplies. GTUA is currently evaluating a Regional Water System to treat and transport these supplies. **Table 5D.20** lists the projected demands for GTUA and customers.

To meet the needs of GTUA's current and future demands, the following strategies are recommended:

- Conservation
- Additional Supplies from NTMWD
- GTUA Regional Water System – Phase I
- GTUA Regional Water System – Phase II
- Parallel CGMA Pipeline (NTMWD)

FIGURE 5D.14 RECOMMENDED WATER MANAGEMENT STRATEGIES – GREATER TEXOMA RIVER AUTHORITY



GTUA has no alternative water management strategies. The recommended strategies are discussed individually below.

Conservation: Conservation is the projected conservation savings for the GTUA's existing and potential customers, based on the recommended Region C water conservation program. Water savings by the GTUA and customers is projected to reach over 3,800 acre-feet per year by 2080.

GTUA Regional Water System (Phase 1): A regional water system strategy was developed for communities in northern Denton and Grayson counties. Several of the entities in this area hold water rights in Lake Texoma but currently do not have access to this resource. The source water for the regional system comes from three distinct strategies: 1) utilizing existing contracts and water rights in Lake Texoma, 2) brackish groundwater in Grayson County, and 3) reallocation of storage in Lake Texoma for new supply. The regional system would be developed in two phases with Phase 1 using the existing supplies in Lake Texoma and the brackish groundwater. Phase 2 would use the water from reallocation. GTUA would develop, treat and distribute the treated water to the participants.

GTUA Regional Water System (Phase 2): Phase 2 of the regional system would utilize Texoma water from reallocation. This strategy proposes to reallocate 50,000 acre-feet of storage in Lake Texoma from hydropower to water supply. The Texas share of the reallocation would be 25,000 acre-feet. Based on WAM modeling, the amount of supply from this storage would be 28,000 acre-feet per year. After treatment, the available supply is 23,800 acre-feet per year. This water would be distributed to two customers through a parallel pipeline system.

Parallel CGMA Pipeline (NTMWD): The proposed parallel pipeline for the CGMA is needed to increase the delivery capacity for the system beyond 21,200 acre-feet per year.

TABLE 5D.20 SUMMARY OF COSTS FOR RECOMMENDED STRATEGIES – GREATER TEXOMA RIVER AUTHORITY

GREATER TEXOMA RIVER AUTHORITY (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Denison[a]	12,204	12,204	12,204	12,204	12,204	12,204
Pottsboro[a]	5,650	5,650	5,650	5,650	5,650	5,650
NTMWD (Collin-Grayson Municipal Alliance)						
Anna	6,149	10,232	13,087	15,672	18,196	19,544
Howe	206	290	363	435	513	648
Melissa	1,929	2,852	3,822	4,739	5,180	5,180
Van Alstyne	646	1,525	2,605	3,267	4,374	5,194
Sherman[a]	37,209	37,209	37,209	37,209	37,209	37,209
Subtotal - Existing	**63,993**	**69,962**	**74,940**	**79,176**	**83,326**	**85,629**
Potential Future Customers						
GTUA Regional System						
Celina	0	7,450	26,450	26,450	26,450	26,450
Collinsville	0	500	500	500	500	500
Mustang SUD	0	2,000	6,800	6,800	6,800	6,800
Northwest Grayson County WCID 1	0	500	500	500	500	500
Two Way SUD	0	1,500	1,500	1,500	1,500	1,500
Whitesboro	0	1,500	1,500	1,500	1,500	1,500
Woodbine WSC	0	700	700	700	700	700

GREATER TEXOMA RIVER AUTHORITY (AC-FT/YR)	2030	2040	2050	2060	2070	2080
Subtotal - Potential	***0***	***14,150***	***37,950***	***37,950***	***37,950***	***37,950***
TOTAL PROJECTED DEMANDS	***63,993***	***84,112***	***112,890***	***117,126***	***121,276***	***123,579***
Currently Available Water Supplies						
Lake Texoma[b]	83,200	83,200	83,200	83,200	83,200	83,200
North Texas MWD	5,400	5,400	5,400	5,400	5,398	5,400
TOTAL SUPPLIES	***88,600***	***88,600***	***88,600***	***88,600***	***88,598***	***88,600***
NEED (DEMAND-SUPPLY)	***0***	***0***	***24,290***	***28,526***	***32,678***	***34,979***
Water Management Strategies						
Conservation (Wholesale Customers)	540	1,665	2,512	3,090	3,627	3,887
Additional Supplies from NTMWD	2,989	7,834	11,964	15,623	19,238	21,278
GTUA Regional Water System Phase I	0	14,150	14,150	14,150	14,150	14,150
Brackish Groundwater	0	7,095	7,095	7,095	7,095	7,095
Existing Texoma Supplies[c]	0	7,055	7,055	7,055	7,055	7,055
GTUA Regional Water System Phase II	0	0	23,800	23,800	23,800	23,800
Parallel CGMA Pipeline	*2,989*	*7,834*	*11,964*	*15,623*	*19,238*	*21,278*
TOTAL SUPPLIES FROM STRATEGIES	***3,529***	***16,594***	***45,371***	***49,608***	***53,760***	***56,060***
TOTAL SUPPLIES	***92,129***	***105,194***	***133,971***	***138,208***	***142,358***	***144,660***
RESERVE OR (SHORTAGE)	***28,136***	***21,082***	***21,081***	***21,082***	***21,082***	***21,081***
MANAGEMENT SUPPLY FACTOR	***1.44***	***1.25***	***1.19***	***1.18***	***1.17***	***1.17***

[a]Reflects contract demands with GTUA. Infrastructure constraints are shown on the specific entities.

[b]GTUA has a water right in Texoma for 83,200 acre-feet per year. Sherman currently has facilities to use 11,210 acre-feet per year of treated water and 6,163 acre-feet per year of raw water. Denison currently has facilities to use 7,287 acre-feet per year of treated water which they are fully utilizing with their own water rights out of Texoma. Use of additional GTUA Texoma water will require additional facilities.

[c]Not included in total supplies as this is included in the 83,200 acre-feet per year of existing GTUA Texoma water rights.

TABLE 5D.21 SUMMARY OF COSTS FOR RECOMMENDED STRATEGIES – GREATER TEXOMA RIVER AUTHORITY

STRATEGY	ONLINE BY	QUANTITY (AC-FT/YR)	SHARE OF CAPITAL COSTS	UNIT COST ($/1000 GAL)	
				WITH DEBT SERVICE	AFTER DEBT SERVICE
Conservation[a]	2030	3,887	Included under County Summaries in Section 5D.		
Additional Supplies from NTMWD	2030	21,278	$0	$4.00	$4.00
GTUA Regional Water System Phase I	2040	14,150	$779,925,000	$15.35	$6.15
GTUA Regional Water System Phase II	2050	23,800	$827,790,000	$12.45	$6.65
Parallel CGMA Pipeline	*2030*	*21,278*	*$196,818,000*	*$6.39*	*$4.39*
TOTAL GTUA CAPITAL COSTS			***$1,804,533,000***		

[a]GTUA has no retail sales, so conservation savings are reflected in their customers' conservation savings.

5E RECOMMENDED WATER MANAGEMENT STRATEGIES FOR WATER PROVIDERS BY COUNTY

CHAPTER OUTLINE	
Section 5E.1 – 5E.16	County Plans
RELATED APPENDICES	
Appendix C	Adjustments to Projections
Appendix G	Water Management Strategy Evaluation
Appendix H	Cost Estimates
Appendix N	WMS Implementation Survey

This chapter provides a summary of the projected demands, supplies and water management strategies (WMS) for wholesale water providers (WWPs) and water user groups (WUGs).

Included in this chapter is a section dedicated to each one of Region C's sixteen counties. Each section includes a county overview at the beginning to provide a snapshot of the county's overall water supply situation. Major water providers and regional water providers are discussed in **Chapter 5D**. Other WWPs and WUGs are discussed in alphabetical order after each county overview. If a WWP or WUG is split between multiple counties, these entities are discussed in the county where the majority of the demand resides. Each county section concludes with a summary of costs for the WWP and WUG strategies discussed in the section.

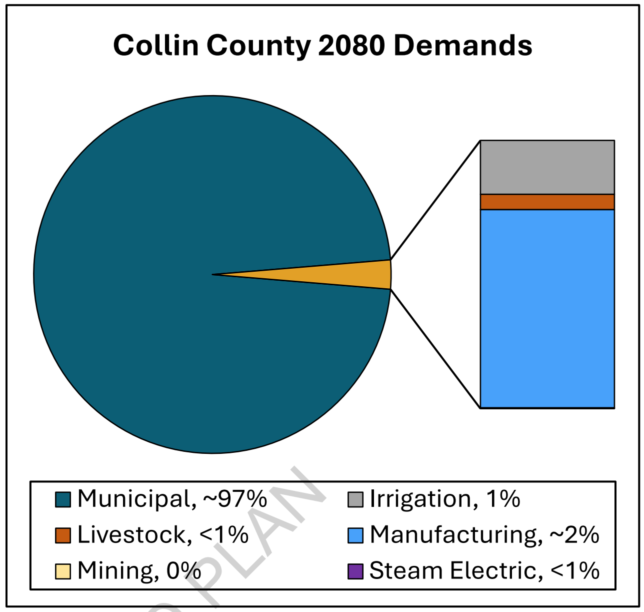
As part of the preparation of this regional water plan, the consultants surveyed municipal WWPs and WUGs to gather information regarding current and future water plans. As appropriate and available, information regarding non-municipal WUGs was gathered from those entities supplying water to meet those demands. In addition, published plans of WUGs were considered in the preparation of this final adopted regional plan.

Many of the strategies included in this section are infrastructure projects needed to deliver and/or treat water included in another strategy. Quantities for these infrastructure projects have been shown in *gray italics* so they can be easily identified. To avoid double-counting quantities of supply, the quantities in *gray italics* are not included in the totals for the tables.

Conservation strategies are discussed in **Chapter 5B**. Estimated water savings are based on population growth and levels of conservation implemented to date. Water savings may fluctuate over the planning period. This is due in part to the passive savings assumed in the water demands and specific BMPs for each entity.

5E.1 Collin County

Collin County is located in the northeastern portion of Region C. **Figure 5E.2** shows water supplier service areas in the county**.**



Collin is one of the state's fastest growing counties and is part of one of the healthiest regional economies in the country. Population projections estimate that the population within Collin County is expected to exceed 2.6 million people by 2080.

Demands for the County are predominately municipal at over 97% of the total county demand. The county has relatively minimal irrigation, livestock, manufacturing and steam electric demands and no mining demands.

The North Texas Municipal Water District (NTMWD) serves most of the municipal and manufacturing water demand in Collin County. In addition to purchasing water from WWPs (especially NTMWD), other water sources include groundwater and direct reuse. An overall summary of projections for the County is shown in **Table 5E-1**, and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Collin County Quick Facts

2020 Population: 1,064,465

Projected 2080 Population: 2,612,777

Projected 2080 Demand: 475 MGD

County Seat: McKinney

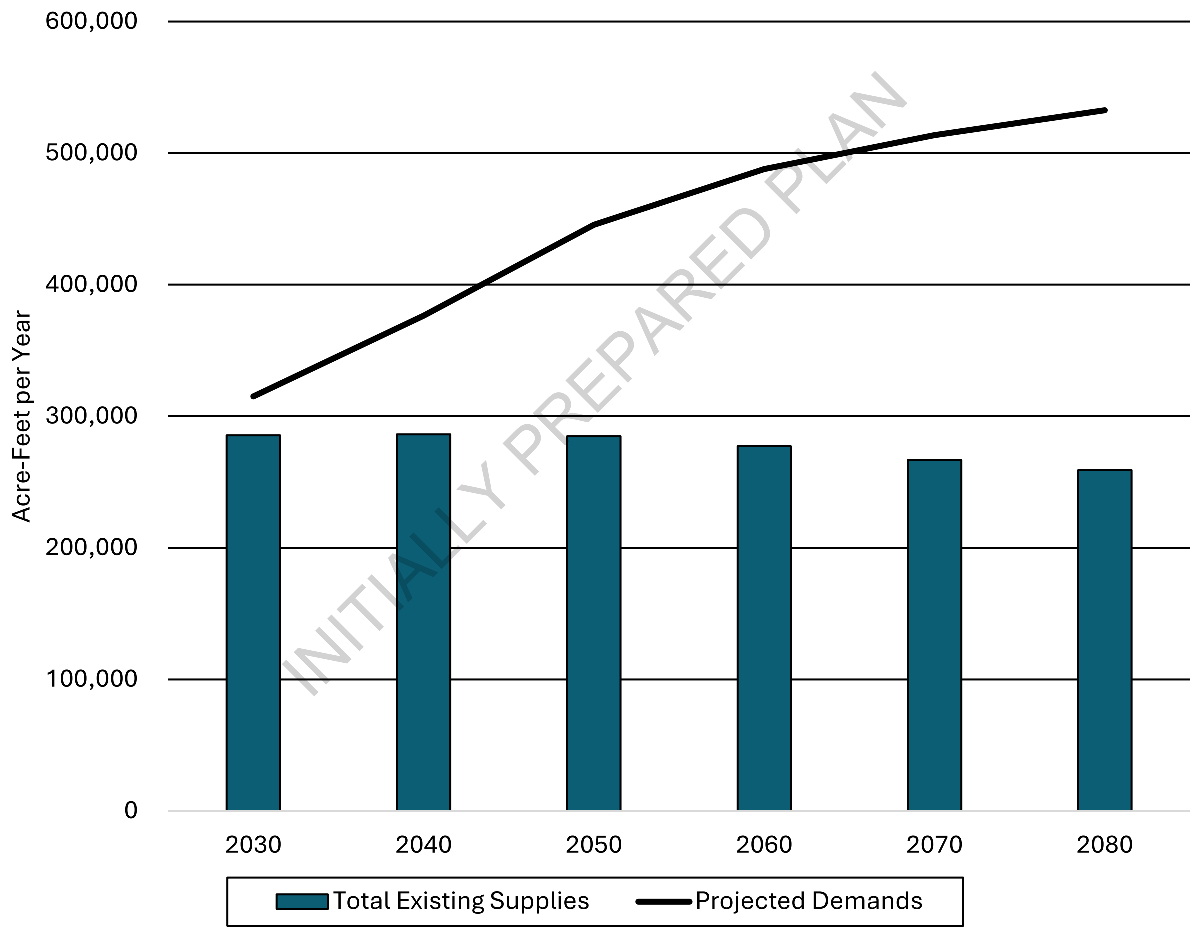
Economy: Government/services; manufacturing; retail and wholesale

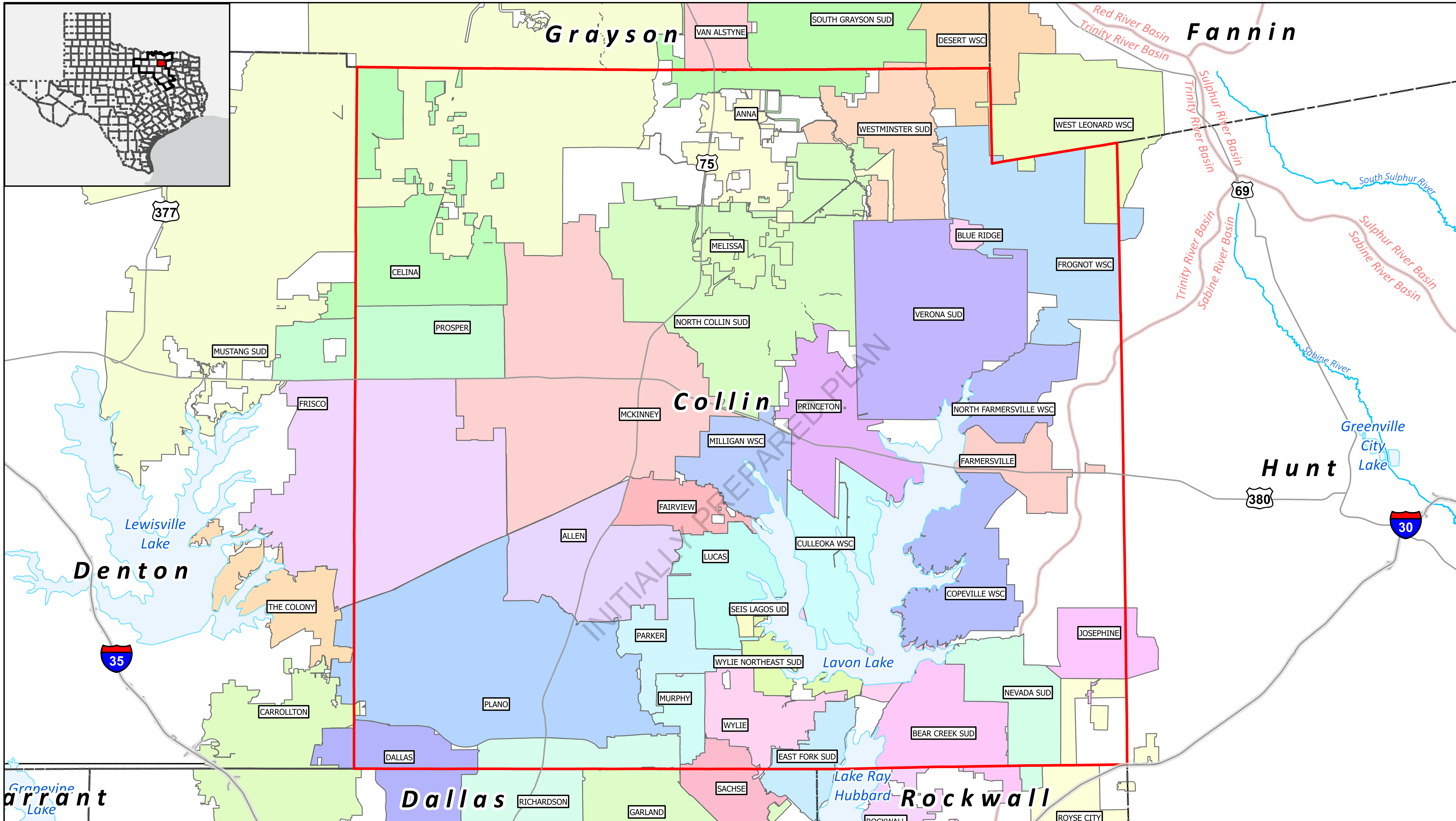
River Basins: Trinity (94%), Sabine (6%)

TABLE 5E-1 SUMMARY OF COLLIN COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**1,418,872**	**1,764,402**	**2,126,310**	**2,351,305**	**2,505,630**	**2,612,777**
Projected Demands	**315,084**	**376,604**	**445,569**	**487,945**	**513,708**	**532,582**
Municipal	302,809	364,010	432,644	474,677	500,084	518,589
Irrigation	2,811	2,811	2,811	2,811	2,811	2,811
Livestock	801	801	801	801	801	801
Manufacturing	8,623	8,942	9,273	9,616	9,972	10,341
Mining	0	0	0	0	0	0
Steam Electric	40	40	40	40	40	40
Total Existing Supplies	***285,573***	***286,275***	***284,757***	***277,286***	***266,877***	***258,995***
Need (Demand - Supply)	***29,511***	***90,329***	***160,812***	***210,659***	***246,831***	***273,587***

FIGURE 5E.1 SUMMARY OF COLLIN COUNTY





REGION C Water Planning for North Texas

Collin County, Texas

Figure 5E.2

Data Source(s): ESRI, TWDB, TxDOT

N

0 4 8 Mi

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.1.1 Wholesale Water Providers and Municipal Water User Groups

Collin County wholesale water providers (WWPs) and municipal water user groups (WUGs) are discussed individually in alphabetical order. The costs for recommended and alternative water management strategies are presented in **Section 5E.1.2**. **Appendix H** has more detailed cost estimates.

Allen

The City of Allen is located in south central Collin County and is nearly fully developed. Allen supplies a small manufacturing demand. Allen receives treated water supplies from NTMWD and plans to continue to be supplied by NTMWD. Recommended water management strategies for Allen include implementing water conservation measures and purchasing additional supplies from NTMWD. **Table 5E.2** shows the projected population and demand, the current supplies, and the water management strategies for Allen.

TABLE 5E.2 SUMMARY OF WATER USER GROUP - CITY OF ALLEN

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**125,000**	**140,000**	**140,000**	**140,000**	**140,000**	**140,000**
Projected Water Demand						
Municipal Demand	25,556	28,533	28,533	28,533	28,533	28,533
Manufacturing, Collin	*172*	*179*	*185*	*192*	*199*	*207*
Total Projected Water Demand	***25,728***	***28,712***	***28,718***	***28,725***	***28,732***	***28,740***
Currently Available Water Supplies						
North Texas MWD	23,335	22,247	19,026	16,889	15,633	14,832
Manufacturing, Collin	157	140	123	114	109	107
Total Current Supplies	***23,492***	***22,387***	***19,149***	***17,003***	***15,742***	***14,939***
Need (Demand - Current Supply)	***2,236***	***6,325***	***9,569***	***11,722***	***12,990***	***13,801***
Water Management Strategies						
Water Conservation for Municipal	1,205	2,186	2,412	2,446	2,512	2,591
Additional Supplies from NTMWD	1,016	4,100	7,095	9,198	10,388	11,110
Manufacturing, Collin	*15*	*39*	*62*	*78*	*90*	*100*
Total Water Management Strategies	***2,236***	***6,325***	***9,569***	***11,722***	***12,990***	***13,801***
Allen Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Anna

Anna is expected to experience rapid growth over the planning horizon. Anna is in north Collin County and currently receives supplies from groundwater (Trinity and Woodbine aquifers) and treated supplies from NTMWD (through GTUA's Collin-Grayson Municipal Alliance). Water management strategies for Anna are conservation and expansion of supplies through the Collin-Grayson Municipal Alliance (CGMA) from NTMWD through GTUA. **Table 5E.3** shows the projected population and demand, the current supplies, and the water management strategies for Anna.

TABLE 5E.3 SUMMARY OF WATER USER GROUP - CITY OF ANNA

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**42,924**	**69,571**	**88,103**	**104,876**	**121,250**	**130,000**
Projected Water Demand						
Municipal Demand	6,639	10,722	13,577	16,162	18,686	20,034
Total Projected Water Demand	***6,639***	***10,722***	***13,577***	***16,162***	***18,686***	***20,034***
Currently Available Water Supplies						
Trinity Aquifer	445	445	445	445	445	445
Woodbine Aquifer	45	45	45	45	45	45
North Texas MWD (through GTUA CGMA)	3,719	3,719	3,719	3,719	3,719	3,719
Total Current Supplies	***4,209***	***4,209***	***4,209***	***4,209***	***4,209***	***4,209***
Need (Demand - Current Supply)	***2,430***	***6,513***	***9,368***	***11,953***	***14,477***	***15,825***
Water Management Strategies						
Water Conservation	458	1,413	2,044	2,449	2,862	3,068
Expand Collin-Grayson Municipal Alliance, Additional Supplies from NTMWD through GTUA	2,006	5,165	7,398	9,578	11,690	12,832
Total Water Management Strategies	***2,464***	***6,578***	***9,442***	***12,027***	***14,552***	***15,900***
Anna Reserve (Shortage)	***34***	***65***	***74***	***74***	***75***	***75***

Bear Creek Special Utility District (Formerly Called Lavon SUD)

Bear Creek SUD, previously known as Lavon SUD, supplies water to parts of Collin and Rockwall Counties in Region C. The SUD receives treated water supplies from NTMWD and is projected to grow rapidly over the planning horizon. Water management strategies for Bear Creek SUD are conservation and additional water from NTMWD. **Table 5E.4** shows the projected population and demand, the current supplies, and the water management strategies for Bear Creek SUD.

TABLE 5E.4 SUMMARY OF WATER USER GROUP – BEAR CREEK SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**27,782**	**48,717**	**55,704**	**60,660**	**66,501**	**66,501**
Projected Water Demand						
Municipal Demand	3,207	5,598	6,401	6,971	7,642	7,642
Total Projected Water Demand	***3,207***	***5,598***	***6,401***	***6,971***	***7,642***	***7,642***
Currently Available Water Supplies						
North Texas MWD	2,929	4,364	4,268	4,126	4,187	3,973
Total Current Supplies	***2,929***	***4,364***	***4,268***	***4,126***	***4,187***	***3,973***
Need (Demand - Current Supply)	***278***	***1,234***	***2,133***	***2,845***	***3,455***	***3,669***
Water Management Strategies						
Water Conservation	179	559	595	618	680	642
Additional Supplies from NTMWD	99	675	1,538	2,227	2,775	3,027
Total Water Management Strategies	***278***	***1,234***	***2,133***	***2,845***	***3,455***	***3,669***
Bear Creek SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Blue Ridge

The City of Blue Ridge is in northeast Collin County. The city's current water supply is limited to groundwater (Woodbine aquifer). Due to the long-term projected growth and limited supplies from the Woodbine aquifer, it is assumed that Blue Ridge will contract with NTMWD for additional supplies. Water management strategies for Blue Ridge include implementing conservation measures and establishing a direct connection and purchasing treated supplies from NTMWD with associated infrastructure. **Table 5E.5** shows the projected population and demand, the current supplies, and the water management strategies for Blue Ridge.

TABLE 5E.5 SUMMARY OF WATER USER GROUP - CITY OF BLUE RIDGE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,653**	**2,162**	**2,740**	**3,320**	**3,959**	**4,664**
Projected Water Demand						
Municipal Demand	278	362	459	556	663	781
Total Projected Water Demand	***278***	***362***	***459***	***556***	***663***	***781***
Currently Available Water Supplies						
Woodbine Aquifer	400	400	400	400	400	400
Total Current Supplies	***400***	***400***	***400***	***400***	***400***	***400***
Need (Demand - Current Supply)	***0***	***0***	***59***	***156***	***263***	***381***
Water Management Strategies						
Water Conservation	9	15	21	27	35	45
Connect to and Purchase Water from NTMWD (4 MGD)	0	0	56	148	249	359
Direct Connection and Additional Delivery Infrastructure from NTMWD	*0*	*0*	*56*	*148*	*249*	*359*
Total Water Management Strategies	***9***	***15***	***77***	***175***	***284***	***404***
Blue Ridge Reserve (Shortage)	***131***	***53***	***18***	***19***	***21***	***23***

Caddo Basin Special Utility District

Caddo Basin SUD is split almost evenly between Collin County in Region C and Hunt County in Region D. Caddo Basin SUD currently receives treated water supplies from NTMWD and is expected to continue to use NTMWD supplies. A portion of the SUD's supplies are purchased through Farmersville (another customer of NTMWD), but most supplies are through a direct connection with NTMWD. The only water management strategy for Caddo Basin SUD is additional water from NTMWD. **Table 5E.6** shows the projected population and demand, the current supplies, and the water management strategies for Caddo Basin SUD.

TABLE 5E.6 SUMMARY OF WATER USER GROUP – CADDO BASIN SUD (REGIONS C AND D)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**18,175**	**26,075**	**35,538**	**38,969**	**41,334**	**43,698**
Projected Water Demand						
Municipal Demand	2,276	3,250	4,430	4,858	5,153	5,447
Total Projected Water Demand	***2,276***	***3,250***	***4,430***	***4,858***	***5,153***	***5,447***
Currently Available Water Supplies						
North Texas MWD	1,870	2,281	2,659	2,588	2,541	2,549
North Texas MWD (through Farmersville)	208	254	296	288	283	283
Total Current Supplies	***2,078***	***2,535***	***2,955***	***2,876***	***2,824***	***2,832***
Need (Demand - Current Supply)	***198***	***715***	***1,475***	***1,982***	***2,329***	***2,615***
Water Management Strategies						
Additional Supplies from NTMWD	198	715	1,475	1,982	2,329	2,615
Total Water Management Strategies	***198***	***715***	***1,475***	***1,982***	***2,329***	***2,615***
Caddo Basin SUD (Regions C and D) Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Carrollton

Carrollton is located in Denton, Dallas, and Collin Counties. The water management strategies for Carrollton are discussed under Denton County in **Section 5E.4**.

Celina

The City of Celina is located in northwest Collin County and Denton County and is projected to experience rapid growth over the planning period. Current growth is outpacing the projected Region C population projections and water needs are expected to be greater than shown in this plan. The city currently receives its water supply from Upper Trinity Regional Water District (UTRWD). Due to the long-term projected growth, the city is planning several water management strategies to meet projected needs. Water management strategies for Celina include implementing conservation measures, purchasing additional supplies from UTRWD, and purchasing supplies from a new GTUA Regional Water System. More information on the new GTUA Regional Water System is available in **Chapter 5C** and **Appendix G**. **Table 5E.7** shows the projected population and demand, the current supplies, and the water management strategies for Celina. Region C is showing an unmet need of approximately 2,300 acre-feet per year in 2030 due to the rapid growth in the area and the lack of readily available water. As noted above, this need may be greater if growth continues at the current rate. Celina has reached out to multiple water providers for additional supplies, but the new water cannot be developed until 2040. For more information on the impacts of unmet need see **Chapter 6**.

TABLE 5E.7 SUMMARY OF WATER USER GROUP – CITY OF CELINA

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**66,668**	**116,498**	**194,230**	**202,714**	**250,267**	**302,694**
Projected Water Demand						
Municipal Demand	13,705	23,897	39,843	41,583	51,338	62,092
Total Projected Water Demand	***13,705***	***23,897***	***39,843***	***41,583***	***51,338***	***62,092***
Currently Available Water Supplies						
Upper Trinity Regional WD	10,255	12,012	14,116	12,276	12,454	12,531
Total Current Supplies	***10,255***	***12,012***	***14,116***	***12,276***	***12,454***	***12,531***
Need (Demand - Current Supply)	***3,450***	***11,885***	***25,727***	***29,307***	***38,884***	***49,561***
Water Management Strategies						
Water Conservation	1,082	4,558	9,345	9,106	11,474	14,043
Additional Supplies from UTRWD	0	1,525	5,708	7,210	9,471	11,493
Supplies from New GTUA Regional Water System	0	7,450	26,450	26,450	26,450	26,450
Total Water Management Strategies	***1,082***	***13,533***	***41,503***	***42,766***	***47,395***	***51,986***
Celina Reserve (Shortage)	***(2,368)***	***1,648***	***15,776***	***13,459***	***8,511***	***2,425***

Collin County Irrigation

> ***The Texas Water Development Board classifies the use of potable water for golf course irrigation as a part of municipal use. The use of raw water or reuse of treated wastewater effluent for golf course irrigation is classified as irrigation use.***

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. Most irrigation in Collin County is for golf course irrigation. **Table 5E.8** shows the projected demand, the current supplies, and the water management strategies for Collin County Irrigation. Currently available supplies include groundwater from the Trinity and Woodbine aquifers, direct reuse, local supplies (Trinity Run-of-River), and purchased supplies from DWU. Water management strategies include implementing water conservation measures and purchasing additional supplies from DWU.

TABLE 5E.8 SUMMARY OF WATER USER GROUP – COLLIN COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***2,811***	***2,811***	***2,811***	***2,811***	***2,811***	***2,811***
Currently Available Water Supplies						
Dallas	46	44	42	40	38	37
Direct Reuse through The Colony	457	457	457	457	457	457
Direct Reuse through NTMWD	1,640	1,640	1,640	1,640	1,640	1,640
Trinity Run-of-River	265	265	265	265	265	265
Trinity Aquifer	302	302	302	302	302	302
Woodbine Aquifer	97	97	97	97	97	97
Total Current Supplies	***2,807***	***2,805***	***2,803***	***2,801***	***2,799***	***2,798***
Need (Demand - Current Supply)	***4***	***6***	***8***	***10***	***12***	***13***
Water Management Strategies						
Water Conservation	5	78	150	187	223	258
Additional Supplies from DWU	4	5	5	7	8	8
Total Water Management Strategies	***9***	***83***	***155***	***194***	***231***	***266***
Irrigation, Collin Reserve (Shortage)	***5***	***77***	***147***	***184***	***219***	***253***

Collin County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. **Table 5E.9** shows the projected demand and the current supplies for Collin County Livestock. The current supplies for Collin County Livestock are local surface water supplies. This source is sufficient to meet the projected demands and there are no recommended water management strategies.

TABLE 5E.9 SUMMARY OF WATER USER GROUP – COLLIN COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***801***	***801***	***801***	***801***	***801***	***801***
Currently Available Water Supplies						
Sabine Livestock Local Supply	39	39	39	39	39	39
Trinity Livestock Local Supply	762	762	762	762	762	762
Total Current Supplies	***801***	***801***	***801***	***801***	***801***	***801***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Collin Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Collin County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. **Table 5E.10** shows the projected demand, the current supplies, and the water management strategies for Collin County Manufacturing. Most manufacturing in Collin County is supplied by entities that obtain supplies from NTMWD. A much smaller portion of the demand is supplied by groundwater through wells located in the Woodbine aquifer. Recommended water management strategies include additional supplies from NTMWD. Conservation was considered for this water user group but is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG.

TABLE 5E.10 SUMMARY OF WATER USER GROUP – COLLIN COUNTY MANFUCATURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***8,623***	***8,942***	***9,273***	***9,616***	***9,972***	***10,341***
Currently Available Water Supplies						
Woodbine Aquifer	345	358	371	385	399	414
North Texas MWD (through Allen)	157	140	123	114	109	107
North Texas MWD (through McKinney)	630	557	494	455	437	430
North Texas MWD (through Plano)	79	69	62	57	54	54
North Texas MWD (through Richardson)	6,693	5,926	5,256	4,838	4,644	4,570
Total Current Supplies	***7,904***	***7,050***	***6,306***	***5,849***	***5,643***	***5,575***
Need (Demand - Current Supply)	***719***	***1,892***	***2,967***	***3,767***	***4,329***	***4,766***
Water Management Strategies						
Additional Supplies from NTMWD	719	1,892	2,967	3,767	4,329	4,766
Total Water Management Strategies	***719***	***1,892***	***2,967***	***3,767***	***4,329***	***4,766***
Manufacturing, Collin Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Collin County Mining

Mining demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. There is no projected mining demand in Collin County.

Collin County Other

Collin County Other includes individual domestic users and water suppliers too small to be classified as water user groups. In Collin County these entities include the Air Park HOA, Altoga and Weston WSC. The entities included in Collin County Other currently receive water supplies from either groundwater (Trinity and/or Woodbine aquifers) or from NTMWD (through Plano). Water management strategies for these entities include conservation and new wells in the Trinity aquifer. **Table 5E.11** shows the projected population and demand, the current supplies, and the water management strategies for Collin County Other.

TABLE 5E.11 SUMMARY OF WATER USER GROUP – COLLIN COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,794**	**5,035**	**6,276**	**7,518**	**8,759**	**10,000**
Projected Water Demand						
Municipal Demand	571	754	939	1,125	1,311	1,497
Total Projected Water Demand	***571***	***754***	***939***	***1,125***	***1,311***	***1,497***
Currently Available Water Supplies						
Trinity Aquifer	300	300	300	300	300	300
Woodbine Aquifer	300	300	300	300	300	300
North Texas MWD (through Plano)	45	39	34	30	28	26
Total Current Supplies	***645***	***639***	***634***	***630***	***628***	***626***
Need (Demand - Current Supply)	***0***	***115***	***305***	***495***	***683***	***871***
Water Management Strategies						
Water Conservation	5	10	15	22	30	38
New Well(s) in Trinity Aquifer	0	150	300	500	700	850
Total Water Management Strategies	***5***	***160***	***315***	***522***	***730***	***888***
County-Other, Collin Reserve (Shortage)	***79***	***45***	***10***	***27***	***47***	***17***

Collin County Steam Electric Power

Steam electric power demands generally represent the cooling water needs during power generation. These demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. **Table 5E.12** shows the projected demand, the current supplies, and the water management strategies for Collin County Steam Electric Power. Demands in Collin County are for the Ray Olinger Steam Electric Plant (Garland Power & Light). Collin County Steam Electric Power is currently supplied by raw water purchased from NTMWD through Garland. These supplies are sufficient to meet the projected demands over the planning horizon, and there are no water management strategies for this WUG.

TABLE 5E.12 SUMMARY OF WATER USER GROUP – COLLIN COUNTY STEAM ELECTRIC POWER

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***40***	***40***	***40***	***40***	***40***	***40***
Currently Available Water Supplies						
Garland	40	40	40	40	40	40
Total Current Supplies	***40***	***40***	***40***	***40***	***40***	***40***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None	0	0	0	0	0	0
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Steam-Electric Power, Collin Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Copeville Water Supply Corporation

The service area for Copeville WSC is on the east shore of Lake Lavon in eastern Collin County. The WSC receives treated water supplies from NTMWD through the City of Farmersville and from a direct connection. Water management strategies for Copeville WSC include conservation and additional water from NTMWD. **Table 5E.13** shows the projected population and demand, the current supplies, and the water management strategies for Copeville WSC.

TABLE 5E.13 SUMMARY OF WATER USER GROUP – COPEVILLE WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**7,703**	**12,179**	**17,902**	**19,644**	**21,942**	**24,238**
Projected Water Demand						
Municipal Demand	931	1,466	2,155	2,365	2,641	2,918
Total Projected Demand	***931***	***1,466***	***2,155***	***2,365***	***2,641***	***2,918***
Currently Available Water Supplies						
North Texas MWD (through Farmersville)	128	172	215	210	217	228
North Texas MWD	722	971	1,221	1,190	1,230	1,289
Total Current Supplies	***850***	***1,143***	***1,436***	***1,400***	***1,447***	***1,517***
Need (Demand - Current Supply)	***81***	***323***	***719***	***965***	***1,194***	***1,401***
Water Management Strategies						
Water Conservation	17	34	62	76	176	225
Additional Supplies from NTMWD	64	289	657	889	1,018	1,176
Total Water Management Strategies	***81***	***323***	***719***	***965***	***1,194***	***1,401***
Copeville WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Culleoka Water Supply Corporation

The service area for Culleoka WSC is located between the two arms of Lake Lavon in central Collin County. The WSC receives treated water supplies from NTMWD through Princeton. Water management strategies for Culleoka WSC include conservation and additional supplies from NTMWD. **Table 5E.14** shows the projected population and demand, the current supplies, and the water management strategies for Culleoka WSC.

TABLE 5E.14 SUMMARY OF WATER USER GROUP – CULLEOKA WSC

MUNICIPAL DEMAND	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**12,542**	**14,383**	**17,346**	**19,661**	**22,127**	**24,442**
Projected Water Demand						
Municipal Demand	1,316	1,503	1,812	2,054	2,312	2,554
Total Projected Water Demand	***1,316***	***1,503***	***1,812***	***2,054***	***2,312***	***2,554***
Currently Available Water Supplies						
North Texas MWD (through Princeton)	1,201	1,172	1,208	1,216	1,266	1,327
Total Current Supplies	***1,201***	***1,172***	***1,208***	***1,216***	***1,266***	***1,327***
Need (Demand - Current Supply)	***115***	***331***	***604***	***838***	***1,046***	***1,227***
Water Management Strategies						
Water Conservation	34	53	69	85	184	236
Additional Supplies from NTMWD	81	278	535	753	862	991
Total Water Management Strategies	***115***	***331***	***604***	***838***	***1,046***	***1,227***
Culleoka WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Dallas

Dallas is a major wholesale water provider that supplies water in Dallas, Collin, Denton, Kaufman, and Rockwall Counties. See Dallas Water Utilities (DWU) in **Chapter 5D**.

Desert WSC

Desert WSC serves parts of Collin, Fannin, and Grayson Counties. Water management strategies for Desert WSC are discussed under Fannin County in **Section 5E.6.1**.

East Fork Special Utility District

East Fork SUD is located in southern Collin County and extends into Dallas and Rockwall Counties as well. The SUD receives treated water supplies from NTMWD. Water management strategies for East Fork SUD include conservation and additional water from NTMWD with additional delivery infrastructure. **Table 5E.15** shows the projected population and demand, the current supplies, and the water management strategies for East Fork SUD.

TABLE 5E.15 SUMMARY OF WATER USER GROUP – EAST FORK SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**24,736**	**29,515**	**35,021**	**39,846**	**44,015**	**48,621**
Projected Water Demand						
Municipal Demand	2,940	3,491	4,143	4,714	5,206	5,752
Total Projected Demand	***2,940***	***3,491***	***4,143***	***4,714***	***5,206***	***5,752***
Currently Available Water Supplies						
North Texas MWD	2,685	2,722	2,763	2,791	2,852	2,990
Total Current Supplies	***2,685***	***2,722***	***2,763***	***2,791***	***2,852***	***2,990***
Need (Demand - Current Supply)	***255***	***769***	***1,380***	***1,923***	***2,354***	***2,762***
Water Management Strategies						
Water Conservation	125	221	298	353	396	452
Additional Water from NTMWD	130	548	1,082	1,570	1,958	2,310
Increase Delivery Infrastructure from NTWMD	*130*	*548*	*1,082*	*1,570*	*1,958*	*2,310*
Total Water Management Strategies	***255***	***769***	***1,380***	***1,923***	***2,354***	***2,762***
East Fork SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Fairview

The Town of Fairview is located in central Collin County and is adjacent to the Heard Wildlife Sanctuary. It is bordered by McKinney, the county seat, to the north, by Allen to the west and south, and by Lucas to the southeast. The town receives treated water supplies from NTMWD. Water management strategies for Fairview include conservation and additional water from NTMWD. **Table 5E.16** shows the projected population and demand, the current supplies, and the water management strategies for Fairview.

TABLE 5E.16 SUMMARY OF WATER USER GROUP – CITY OF FAIRVIEW

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**13,152**	**16,629**	**20,418**	**20,418**	**20,418**	**20,418**
Projected Water Demand						
Municipal Demand	4,646	5,863	7,199	7,199	7,199	7,199
Total Projected Demand	***4,646***	***5,863***	***7,199***	***7,199***	***7,199***	***7,199***
Currently Available Water Supplies						
North Texas MWD	4,242	4,571	4,800	4,261	3,945	3,742
Total Current Supplies	***4,242***	***4,571***	***4,800***	***4,261***	***3,945***	***3,742***
Need (Demand - Current Supply)	***404***	***1,292***	***2,399***	***2,938***	***3,254***	***3,457***
Water Management Strategies						
Water Conservation	156	506	1,100	1,146	1,126	1,129
Additional Supplies from NTMWD	248	786	1,299	1,792	2,128	2,328
Total Water Management Strategies	***404***	***1,292***	***2,399***	***2,938***	***3,254***	***3,457***
Fairview Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Farmersville

The City of Farmersville is located in eastern Collin County and receives treated water supplies from NTMWD. The city is at the intersection of U.S. Highway 380 and State Highway 78 and is expected to grow rapidly in the coming decades. Water management strategies for Farmersville include conservation and additional water from NTMWD. **Table 5E.17** shows the projected population and demand, the current supplies, and the water management strategies for Farmersville.

TABLE 5E.17 SUMMARY OF WATER USER GROUP – CITY OF FARMERSVILLE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,700**	**14,074**	**27,886**	**31,725**	**35,920**	**39,678**
Projected Water Demand						
Municipal Demand	659	1,618	3,206	3,648	4,130	4,562
Total Projected Demand	***659***	***1,618***	***3,206***	***3,648***	***4,130***	***4,562***
Currently Available Water Supplies						
North Texas MWD	601	1,262	2,138	2,159	2,263	2,371
Total Current Supplies	***601***	***1,262***	***2,138***	***2,159***	***2,263***	***2,371***
Need (Demand - Current Supply)	***58***	***356***	***1,068***	***1,489***	***1,867***	***2,191***
Water Management Strategies						
Water Conservation	15	74	399	513	540	573
Additional Supplies from NTMWD	43	282	669	976	1,327	1,618
Total Water Management Strategies	***58***	***356***	***1,068***	***1,489***	***1,867***	***2,191***
Farmersville Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Frisco

The City of Frisco is a rapidly growing community in west Collin County and east Denton County. The city purchases treated water from NTMWD and obtains reuse supplies from wastewater plants operated by NTMWD. Reuse supplies originate from the Stewart Creek West and Panther Creek wastewater treatment plants and are used by Frisco for irrigation at parks, schools, and neighborhoods. The city also owns two groundwater wells that are used for municipal irrigation purposes (Trinity and Woodbine aquifer). The city plans to replace these groundwater supplies with reuse supplies over the planning horizon due to issues with high salinity and reliability. Water management strategies for Frisco are conservation, additional direct reuse, and additional water from NTMWD with infrastructure improvements. **Table 5E.18** shows the projected population and demand, the current supplies, and the water management strategies for Frisco.

TABLE 5E.18 SUMMARY OF WATER USER GROUP – CITY OF FRISCO

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**320,025**	**387,697**	**389,656**	**389,656**	**389,656**	**389,656**
Projected Water Demand						
Municipal Demand	76,294	92,192	92,658	92,658	92,658	92,658
Manufacturing, Denton	*30*	*31*	*33*	*34*	*35*	*36*
Total Projected Demand	***76,324***	***92,223***	***92,691***	***92,692***	***92,693***	***92,694***
Currently Available Water Supplies						
North Texas MWD	69,207	71,493	61,451	54,549	50,493	47,908
Manufacturing, Denton	*27*	*24*	*22*	*20*	*20*	*19*
Direct Reuse	3,038	3,038	3,038	3,038	3,038	3,038
Trinity Aquifer	65	65	65	65	65	65
Woodbine Aquifer	75	75	75	75	75	75
Total Current Supplies	***72,412***	***74,695***	***64,651***	***57,747***	***53,691***	***51,105***
Need (Demand - Current Supply)	***3,912***	***17,528***	***28,040***	***34,945***	***39,002***	***41,589***
Water Management Strategies						
Water Conservation for Municipal	3,400	6,282	6,274	6,227	6,358	6,578
Additional Supplies from NTMWD for Frisco	171	10,913	21,429	28,378	32,303	34,669
Manufacturing, Denton	*3*	*7*	*11*	*14*	*15*	*17*
Additional Direct Reuse	500	500	500	500	500	500
Infrastructure Improvements	*174*	*10,920*	*21,440*	*28,392*	*32,318*	*34,686*
Total Water Management Strategies	***4,074***	***17,702***	***28,214***	***35,119***	***39,176***	***41,764***
Frisco Reserve (Shortage)	***162***	***174***	***174***	***174***	***174***	***175***

Frognot Water Supply Corporation

Frognot WSC is located predominately in northeastern Collin County and has a small service area in Hunt County in Region D. Frognot WSC currently uses groundwater and gets supplies from the Woodbine aquifer. The only water management strategy for the WSC is conservation. **Table 5E.19** shows the projected population and demand, the current supplies, and the water management strategies for Frognot WSC.

TABLE 5E.19 SUMMARY OF WATER USER GROUP – CITY OF FROGNOT WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,130**	**2,664**	**3,263**	**3,865**	**4,527**	**5,257**
Projected Water Demand						
Municipal Demand	213	266	326	386	451	525
Total Projected Water Demand	***213***	***266***	***326***	***386***	***451***	***525***
Currently Available Water Supplies						
Woodbine Aquifer	213	266	326	386	451	525
Total Current Supplies	***213***	***266***	***326***	***386***	***451***	***525***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	5	8	11	15	18	23
Total Water Management Strategies	***5***	***8***	***11***	***15***	***18***	***23***
Frognot WSC Reserve (Shortage)	***5***	***8***	***11***	***15***	***18***	***23***

Garland

Garland is a municipality and wholesale water provider in northeastern Dallas, Collin, and Rockwall Counties. Demands and strategies for Garland are discussed under Dallas County in **Section 5E.3**.

Hickory Creek Special Utility District

Hickory Creek SUD is primarily located in Hunt County in the North East Texas Region (Region D), with some service area in northeast Collin County and south Fannin County in Region C. Water management strategies for Region C are described under Fannin County in **Section 5E.5**.

Josephine

Josephine is located predominately in southeastern Collin County, with a small portion located in Hunt County in the North East Texas Region (Region D). Josephine receives treated water supplies from NTMWD and plans to continue to do so. Water management strategies for Josephine include conservation and additional water from NTMWD. **Table 5E.20** shows the projected population and demand, the current supplies, and the water management strategies for Josephine.

TABLE 5E.20 SUMMARY OF WATER USER GROUP – CITY OF JOSEPHINE (REGION C AND D)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,544**	**12,169**	**17,628**	**19,716**	**22,045**	**22,067**
Projected Water Demand						
Municipal Demand	1,169	2,561	3,710	4,148	4,639	4,643
Total Projected Demand	***1,169***	***2,561***	***3,710***	***4,148***	***4,639***	***4,643***
Currently Available Water Supplies						
North Texas MWD	1,068	1,996	2,473	2,455	2,542	2,414
Total Current Supplies	***1,068***	***1,996***	***2,473***	***2,455***	***2,542***	***2,414***
Need (Demand - Current Supply)	***101***	***565***	***1,237***	***1,693***	***2,097***	***2,229***
Water Management Strategies						
Water Conservation	17	49	87	112	311	342
Additional Water from NTMWD	84	516	1,150	1,581	1,786	1,887
Total Water Management Strategies	***101***	***565***	***1,237***	***1,693***	***2,097***	***2,229***
Josephine (Region C and D) Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Lucas

The City of Lucas is located in south central Collin County. Lucas receives treated water supplies from NTMWD and plans to continue to do so. Water management strategies for Lucas include conservation and additional water from NTMWD. **Table 5E.21** shows the projected population and demand, the current supplies, and the water management strategies for Lucas.

TABLE 5E.21 SUMMARY OF WATER USER GROUP – CITY OF LUCAS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**11,475**	**13,122**	**13,442**	**13,442**	**13,442**	**13,442**
Projected Water Demand						
Municipal Demand	3,226	3,681	3,771	3,771	3,771	3,771
Total Projected Demand	***3,226***	***3,681***	***3,771***	***3,771***	***3,771***	***3,771***
Currently Available Water Supplies						
North Texas MWD	2,946	2,870	2,514	2,232	2,066	1,960
Total Current Supplies	***2,946***	***2,870***	***2,514***	***2,232***	***2,066***	***1,960***
Need (Demand - Current Supply)	***280***	***811***	***1,257***	***1,539***	***1,705***	***1,811***
Water Management Strategies						
Water Conservation	43	61	76	88	101	113
Additional Water from NTMWD	237	750	1,181	1,451	1,604	1,698
Total Water Management Strategies	***280***	***811***	***1,257***	***1,539***	***1,705***	***1,811***
Lucas Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

McKinney

The City of McKinney is the county seat of Collin County and is located in central Collin County. McKinney supplies several customers including portions of Collin County Manufacturing and Melissa. McKinney gets all of its treated water supplies from NTMWD and plans to continue to do so in the future. Water management strategies for McKinney include conservation and additional water from NTMWD. **Table 5E.22** shows the projected population and demand, the current supplies, and the water management strategies for McKinney.

TABLE 5E.22 SUMMARY OF WATER USER GROUP – CITY OF MCKINNEY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**227,593**	**269,464**	**344,909**	**433,869**	**433,869**	**433,869**
Projected Water Demand						
Municipal Demand	48,864	57,687	73,839	92,883	92,883	92,883
Melissa	*561*	*561*	*561*	*561*	*561*	*561*
Manufacturing, Collin	*690*	*715*	*742*	*769*	*798*	*827*
Total Projected Demand	***50,115***	***58,963***	***75,142***	***94,213***	***94,242***	***94,271***
Currently Available Water Supplies						
North Texas MWD	44,618	44,980	49,235	54,979	50,890	48,286
Melissa	*513*	*437*	*374*	*333*	*307*	*292*
Manufacturing, Collin	*630*	*557*	*494*	*455*	*437*	*430*
Total Current Supplies	***45,761***	***45,974***	***50,103***	***55,767***	***51,634***	***49,008***
Need (Demand - Current Supply)	***4,354***	***12,989***	***25,039***	***38,446***	***42,608***	***45,263***
Water Management Strategies						
Water Conservation	2,276	4,374	6,989	9,334	8,638	8,445
Melissa	*425*	*1,021*	*1,500*	*1,890*	*1,966*	*1,831*
Additional Supplies from NTMWD	1,970	8,333	17,615	28,570	33,355	36,152
Melissa	*60*	*158*	*248*	*314*	*361*	*397*
Manufacturing, Collin	*23*	*83*	*143*	*183*	*211*	*229*
Total Water Management Strategies	***4,754***	***13,969***	***26,495***	***40,291***	***44,531***	***47,054***
McKinney Reserve (Shortage)	***400***	***980***	***1,456***	***1,845***	***1,923***	***1,791***

Melissa

Melissa is located in northern Collin County. The city receives its water supply from groundwater (Woodbine aquifer) and from NTMWD (through McKinney and through the GTUA Collin-Grayson Municipal Alliance pipeline). Melissa is planning to add a direct connection to NTMWD in the next few years. It was assumed for the purposes of the *2026 Region C Plan* that this direct connection to NTMWD would be online by 2030. Melissa is expected to grow rapidly over the planning horizon. Water management strategies for Melissa include conservation, additional water from NTMWD (direct connection), additional water from NTMWD (through McKinney), and additional water from NTMWD (through the GTUA Collin-Grayson Municipal Alliance pipeline). **Table 5E.23** shows the projected population and demand, the current supplies, and the water management strategies for Melissa. Due to the rapid growth that is projected, it is important to the city to have a reliable and diverse water supply portfolio.

TABLE 5E.23 SUMMARY OF WATER USER GROUP – CITY OF MELISSA

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**43,840**	**65,280**	**87,678**	**108,878**	**119,072**	**119,072**
Projected Water Demand						
Municipal Demand	9,505	14,123	18,969	23,555	25,761	25,761
Total Projected Demand	***9,505***	***14,123***	***18,969***	***23,555***	***25,761***	***25,761***
Currently Available Water Supplies						
Woodbine Aquifer	175	175	175	175	175	175
North Texas MWD (through McKinney)	513	437	374	333	307	292
North Texas MWD (through GTUA CGMA)	1,167	1,167	1,167	1,167	1,167	1,167
North Texas MWD	6,405	8,350	9,726	10,805	10,969	10,407
Total Current Supplies	***8,260***	***10,129***	***11,442***	***12,480***	***12,618***	***12,041***
Need (Demand - Current Supply)	***1,245***	***3,994***	***7,527***	***11,075***	***13,143***	***13,720***
Water Management Strategies						
Water Conservation	425	1,021	1,500	1,890	1,966	1,831
Additional Supplies from NTMWD	296	1,586	3,706	5,985	7,523	8,190
Additional Supplies from NTMWD through McKinney	23	83	143	183	211	229
Expand Collin-Grayson Municipal Alliance, Supplies from NTMWD through GTUA	676	1,479	2,353	3,192	3,618	3,645
Total Water Management Strategies	***1,420***	***4,169***	***7,702***	***11,250***	***13,318***	***13,895***
Melissa Reserve (Shortage)	***175***	***175***	***175***	***175***	***175***	***175***

Milligan Water Supply Corporation

Milligan WSC is located in central Collin County and is bordered to the west by McKinney. The WSC receives treated water supplies from NTMWD and plans to continue to do so. Milligan WSC's water management strategies include conservation and additional water from NTMWD. **Table 5E.24** shows the projected population and demand, the current supplies, and the water management strategies for Milligan WSC.

TABLE 5E.24 SUMMARY OF WATER USER GROUP – MILLIGAN WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,352**	**3,525**	**4,137**	**4,824**	**5,593**	**6,231**
Projected Water Demand						
Municipal Demand	387	404	474	553	641	714
Total Projected Water Demand	***387***	***404***	***474***	***553***	***641***	***714***
Currently Available Water Supplies						
North Texas MWD	353	315	316	327	352	371
Total Current Supplies	***353***	***315***	***316***	***327***	***352***	***371***
Need (Demand - Current Supply)	***34***	***89***	***158***	***226***	***289***	***343***
Water Management Strategies						
Water Conservation	5	7	9	13	17	22
Additional Water from NTMWD	29	82	149	213	272	321
Total Water Management Strategies	***34***	***89***	***158***	***226***	***289***	***343***
Milligan WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Murphy

The City of Murphy is located in southern Collin County and receives treated water supplies from NTMWD. Water management strategies for Murphy are conservation and additional water from NTMWD. **Table 5E.25** shows the projected population and demand, the current supplies, and the water management strategies for Murphy.

TABLE 5E.25 SUMMARY OF WATER USER GROUP – CITY OF MURPHY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**21,373**	**21,822**	**24,104**	**26,718**	**29,564**	**31,653**
Projected Water Demand						
Municipal Demand	4,832	4,914	5,428	6,017	6,658	7,128
Total Projected Demand	***4,832***	***4,914***	***5,428***	***6,017***	***6,658***	***7,128***
Currently Available Water Supplies						
North Texas MWD	4,412	3,832	3,619	3,561	3,648	3,705
Total Current Supplies	***4,412***	***3,832***	***3,619***	***3,561***	***3,648***	***3,705***
Need (Demand - Current Supply)	***420***	***1,082***	***1,809***	***2,456***	***3,010***	***3,423***
Water Management Strategies						
Water Conservation	240	295	380	462	542	594
Additional Water from NTMWD	180	787	1,429	1,994	2,468	2,829
Total Water Management Strategies	***420***	***1,082***	***1,809***	***2,456***	***3,010***	***3,423***
Murphy Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Nevada Special Utility District

Nevada SUD supplies water to parts of Collin and Rockwall Counties. The SUD receives treated water supplies from NTMWD and plans to continue to do so. The water management strategies include conservation and additional water from NTMWD. **Table 5E.26** shows the projected population and demand, the current supplies, and the water management strategies for Nevada SUD.

TABLE 5E.26 SUMMARY OF WATER USER GROUP – NEVADA SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,805**	**7,364**	**10,957**	**23,127**	**41,290**	**55,490**
Projected Water Demand						
Municipal Demand	559	705	1,048	2,213	3,951	5,310
Total Projected Demand	***559***	***705***	***1,048***	***2,213***	***3,951***	***5,310***
Currently Available Water Supplies						
North Texas MWD	511	550	698	1,310	2,165	2,760
Total Current Supplies	***511***	***550***	***698***	***1,310***	***2,165***	***2,760***
Need (Demand - Current Supply)	***48***	***155***	***350***	***903***	***1,786***	***2,550***
Water Management Strategies						
Water Conservation	30	41	62	194	441	561
Additional Water from NTMWD	18	114	288	709	1,345	1,989
Total Water Management Strategies	***48***	***155***	***350***	***903***	***1,786***	***2,550***
Nevada SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

North Collin Special Utility District

North Collin SUD is located in north Collin County. The SUD currently receives treated water supplies from NTMWD and plans to continue to do so. Water management strategies for North Collin SUD include conservation and additional water from NTMWD. **Table 5E.27** shows the projected population and demand, the current supplies, and the water management strategies for North Collin SUD.

TABLE 5E.27 SUMMARY OF WATER USER GROUP – NORTH COLLIN SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**7,544**	**8,523**	**10,409**	**12,496**	**14,565**	**16,977**
Projected Water Demand						
Municipal Demand	1,080	1,216	1,485	1,783	2,078	2,422
Total Projected Demand	***1,080***	***1,216***	***1,485***	***1,783***	***2,078***	***2,422***
Currently Available Water Supplies						
North Texas MWD	986	948	990	1,055	1,139	1,259
Total Current Supplies	***986***	***948***	***990***	***1,055***	***1,139***	***1,259***
Need (Demand - Current Supply)	***94***	***268***	***495***	***728***	***939***	***1,163***
Water Management Strategies						
Water Conservation	15	21	33	49	63	81
Additional Supplies from NTMWD	79	247	462	679	876	1,082
Total Water Management Strategies	***94***	***268***	***495***	***728***	***939***	***1,163***
North Collin SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

North Farmersville Water Supply Corporation

North Farmersville WSC supplies water in Collin County and is located north of the City of Farmersville. The WSC receives treated water supplies from NTMWD through Farmersville. The water management strategies for North Farmersville WSC include conservation and additional supplies from NTMWD. **Table 5E.28** shows the projected population and demand, the current supplies, and the water management strategies for North Farmersville WSC.

TABLE 5E.28 SUMMARY OF WATER USER GROUP – NORTH FARMERSVILLE WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**465**	**550**	**715**	**834**	**942**	**992**
Projected Water Demand						
Municipal Demand	99	117	152	177	200	211
Total Projected Water Demand	***99***	***117***	***152***	***177***	***200***	***211***
Currently Available Water Supplies						
North Texas MWD (through Farmersville)	91	91	101	104	110	109
Total Current Supplies	***91***	***91***	***101***	***104***	***110***	***109***
Need (Demand - Current Supply)	***8***	***26***	***51***	***73***	***90***	***102***
Water Management Strategies						
Water Conservation	1	4	6	7	8	9
Additional Supplies from NTMWD	7	22	45	66	82	93
Total Water Management Strategies	***8***	***26***	***51***	***73***	***90***	***102***
North Farmersville WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Parker

The City of Parker is located in south Collin County and receives treated water supplies from NTMWD. Water management strategies for Parker include conservation and additional water from NTMWD, including additional delivery infrastructure. **Table 5E.29** shows the projected population and demand, the current supplies, and the water management strategies for Parker.

TABLE 5E.29 SUMMARY OF WATER USER GROUP – CITY OF PARKER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,878**	**8,782**	**12,121**	**14,089**	**14,089**	**14,089**
Projected Water Demand						
Municipal Demand	2,913	3,714	5,126	5,958	5,958	5,958
Total Projected Demand	***2,913***	***3,714***	***5,126***	***5,958***	***5,958***	***5,958***
Currently Available Water Supplies						
North Texas MWD	2,660	2,896	3,418	3,526	3,264	3,097
Total Current Supplies	***2,660***	***2,896***	***3,418***	***3,526***	***3,264***	***3,097***
Need (Demand - Current Supply)	***253***	***818***	***1,708***	***2,432***	***2,694***	***2,861***
Water Management Strategies						
Water Conservation	80	120	190	249	269	289
Additional Water from NTMWD	173	698	1,518	2,183	2,425	2,572
Increase Delivery Infrastructure from NTMWD	*0*	*0*	*1,291*	*2,064*	*2,044*	*2,024*
Total Water Management Strategies	***253***	***818***	***1,708***	***2,432***	***2,694***	***2,861***
Parker Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Plano

The City of Plano is located in southwest Collin County and southeast Denton County. Plano provides water to a portion of The Colony and to some manufacturing within Plano. The city receives all of its treated water supplies from NTMWD. Water management strategies for Plano include conservation and additional water from NTMWD. **Table 5E.30** shows the projected population and demand, the current supplies, and the water management strategies for Plano.

TABLE 5E.30 SUMMARY OF WATER USER GROUP – CITY OF PLANO

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**286,224**	**288,115**	**317,280**	**326,800**	**326,800**	**326,800**
Projected Water Demand						
Municipal Demand	72,516	72,811	80,181	82,588	82,588	82,588
County-Other, Collin	*50*	*50*	*50*	*50*	*50*	*50*
Manufacturing, Collin	*86*	*89*	*93*	*96*	*100*	*103*
The Colony	*1,200*	*2,000*	*2,200*	*2,200*	*2,200*	*2,200*
Total Projected Demand	***73,852***	***74,950***	***82,524***	***84,934***	***84,938***	***84,941***
Currently Available Water Supplies						
North Texas MWD	66,214	56,772	53,464	48,885	45,250	42,934
County-Other, Collin	*45*	*39*	*34*	*30*	*28*	*26*
Manufacturing, Collin	*79*	*69*	*62*	*57*	*54*	*54*
The Colony	*1,096*	*1,559*	*1,467*	*1,303*	*1,206*	*1,144*
Total Current Supplies	***67,434***	***58,439***	***55,027***	***50,275***	***46,538***	***44,158***
Need (Demand - Current Supply)	***6,418***	***16,511***	***27,497***	***34,659***	***38,400***	***40,783***
Water Management Strategies						
Water Conservation	4,719	8,816	12,540	13,073	13,119	13,281
County-Other, Collin	*5*	*10*	*15*	*22*	*30*	*38*
Manufacturing, Collin	*0*	*0*	*0*	*0*	*0*	*0*
The Colony	*328*	*548*	*663*	*636*	*639*	*658*
Additional Supplies from NTMWD	1,583	7,223	14,177	20,630	24,219	26,373
County-Other, Collin	5	11	15	19	21	23
Manufacturing, Collin	7	20	31	39	46	49
The Colony	52	318	587	757	853	911
Total Water Management Strategies	***6,699***	***16,946***	***28,028***	***35,176***	***38,927***	***41,333***
Plano Reserve (Shortage)	***281***	***435***	***531***	***517***	***527***	***550***

Princeton

Princeton is at the intersections of U.S. Highway 380 and Farm Roads 75, 1377, and 982, seven miles east of McKinney in east central Collin County. The city supplies its citizens and provides wholesale supplies to Culleoka Water Supply Corporation. Princeton obtains all its treated water supplies from the North Texas Municipal Water District (NTMWD) and plans to continue to do so. The recommended water management strategies for Princeton include implementing water conservation measures and purchasing additional treated water from NTMWD. **Table 5E.31** shows the projected demand, the current supplies, and the water management strategies for Princeton.

TABLE 5E.31 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS - PRINCETON

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Princeton	5,085	10,783	14,621	16,324	17,769	17,769
Culleoka WSC	1,316	1,503	1,812	2,054	2,312	2,554
Total Projected Water Demand	***6,401***	***12,286***	***16,433***	***18,378***	***20,081***	***20,323***
Currently Available Supplies						
NTMWD	5,844	9,580	10,958	10,878	11,001	10,564
Total Current Supplies	***5,844***	***9,580***	***10,958***	***10,878***	***11,001***	***10,564***
Need (Demand less Supply)	***557***	***2,706***	***5,475***	***7,500***	***9,080***	***9,759***
Water Management Strategies						
Conservation (retail)	259	1,051	1,402	1,449	1,525	1,444
Conservation (wholesale)	34	53	69	85	184	236
Additional NTMWD	264	1,602	4,004	5,966	7,371	8,079
Total Supplies from Strategies	***557***	***2,706***	***5,475***	***7,500***	***9,080***	***9,759***
Total Supplies	***6,401***	***12,286***	***16,433***	***18,378***	***20,081***	***20,323***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

Prosper

The City of Prosper is located in western Collin County and eastern Denton County. The city currently receives treated water supplies from NTMWD. Water management strategies for Prosper include conservation and additional water from NTMWD. **Table 5E.32** shows the projected population and demand, the current supplies, and the water management strategies for Prosper.

TABLE 5E.32 SUMMARY OF WATER USER GROUP – CITY OF PROSPER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**55,275**	**65,096**	**77,748**	**80,875**	**85,432**	**85,432**
Projected Water Demand						
Municipal Demand	14,329	16,839	20,112	20,921	22,100	22,100
Total Projected Demand	***14,329***	***16,839***	***20,112***	***20,921***	***22,100***	***22,100***
Currently Available Water Supplies						
North Texas MWD	13,084	13,130	13,411	12,383	12,109	11,489
Total Current Supplies	***13,084***	***13,130***	***13,411***	***12,383***	***12,109***	***11,489***
Need (Demand - Current Supply)	***1,245***	***3,709***	***6,701***	***8,538***	***9,991***	***10,611***
Water Management Strategies						
Water Conservation	192	563	908	832	892	815
Additional Supplies from NTMWD	1,053	3,146	5,793	7,706	9,099	9,796
Total Water Management Strategies	***1,245***	***3,709***	***6,701***	***8,538***	***9,991***	***10,611***
Prosper Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Richardson

Richardson is located in north Dallas County and southwest Collin County. Since most of the population is in Dallas County, its water supply plan is discussed under Dallas County in **Section 5E.3**.

Royse City

Royse City is located in northeast Rockwall County and southeast Collin County. Since most of the population is in Rockwall County, its water supply plan is discussed under Rockwall County in **Section 5E.14.**

Sachse

Sachse is located in north Dallas County and south Collin County. Since most of the population is in Dallas County, its water supply plan is discussed under Dallas County in **Section 5E.3**.

Seis Lagos Utility District

Seis Lagos Utility District is located in central Collin County on the western shore of Lake Lavon. The District currently receives treated water supplies from NTMWD. Water management strategies for Seis Lagos UD include conservation and additional water from NTMWD. **Table 5E.33** shows the projected population and demand, the current supplies, and the water management strategies for Seis Lagos UD.

TABLE 5E.33 SUMMARY OF WATER USER GROUP – SEIS LAGOS UTILITY DISTRICT

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,348**	**2,270**	**2,383**	**2,479**	**2,535**	**2,541**
Projected Water Demand						
Municipal Demand	656	633	665	691	707	709
Total Projected Demand	***656***	***633***	***665***	***691***	***707***	***709***
Currently Available Water Supplies						
North Texas MWD	599	493	443	409	387	369
Total Current Supplies	***599***	***493***	***443***	***409***	***387***	***369***
Need (Demand - Current Supply)	***57***	***140***	***222***	***282***	***320***	***340***
Water Management Strategies						
Water Conservation	8	10	13	15	20	22
Additional Supplies from NTMWD	49	130	209	267	300	318
Total Water Management Strategies	***57***	***140***	***222***	***282***	***320***	***340***
Seis Lagos Utility District Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

South Grayson Special Utility District

South Grayson SUD is located in south Grayson County and north Collin County. The water supply plan for South Grayson SUD is discussed under Grayson County in **Section 5E.8**.

Verona Special Utility District

Verona SUD is located in northeastern Collin County, south of Westminster SUD. The SUD receives its water supply from the Woodbine aquifer and the only water management strategy is water conservation. **Table 5E.34** shows the projected population and demand, the current supplies, and the water management strategies for Verona SUD.

TABLE 5E.34 SUMMARY OF WATER USER GROUP – VERONA SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,345**	**4,217**	**5,210**	**6,206**	**7,303**	**8,512**
Projected Water Demand						
Municipal Demand	442	555	685	816	961	1,120
Total Projected Water Demand	***442***	***555***	***685***	***816***	***961***	***1,120***
Currently Available Water Supplies						
Woodbine Aquifer	442	555	685	816	961	1,120
Total Current Supplies	***442***	***555***	***685***	***816***	***961***	***1,120***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	10	18	24	32	41	51
Total Water Management Strategies	***10***	***18***	***24***	***32***	***41***	***51***
Verona SUD Reserve (Shortage)	***10***	***18***	***24***	***32***	***41***	***51***

West Leonard Water Supply Corporation

West Leonard WSC serves Collin and Fannin Counties in Region C and Hunt County in Region D. The water management strategies for West Leonard WSC are discussed under Fannin County in **Section 5E.5**.

Westminster Special Utility District

Westminster SUD serves Collin and Grayson County. The SUD receives its water supply from the Woodbine aquifer. Since the SUD's projected demands can be met with the existing supplies, the only water management strategy included for this entity is conservation. **Table 5E.35** shows the projected population and demand, the current supplies, and the water management strategies for Westminster SUD.

TABLE 5E.35 SUMMARY OF WATER USER GROUP – WESTMINSTER SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,168**	**2,710**	**3,324**	**3,940**	**4,620**	**5,367**
Projected Water Demand						
Municipal Demand	410	511	626	742	870	1,011
Total Projected Water Demand	***410***	***511***	***626***	***742***	***870***	***1,011***
Currently Available Water Supplies						
Woodbine Aquifer	410	511	626	742	870	1,011
Total Current Supplies	***410***	***511***	***626***	***742***	***870***	***1,011***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	23	72	117	141	167	197
Total Water Management Strategies	***23***	***72***	***117***	***141***	***167***	***197***
Westminster SUD Reserve (Shortage)	***23***	***72***	***117***	***141***	***167***	***197***

Wylie

Wylie is located in southern Collin County, with some areas also extending into Dallas and Rockwall Counties. The City of Wylie currently receives treated water supplies from NTMWD and is home to NTMWD's Wylie Water Treatment Plant. Water management strategies for Wylie include conservation and additional water from NTMWD. **Table 5E.36** shows the projected population and demand, the current supplies, and the water management strategies for Wylie. It should be noted that some parts of the City of Wylie receive treated water supplies from Wylie Northeast SUD. The population in **Table 5E.36** (water service area population) is less than the population of the whole city.

TABLE 5E.36 SUMMARY OF WATER USER GROUP – CITY OF WYLIE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**47,379**	**46,874**	**49,115**	**50,589**	**50,589**	**50,589**
Projected Water Demand						
Municipal Demand	6,935	6,830	7,157	7,372	7,372	7,372
Total Projected Demand	***6,935***	***6,830***	***7,157***	***7,372***	***7,372***	***7,372***
Currently Available Water Supplies						
North Texas MWD	6,333	5,326	4,772	4,363	4,039	3,833
Total Current Supplies	***6,333***	***5,326***	***4,772***	***4,363***	***4,039***	***3,833***
Need (Demand - Current Supply)	***602***	***1,504***	***2,385***	***3,009***	***3,333***	***3,539***
Water Management Strategies						
Water Conservation	310	336	399	437	449	466
Additional Supplies from NTMWD	292	1,168	1,986	2,572	2,884	3,073
Total Water Management Strategies	***602***	***1,504***	***2,385***	***3,009***	***3,333***	***3,539***
Wylie Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Wylie Northeast Special Utility District

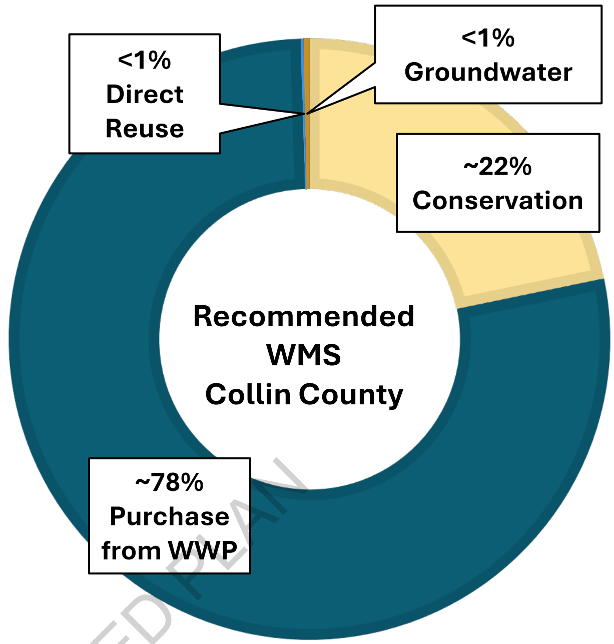
Wylie Northeast SUD is located in Collin County north of the City of Wylie. Wylie Northeast SUD currently receives treated water supplies from NTMWD. Water management strategies for Wylie Northeast SUD include conservation and additional water from NTMWD, with additional delivery infrastructure. The quantities shown for additional delivery infrastructure projects in the *Region C Regional Water Plan* are assumed to be equivalent to the additional supplies from the wholesale water provider. **Table 5E.37** shows the projected population and demand, the current supplies, and the water management strategies for Wylie.

TABLE 5E.37 SUMMARY OF WATER USER GROUP – WYLIE NORTHEAST SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**15,891**	**19,669**	**24,240**	**25,954**	**26,648**	**26,648**
Projected Water Demand						
Municipal Demand	1,851	2,278	2,807	3,006	3,086	3,086
Total Projected Demand	***1,851***	***2,278***	***2,807***	***3,006***	***3,086***	***3,086***
Currently Available Water Supplies						
North Texas MWD	1,690	1,776	1,872	1,780	1,691	1,605
Total Current Supplies	***1,690***	***1,776***	***1,872***	***1,780***	***1,691***	***1,605***
Need (Demand - Current Supply)	***161***	***502***	***935***	***1,226***	***1,395***	***1,481***
Water Management Strategies						
Water Conservation	46	71	206	254	252	247
Additional Supplies from NTMWD	115	431	729	972	1,143	1,234
Increase Delivery Infrastructure from NTWMD	*115*	*431*	*729*	*972*	*1,143*	*1,234*
Total Water Management Strategies	***161***	***502***	***935***	***1,226***	***1,395***	***1,481***
Wylie Northeast SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

5E.1.2 Summary of Costs for Collin County

Table 5E.38 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Collin County. Total quantities from **Table 5E.38** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands for WUGs located within Collin County are projected to come through purchases from wholesale water providers. Other strategies include conservation, direct reuse, and groundwater.

Table 5E.39 summarizes the recommended water management strategies within Collin County for individual WUGs and WWPs. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.38 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR COLLIN COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	62,206	$3,083,576
Purchase from WWP	222,398	$0
Additional Infrastructure	*49,072*	*$62,926,000*
Direct Reuse	500	$96,654,000
Groundwater	850	$9,523,000
Total	***285,954***	***$172,186,576***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.39 SUMMARY OF COSTS FOR COLLIN COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Garland[a]	Conservation	See Dallas County.				
	Other WMSs					
Princeton	Conservation (retail)	2030	1,525	$166,682	$1.53	$0.49
	Conservation (wholesale)	2030	Included under WUGs			
	NTMWD	2030	8,079	$0	$4.00	$4.00
WUGs						
Allen	Conservation	2030	2,591	$150,000	$2.81	$0.75
	NTMWD	2030	11,110	$0	$4.00	$4.00
Anna	Conservation	2030	3,068	$150,000	$1.47	$0.75
	NTMWD through GTUA (CGMA)	2030	12,832	$0	$1.50	$1.50
Bear Creek SUD[a]	Conservation	2030	680	$150,000	$1.82	$0.40
	NTMWD	2030	3,027	$0	$4.00	$4.00
Blue Ridge	Conservation	2030	45	$0	$3.34	$1.59
	NTMWD	2050	359	$0	$4.00	$4.00
	Connection to NTMWD	*2050*	*359*	*$10,211,000*	*$5.56*	*$0.82*
Caddo Basin SUD	Conservation	See 2026 Region D Plan				
	NTMWD					
Carrollton[a]	Conservation	See Denton County.				
	DWU					
Celina[a]	Conservation	2030	14,043	$150,000	$1.27	$0.83
	UTRWD	2040	11,493	$0	$4.00	$4.00
	GTUA Regional Water System	2040	26,450	$0	$15.35	$6.15
Copeville WSC	Conservation	2030	225	$158,560	$4.27	$1.43
	NTMWD	2030	1,176	$0	$4.00	$4.00
Culleoka WSC	Conservation	2030	236	$158,560	$4.61	$2.45
	NTMWD	2030	991	$0	$4.00	$4.00
Dallas[a]	Conservation	See DWU in **Chapter 5D**.				
	Other WMSs					
Desert WSC[a]	Conservation	See Fannin County.				
	Other WMSs					
East Fork SUD[a]	Conservation	2030	452	$158,560	$1.09	$0.53
	NTMWD	2030	2,310	$0	$4.00	$4.00

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	Additional Delivery Infrastructure from NTWMD	*2030*	*2,310*	*$6,438,000*	*$0.53*	*$0.06*
Fairview	Conservation	2030	1,146	$150,000	$1.83	$0.95
	NTMWD	2030	2,328	$0	$4.00	$4.00
Farmersville	Conservation	2030	573	$158,560	$5.27	$0.56
	NTMWD	2030	1,618	$0	$4.00	$4.00
Frisco[a]	Conservation	2030	6,578	$150,000	$5.42	$0.42
	Direct Reuse	2030	500	$96,654,000	$36.96	$4.71
	NTMWD	2030	34,669	$0	$4.00	$4.00
	Infrastructure Improvements	*2030*	*34,686*	*$11,866,000*	*$0.06*	*$0.01*
Frognot WSC[a]	Conservation	2030	23	$0	$10.90	$2.76
Hickory Creek SUD[a] (Region C Portion Only)	Conservation	See Fannin County.				
Josephine[a]	Conservation	2030	342	$156,974	$3.24	$0.93
	NTMWD	2030	1,887	$0	$4.00	$4.00
Lucas	Conservation	2030	113	$0	$10.08	$0.59
	NTMWD	2030	1,698	$0	$4.00	$4.00
McKinney	Conservation	2030	9,334	$150,000	$3.07	$0.48
	NTMWD	2030	36,152	$0	$4.00	$4.00
Melissa	Conservation	2030	1,966	$150,000	$1.04	$0.22
	NTMWD	2030	8,190	$0	$4.00	$4.00
	Additional Delivery Infrastructure from NTWMD	*2030*	*8,190*	*$11,885,000*	*$1.23*	*$0.27*
	Additional Delivery Infrastructure from NTMWD (through McKinney)	*2030*	*229*	*$3,470,000*	*$2.87*	*$0.33*
	NTMWD through GTUA (CGMA)	2030	3,645	$0	$1.50	$1.50
	CGMA	*2030*	See GTUA in **Chapter 5D**.			
Milligan WSC	Conservation	2030	22	$0	$3.21	$1.18
	NTMWD	2030	321	$0	$4.00	$4.00
Murphy	Conservation	2030	2,829	$158,560	$0.97	$0.34
	NTMWD	2030	2,829	$0	$4.00	$4.00
Nevada SUD[a]	Conservation	2030	561	$150,000	$2.91	$1.35

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	NTMWD	2030	1,989	$0	$4.00	$4.00
North Collin SUD	Conservation	2030	81	$8,560	$3.13	$1.25
	NTMWD	2030	1,082	$0	$4.00	$4.00
North Farmersville WSC	Conservation	2030	9	$0	$4.23	$1.26
	NTMWD	2030	0	$0	$4.00	$4.00
Parker	Conservation	2030	289	$0	$2.40	$0.53
	NTMWD	2030	2,572	$0	$4.00	$4.00
	Additional Delivery Infrastructure from NTWMD	*2050*	*2,064*	*$11,885,000*	*$1.23*	*$0.27*
Plano[a]	Conservation	2030	13,281	$150,000	$1.61	$1.17
	NTMWD	2030	26,396	$0	$4.00	$4.00
Prosper[a]	Conservation	2030	908	$150,000	$0.98	$0.21
	NTMWD	2030	9,796	$0	$4.00	$4.00
Richardson[a]	Conservation	See Dallas County.				
	NTMWD					
Royse City[a]	Conservation	See Rockwall County.				
	NTMWD					
Sachse[a]	Conservation	See Dallas County.				
	NTMWD					
Seis Lagos UD	Conservation	2030	22	$0	$1.13	$0.62
	NTMWD	2030	318	$0	$4.00	$4.00
South Grayson SUD[a]	Conservation	See Grayson County.				
	Connect to Sherman					
Verona SUD	Conservation	2030	51	$0	$3.92	$1.95
West Leonard WSC[a]	Conservation	See Fannin County.				
Westminster SUD[a]	Conservation	2030	197	$0	$2.22	$1.22
Wylie[a]	Conservation	2030	466	$150,000	$2.73	$2.20
	NTMWD	2030	3,073	$0	$4.00	$4.00
Wylie Northeast SUD	Conservation	2030	254	$158,560	$4.85	$0.86
	NTMWD	2030	1,234	$0	$4.00	$4.00
	Additional Delivery Infrastructure from NTWMD	*2030*	*1,234*	*$7,171,000*	*$1.19*	*$0.22*
County Other and Non-Municipal						
	Conservation	2030	38	$0	$4.70	$0.75

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
County Other, Collin	New Well(s) in Trinity Aquifer	2040	850	$9,523,000	$3.18	$0.76
Irrigation, Collin	Conservation	2030	258	$0	$0.94	$0.94
	DWU	2030	8	$0	$4.00	$4.00
Livestock, Collin	None	None				
Manufacturing, Collin	NTMWD	2030	4,766	$0	$4.00	$4.00
Mining, Collin	None	None				
Steam Electric Power, Collin	None	None				

[a]*Water User Groups extend into more than one county*

[b]*Quantities listed are for the WUG only. They do not include the WUG's customers.*

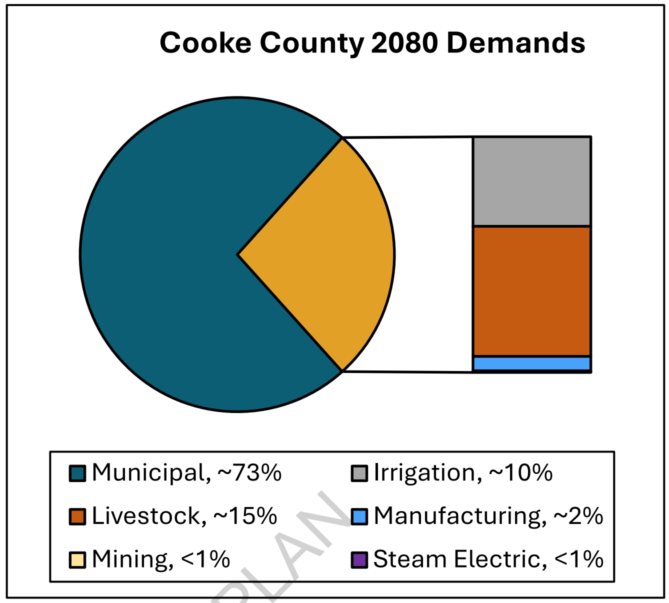
[c]*Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.*

5E.2 Cooke County

Cooke County is located in the north central portion of Region C. **Figure 5E.4** shows water supplier service areas in the county.

Population projections estimate that the population within Cooke County is expected to exceed 51,000 people by 2080.

Demands for the County are predominately municipal. The second and third largest demands for most of the planning period are livestock and irrigation. The county has relatively minimal manufacturing, mining, and steam electric demands, accounting for less than 3% of the county's total demands.



The City of Gainesville provides most of the water to Cooke County. In addition to purchasing water from WWPs, other water sources include surface water supplies (Moss Lake and Muenster Lake), groundwater, and direct reuse. An overall summary of the County's projections is shown in **Table 5E.40** and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Cooke County Quick Facts

2020 Population: 41,668

Projected 2080 Population: 51,732

Projected 2080 Demand: 9 MGD

County Seat: Gainesville

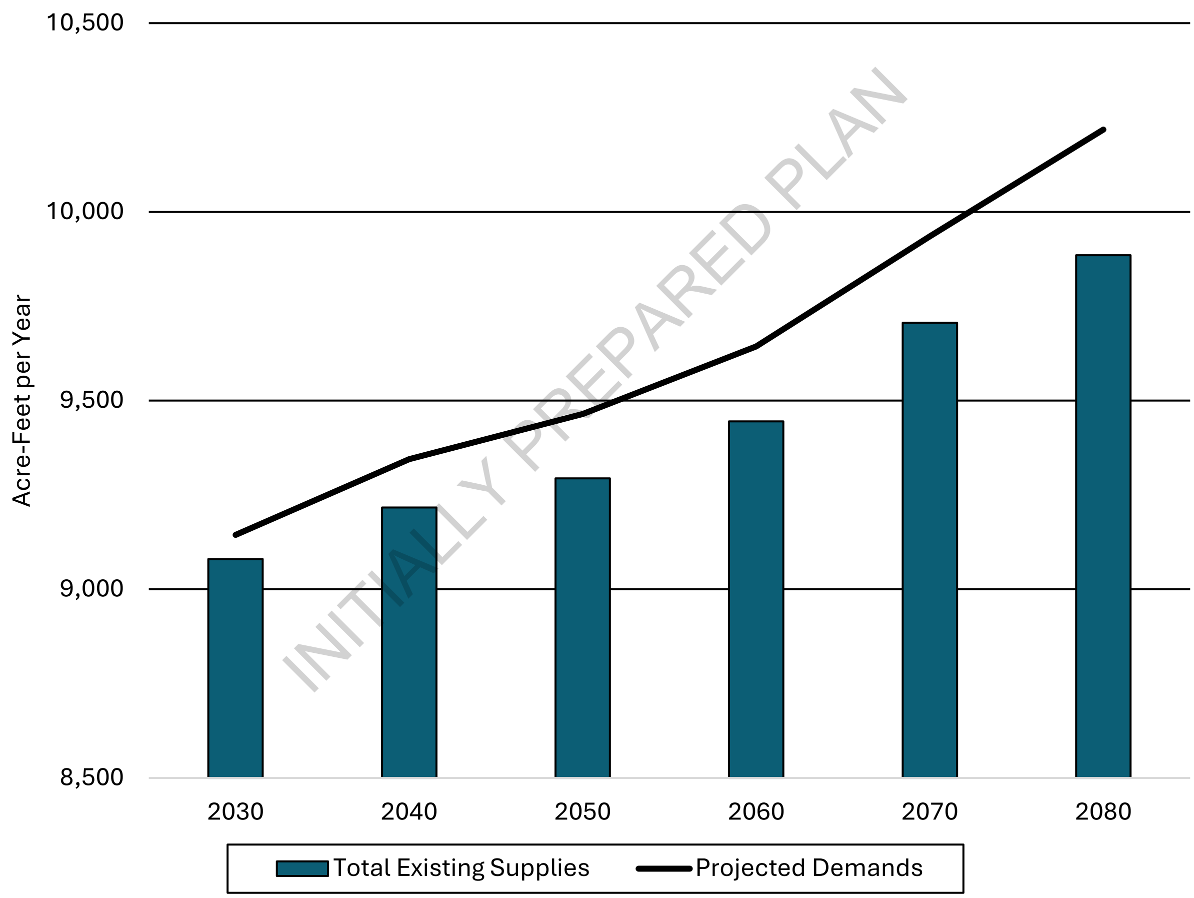
Economy: Oil, agribusiness, tourism, manufacturing

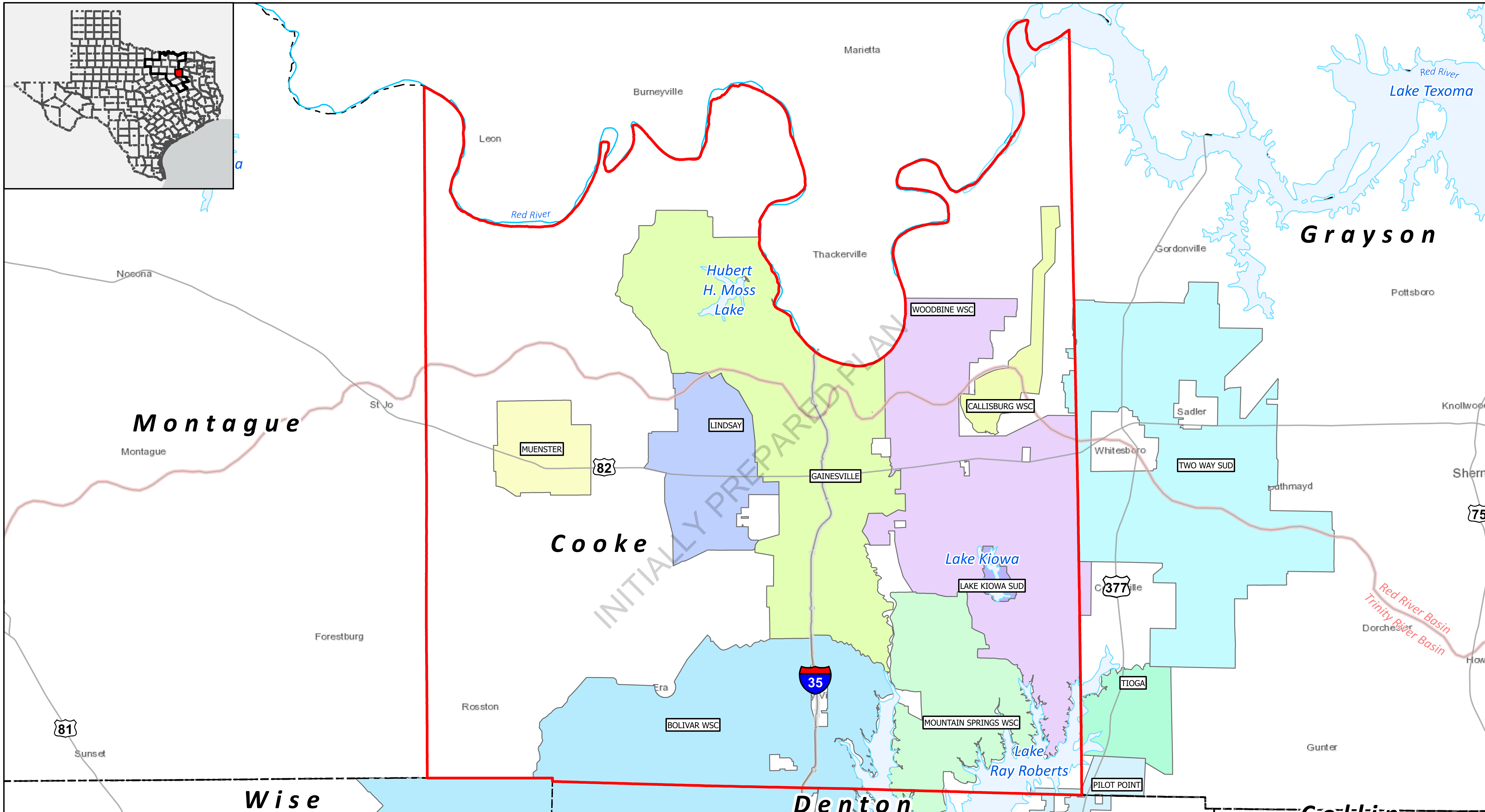
River Basins: Trinity (67%), Red (32%)

TABLE 5E.40 SUMMARY OF COOKE COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**44,200**	**45,693**	**46,466**	**47,694**	**49,742**	**51,732**
Projected Demands	**9,144**	**9,345**	**9,464**	**9,643**	**9,935**	**10,218**
Municipal	6,441	6,637	6,751	6,923	7,209	7,486
Irrigation	1,038	1,038	1,038	1,038	1,038	1,038
Livestock	1,508	1,508	1,508	1,508	1,508	1,508
Manufacturing	139	144	149	155	161	167
Mining	12	12	12	13	13	13
Steam Electric	6	6	6	6	6	6
Total Existing Supplies	***9,080***	***9,217***	***9,294***	***9,445***	***9,706***	***9,885***
Need (Demand - Supply)	***64***	***128***	***170***	***198***	***229***	***333***

FIGURE 5E.3 SUMMARY OF COOKE COUNTY





Cooke County, Texas

Figure 5E.4

Data Source(s): ESRI, TWDB, TxDOT

N

0 2 4 Mi

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.2.1 Wholesale Water Providers and Water User Groups

Cooke County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs for recommended and alternative water management strategies are presented in **Section 5E.2.2. Appendix H** has more detailed cost estimates.

Bolivar Water Supply Corporation

Bolivar WSC serves retail customers in southern Cooke County and in part of Denton and Wise Counties. Plans for Bolivar WSC are covered under Denton County in **Section 5E.4.**

Callisburg Water Supply Corporation

Callisburg WSC is located in northeastern Cooke County, north of Lake Kiowa SUD. The WSC gets its water supply from the Trinity aquifer and the only water management strategy for Callisburg WSC is conservation. **Table 5E.41** shows the projected population and demand, the current supplies, and the water management strategies for Callisburg WSC.

TABLE 5E.41 SUMMARY OF WATER USER GROUP – CALLISBURG WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,614**	**1,686**	**1,717**	**1,728**	**1,740**	**1,752**
Projected Water Demand						
Municipal Demand	141	146	149	150	151	152
Total Projected Water Demand	***141***	***146***	***149***	***150***	***151***	***152***
Currently Available Water Supplies						
Trinity Aquifer	141	146	149	150	151	152
Total Current Supplies	***141***	***146***	***149***	***150***	***151***	***152***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	3	5	5	6	7	7
Total Water Management Strategies	***3***	***5***	***5***	***6***	***7***	***7***
Callisburg WSC Reserve (Shortage)	***3***	***5***	***5***	***6***	***7***	***7***

Cooke County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. Cooke County Irrigation's currently available supplies include groundwater (Trinity aquifer and Woodbine aquifer) and supplies from Gainesville (direct reuse and Moss Lake). The remaining need for Cooke County Irrigation is planned to be met through conservation and additional supplies from Gainesville. **Table 5E.42** shows the projected demand, the current supplies, and the water management strategies for Cooke County Irrigation.

TABLE 5E.42 SUMMARY OF WATER USER GROUP – COOKE COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	**1,038**	**1,038**	**1,038**	**1,038**	**1,038**	**1,038**
Currently Available Water Supplies						
Trinity Aquifer	175	175	175	175	175	175
Woodbine Aquifer	49	49	49	49	49	49
Gainesville (direct reuse and Moss Lake)	814	814	814	814	814	787
Total Current Supplies	***1,038***	***1,038***	***1,038***	***1,038***	***1,038***	***1,011***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***27***
Water Management Strategies						
Water Conservation	1	24	46	57	68	79
Additional Supplies from Gainesville	70	70	70	70	70	70
Total Water Management Strategies	***71***	***94***	***116***	***127***	***138***	***149***
Irrigation, Cooke Reserve (Shortage)	***71***	***94***	***116***	***127***	***138***	***122***

Cooke County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. Currently available supplies include groundwater from the Trinity and Woodbine aquifers as well as local supplies. These supplies are sufficient to meet the projected demand. There are no water management strategies for this WUG. **Table 5E.43** shows the projected demand, the current supplies, and the water management strategies for Cooke County Livestock.

TABLE 5E.43 SUMMARY OF WATER USER GROUP – COOKE COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	**1,508**	**1,508**	**1,508**	**1,508**	**1,508**	**1,508**
Currently Available Water Supplies						
Trinity Aquifer	109	109	109	109	109	109
Woodbine Aquifer	60	60	60	60	60	60
Trinity Livestock Local Supply	910	910	910	910	910	910
Red Livestock Local Supply	429	429	429	429	429	429

Total Current Supplies	***1,508***	***1,508***	***1,508***	***1,508***	***1,508***	***1,508***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Cooke Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Cooke County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. Cooke County manufacturing is currently supplied by groundwater from the Trinity aquifer and surface water provided through the City of Gainesville. Any need is planned to be met with additional supplies from Gainesville. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG. **Table 5E.44** shows the projected demand, the current supplies, and the water management strategies for Cooke County Manufacturing. The reserve shown is for a new manufacturing park in Cooke County that Gainesville is planning to supply.

TABLE 5E.44 SUMMARY OF WATER USER GROUP – COOKE COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	**139**	**144**	**149**	**155**	**161**	**167**
Currently Available Water Supplies						
Trinity Aquifer	4	4	4	4	4	4
Gainesville	135	140	145	151	157	158
Total Current Supplies	***139***	***144***	***149***	***155***	***161***	***162***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***5***
Water Management Strategies						
Additional Supplies from Gainesville	0	1,121	1,121	1,121	1,121	1,126
Total Water Management Strategies	***0***	***1,121***	***1,121***	***1,121***	***1,121***	***1,126***
Manufacturing, Cooke Reserve (Shortage)	***0***	***1,121***	***1,121***	***1,121***	***1,121***	***1,121***

Cooke County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Much of Cooke County Mining demand is for sand and gravel operations. Cooke County Mining demands are currently supplied by groundwater from the Trinity aquifer. These supplies are sufficient to meet the projected demand. There are no water management strategies for this WUG. **Table 5E.45** shows the projected demand, the current supplies, and the water management strategies for Cooke County Mining.

TABLE 5E.45 SUMMARY OF WATER USER GROUP – COOKE COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	**12**	**12**	**12**	**13**	**13**	**13**
Currently Available Water Supplies						
Trinity Aquifer	12	12	12	13	13	13
Total Current Supplies	***12***	***12***	***12***	***13***	***13***	***13***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Mining, Cooke Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Cooke County Other

Cooke County Other includes individual domestic and water suppliers too small to be classified as water user groups. In Cooke County these entities include Valley View, Oak Ridge and Moss Lake WSC. The entities included under Cooke County Other currently receive their water supplies from groundwater (Trinity and Woodbine aquifers). Water management strategies for these entities include conservation and supplies from Gainesville. **Table 5E.46** shows the projected population and demand, the current supplies, and the water management strategies for Cooke County Other.

TABLE 5E.46 SUMMARY OF WATER USER GROUP – COOKE COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,976**	**6,178**	**6,367**	**6,557**	**6,800**	**7,000**
Projected Water Demand						
Municipal Demand	763	785	809	833	864	889
Total Projected Water Demand	***763***	***785***	***809***	***833***	***864***	***889***
Currently Available Water Supplies						
Trinity Aquifer	643	665	689	713	744	769
Woodbine Aquifer	120	120	120	120	120	120
Total Current Supplies	***763***	***785***	***809***	***833***	***864***	***889***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	7	9	12	15	18	22
Connect to Gainesville	0	0	0	166	165	266
Total Water Management Strategies	***7***	***9***	***12***	***181***	***183***	***288***
County-Other, Cooke Reserve (Shortage)	***7***	***9***	***12***	***181***	***183***	***288***

Cooke County Steam Electric Power

Steam electric power demands generally represent the cooling water needs during power generation. These demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. Cooke County's Steam Electric Power demand is attributed to the Cooke County Electric Co Op and is currently supplied fully by groundwater from the Trinity aquifer. There are no additional water management strategies needed. **Table 5E.47** shows the projected demand, the current supplies, and the water management strategies for Cooke County Steam Electric Power.

TABLE 5E.47 SUMMARY OF WATER USER GROUP – COOKE COUNTY SEP

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	**6**	**6**	**6**	**6**	**6**	**6**
Currently Available Water Supplies						
Trinity Aquifer	6	6	6	6	6	6
Total Current Supplies	***6***	***6***	***6***	***6***	***6***	***6***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Steam-Electric Power, Cooke Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Gainesville

The City of Gainesville is located in central Cooke County and is the largest city in the county and the county seat. Current non-municipal demands include irrigation and manufacturing in Cooke County. The city plans to begin providing treated water supplies to Bolivar WSC, Lindsay, Mountain Springs WSC, and entities included in Cooke County Other (such as Valley View and Stark Ranch). Gainesville also plans to provide additional supplies for a new manufacturing park (Camp Howze) in Cooke County. Infrastructure will need to be developed to deliver supplies to these future potential customers.

Gainesville's currently available supplies include groundwater from the Trinity aquifer, surface water from Moss Lake, and a small amount of direct reuse that is used specifically to meet the city's irrigation demand. The yield of Moss Lake is 4,900 acre-feet per year in 2030 but decreases over time due to sedimentation. Gainesville has a water treatment plant with a peak capacity of 4 MGD. Using a peaking factor of 2, Gainesville can treat up to 2,200 acre-feet per year for municipal supplies. The supply from Moss Lake is currently limited by the city's treatment capacity. Groundwater supplies are treated on-site.

Gainesville's recommended water management strategies include implementing conservation measures, developing additional supplies from Moss Lake (including treatment plant expansions and additional infrastructure to deliver to customers) and expanding the direct reuse system.

The City of Gainesville has a contract with GTUA for water from Lake Texoma, but there is currently no infrastructure to transmit or treat the supplies. With additional infrastructure, Gainesville can meet the projected 2080 demands using Lake Moss and groundwater. The city might want to develop supplies from Lake Texoma and participate in the GTUA regional system to meet long-term demand growth. Gainesville is planning to conduct a preliminary engineering study to evaluate long-term options for its contracted supplies from Lake Texoma. This may be a future project beyond the planning cycle. A summary of the recommended water plan for Gainesville is shown on **Table 5E.48**.

TABLE 5E.48 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – GAINESVILLE

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Gainesville	2,741	2,812	2,851	2,981	3,217	3,450
Irrigation, Cooke	814	814	814	814	814	814
Manufacturing, Cooke	135	140	145	151	157	163
Potential Future Customers						
Bolivar WSC	50	75	100	125	150	175
County-Other, Cooke	0	0	0	169	169	273
Lindsay	100	100	100	100	100	100
Manufacturing, Cooke	0	1,121	1,121	1,121	1,121	1,121
Mountain Springs WSC	100	100	100	100	100	100
Total Projected Water Demand	***3,940***	***5,162***	***5,231***	***5,561***	***5,828***	***6,196***
Currently Available Supplies						
Moss Lake	4,900	4,800	4,700	4,633	4,567	4,500
Direct Reuse	4	4	4	4	4	4
Trinity Aquifer	2,104	2,104	2,104	2,104	2,104	2,104
Total Current Supplies	***7,008***	***6,908***	***6,808***	***6,741***	***6,675***	***6,608***
Total Current Supplies Limited by WTP Capacity (4 MGD WTP)	***4,350***	***4,350***	***4,350***	***4,350***	***4,350***	***4,350***
Need (Demand less Supply)	***0***	***812***	***881***	***1,211***	***1,478***	***1,846***
Water Management Strategies						
Conservation (retail)	72	179	202	224	256	288
Conservation (wholesale)	5	26	44	57	66	79
Expand Direct Reuse	70	70	70	70	70	70
Additional Moss Lake with WTP Expansions	3,318	3,142	2,998	2,795	2,487	2,258
6 MGD WTP Plant Expansion	*3,318*	*3,142*	*2,998*	*2,795*	*2,487*	*2,258*
Infrastructure to deliver to customers	*3,318*	*3,142*	*2,998*	*2,795*	*2,487*	*2,258*
Total Supplies from Strategies	***3,465***	***3,417***	***3,314***	***3,146***	***2,879***	***2,695***
Total Supplies	***7,815***	***7,767***	***7,664***	***7,496***	***7,229***	***7,045***
Surplus or (Shortage)	***3,875***	***2,605***	***2,433***	***1,935***	***1,401***	***849***
Management Supply Factor	***1.98***	***1.50***	***1.47***	***1.35***	***1.24***	***1.14***

Lake Kiowa Special Utility District

Lake Kiowa SUD serves the area around Lake Kiowa in eastern Cooke County. The SUD currently gets its water supply from groundwater (Trinity aquifer) and the only water management strategy is conservation. **Table 5E.49** shows the projected population and demand, the current supplies, and the water management strategies for Lake Kiowa SUD.

TABLE 5E.49 SUMMARY OF WATER USER GROUP – LAKE KIOWA SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,346**	**2,477**	**2,532**	**2,555**	**2,581**	**2,609**
Projected Water Demand						
Municipal Demand	942	993	1,015	1,024	1,035	1,046
Total Projected Demand	***942***	***993***	***1,015***	***1,024***	***1,035***	***1,046***
Currently Available Water Supplies						
Trinity Aquifer	942	993	1,015	1,024	1,035	1,046
Total Current Supplies	***942***	***993***	***1,015***	***1,024***	***1,035***	***1,046***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	27	38	41	46	51	55
Total Water Management Strategies	***27***	***38***	***41***	***46***	***51***	***55***
Lake Kiowa SUD Reserve (Shortage)	***27***	***38***	***41***	***46***	***51***	***55***

Lindsay

Lindsay is in central Cooke County. The city currently receives its water supplies from the Trinity aquifer. Water management strategies for Lindsay include conservation and connecting to Gainesville. **Table 5E.50** shows the projected population and demand, the current supplies, and the water management strategies for Lindsay.

TABLE 5E.50 SUMMARY OF WATER USER GROUP – CITY OF LINDSAY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,718**	**1,758**	**1,777**	**1,777**	**1,776**	**1,776**
Projected Water Demand						
Municipal Demand	216	220	223	223	223	223
Total Projected Demand	***216***	***220***	***223***	***223***	***223***	***223***
Currently Available Water Supplies						
Trinity Aquifer	216	220	223	223	223	223
Total Current Supplies	***216***	***220***	***223***	***223***	***223***	***223***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	5	8	10	11	12	12
Connect to Gainesville System	98	96	96	95	95	95
Total Water Management Strategies	***103***	***104***	***106***	***106***	***107***	***107***
Lindsay Reserve (Shortage)	***103***	***104***	***106***	***106***	***107***	***107***

Mountain Springs Water Supply Corporation

Mountain Springs WSC serves parts of Cooke and Denton Counties. The WSC currently receives its water supply from the Trinity aquifer. Water management strategies for Mountain Springs WSC include conservation and connecting to Gainesville. **Table 5E.51** shows the projected population and demand, the current supplies, and the recommended water management strategies for Mountain Spring WSC.

TABLE 5E.51 SUMMARY OF WATER USER GROUP – MOUNTAIN SPRINGS WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,001**	**2,028**	**2,055**	**2,062**	**2,069**	**2,077**
Projected Water Demand						
Municipal Demand	328	331	336	337	338	339
Total Projected Demand	***328***	***331***	***336***	***337***	***338***	***339***
Currently Available Water Supplies						
Trinity Aquifer	328	331	336	337	338	339
Total Current Supplies	***328***	***331***	***336***	***337***	***338***	***339***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	8	11	12	13	15	16
Connect to Gainesville	98	97	96	96	96	95
Total Water Management Strategies	***106***	***108***	***108***	***109***	***111***	***111***
Mountain Springs WSC Reserve (Shortage)	***106***	***108***	***108***	***109***	***111***	***111***

Muenster

The City of Muenster is located in western Cooke County. The city currently receives its water supply from the Trinity aquifer. Water management strategies for Muenster include conservation and construction of a water treatment plant at Muenster Lake in order to begin utilizing Muenster Lake supply. **Table 5E.52** shows the projected population and demand, the current supplies, and the recommended and alternative water management strategies for Muenster.

TABLE 5E.52 SUMMARY OF WATER USER GROUP – MUENSTER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,139**	**2,139**	**2,139**	**2,139**	**2,139**	**2,139**
Projected Water Demand						
Municipal Demand	357	355	355	355	355	355
Total Projected Demand	***357***	***355***	***355***	***355***	***355***	***355***
Currently Available Water Supplies						
Trinity Aquifer	357	355	355	355	355	355
Total Current Supplies	***357***	***355***	***355***	***355***	***355***	***355***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	8	11	13	14	15	16
New 0.5 MGD WTP at Muenster Lake	280	280	280	280	280	280
Total Water Management Strategies	***288***	***291***	***293***	***294***	***295***	***296***
Muenster Reserve (Shortage)	***288***	***291***	***293***	***294***	***295***	***296***

Two Way Special Utility District

Two Way SUD serves eastern Cooke County and western Grayson County. Since most of the service area is in Grayson County, Two Way SUD is discussed under Grayson County in **Section 5E.8.**

Woodbine Water Supply Corporation

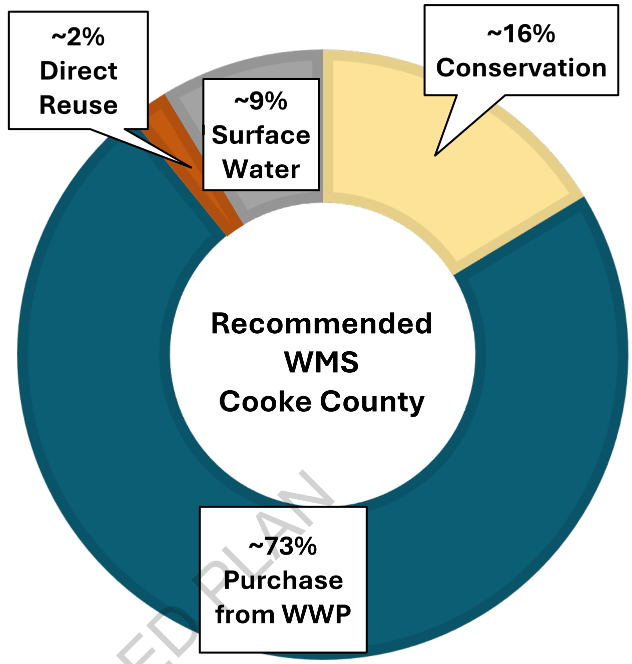
Woodbine WSC serves eastern Cooke County and western Grayson County. The WSC currently receives groundwater supplies from the Trinity aquifer. Water management strategies for Woodbine WSC include conservation and participation in the new GTUA Regional Water Supply System. See **Chapter 5C** and **Appendix G** for more information on the new GTUA Regional Water Supply System. **Table 5E.53** shows the projected population and demand, the current supplies, and the recommended water management strategies for Woodbine WSC.

TABLE 5E.53 SUMMARY OF WATER USER GROUP – WOODBINE WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,944**	**7,212**	**7,333**	**7,370**	**7,409**	**7,453**
Projected Water Demand						
Municipal Demand	712	735	747	751	755	760
Total Projected Demand	***712***	***735***	***747***	***751***	***755***	***760***
Currently Available Water Supplies						
Trinity Aquifer	712	712	712	712	712	712
Total Current Supplies	***712***	***712***	***712***	***712***	***712***	***712***
Need (Demand - Current Supply)	***0***	***23***	***35***	***39***	***43***	***48***
Water Management Strategies						
Water Conservation	17	24	26	29	32	34
Supplies from New GTUA Regional Water System	0	700	700	700	700	700
Total Water Management Strategies	***17***	***724***	***726***	***729***	***732***	***734***
Woodbine WSC Reserve (Shortage)	***17***	***701***	***691***	***690***	***689***	***686***

5E.2.2 Summary of Costs for Cooke County

Table 5E.54 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Cooke County. Total quantities from **Table 5E.54** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Cooke County are projected to come through purchases from wholesale water providers. Other strategies include conservation, infrastructure to utilize surface water (Muenster and Moss Lake), and direct reuse.

Table 5E.55 summarizes the recommended water management strategies within Cooke County individually. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.54 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR COOKE COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	529	$167,120
Purchase from WWP	2,358	$0
Additional Infrastructure	*9,954*	*$278,305,000*
Direct Reuse	70	$6,475,000
Surface Water	280	$23,696,000
Total	***3,237***	***$308,643,120***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.55 SUMMARY OF COSTS FOR COOKE COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Gainesville	Conservation (retail)	2030	288	$158,560	$3.51	$1.40
	Conservation (wholesale)	2030	Included under WUGs			
	Expand Direct Reuse	2030	70	$6,475,000	$17.80	$2.37
	Additional Lake Moss with WTP Expansions	2030	3,318	$0	$0.00	$0.00
	6 MGD WTP Plant Expansion	*2030*	*3,318*	*$71,102,000*	*$6.77*	*$3.24*
	Infrastructure to deliver to customers	*2030*	*3,318*	*$207,203,000*	*$12.18*	*$1.76*
WUGs						
Bolivar WSC[a]	Conservation	See Denton County.				
	New Well(s) in Trinity Aquifer					
	UTRWD					
	Connect to Gainesville					
Callisburg WSC	Conservation	2030	7	$0	$6.23	$3.35
Lake Kiowa SUD	Conservation	2030	55	$8,560	$1.33	$0.78
Lindsay	Conservation	2030	12	$0	$6.41	$1.93
	Gainesville	2030	98	$0	$4.00	$4.00
Mountain Springs WSC[a]	Conservation	2030	16	$0	$3.28	$1.68
	Gainesville	2030	98	$0	$4.00	$4.00
Muenster	Conservation	2030	16	$0	$6.27	$1.59
	Muenster Lake	2030	280	$23,696,000	$25.08	$10.97
	ALTERNATIVE Connect to Gainesville	*2030*	*280*	*$13,535,000*	*$13.67*	*$5.60*
Two Way SUD[a]	Conservation	See Grayson County.				
	New Well(s) in Trinity Aquifer					
	GTUA Regional Water System					
Woodbine WSC[a]	Conservation	2030	34	$0	$5.01	$2.55
	GTUA Regional Water System	2040	700	$0	$12.45	$6.65
County Other and Non-Municipal						
County Other, Cooke	Conservation	2030	22	$0	$4.41	$0.31
	Gainesville	2060	266	$0	$4.00	$4.00
Irrigation, Cooke	Conservation	2030	79	$0	$0.94	$0.94

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	Gainesville	2030	70	$0	$4.00	$4.00
Livestock, Cooke	None	None				
Manufacturing, Cooke	Gainesville	2080	1,126	$0	$4.00	$4.00
Mining, Cooke	None	None				
Steam Electric Power, Cooke	None	None				

[a]*Water user groups extend into more than one county.*

[b]*Quantities listed are for the WUG only. They do not include the WUG's customers.*

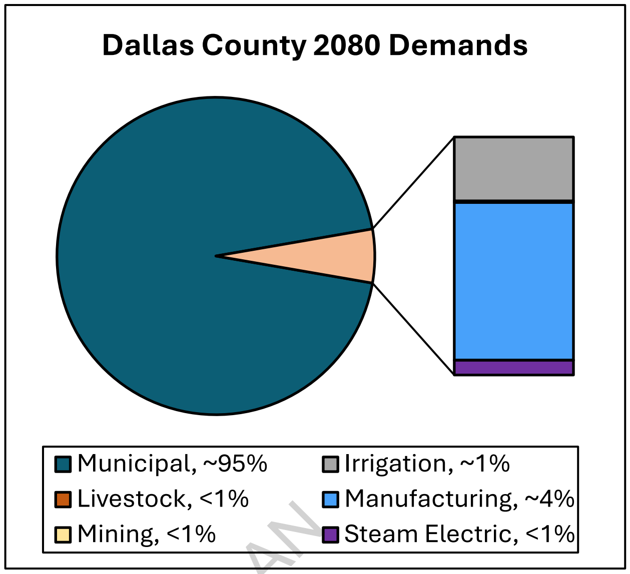
[c]*Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.*

5E.3 Dallas County

Dallas County is located in the central portion of Region C. **Figure 5E. 6** shows water service areas in Dallas County.

Population projections estimate that the population within Dallas County is expected to exceed 3.3 million people by 2080.

Demands for the county are predominately municipal at approximately 95%. The second and third largest demands are manufacturing and irrigation. Livestock, mining and steam electric demands are all less than 1% of the total demand.



Dallas Water Utilities (DWU) provides most of the treated water supplies to water users within the county. Other major water providers include NTMWD and Fort Worth. Strategies for major water providers are discussed in **Chapter 5D**. In addition to purchasing water from major water providers and other WWPs, other water sources include surface water supplies (Joe Pool Lake and Lake Chapman), groundwater, local supplies and reuse.

An overall summary of the County's projections is shown in **Table 5E.56**, and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Dallas County Quick Facts

2020 Population: 2,613,539

Projected 2080 Population: 3,372,187

Projected 2080 Demand: 636 MGD

County Seat: Dallas

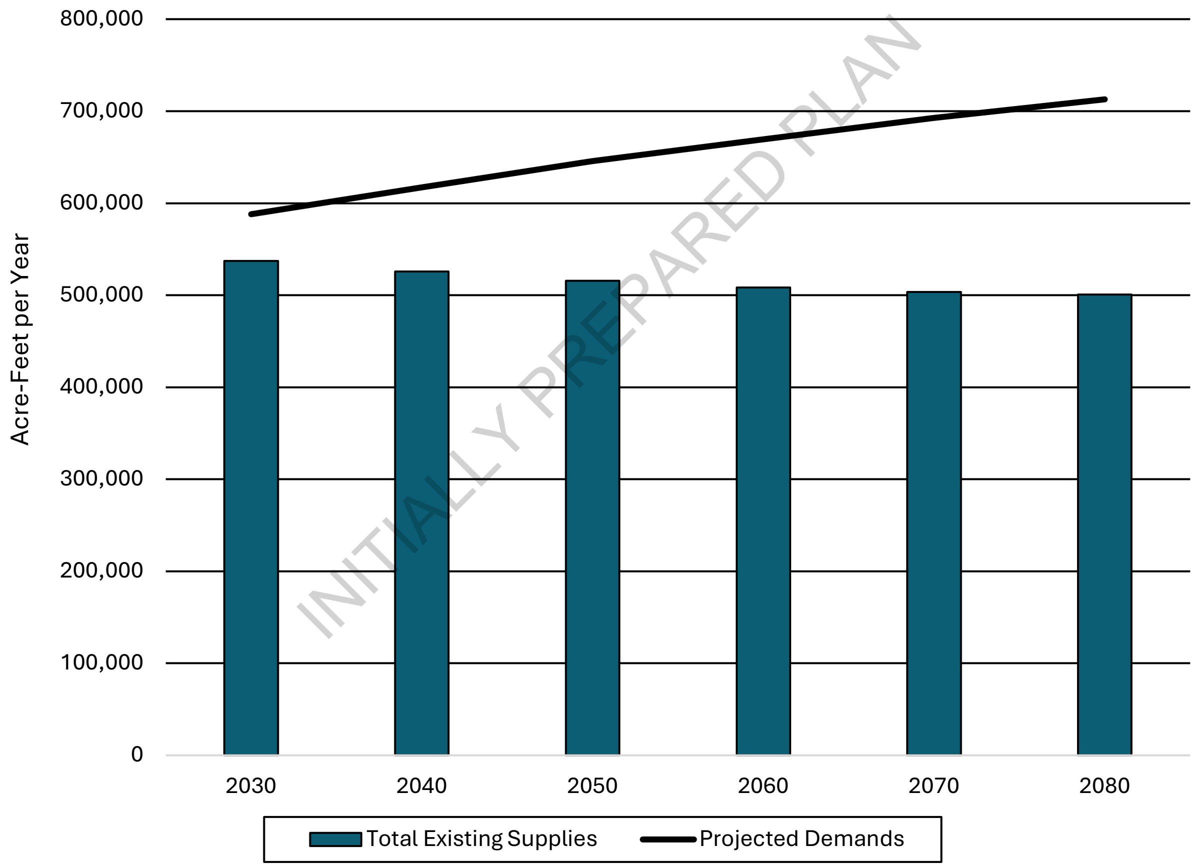
Economy: Telecommunications, transportation, manufacturing, government/services

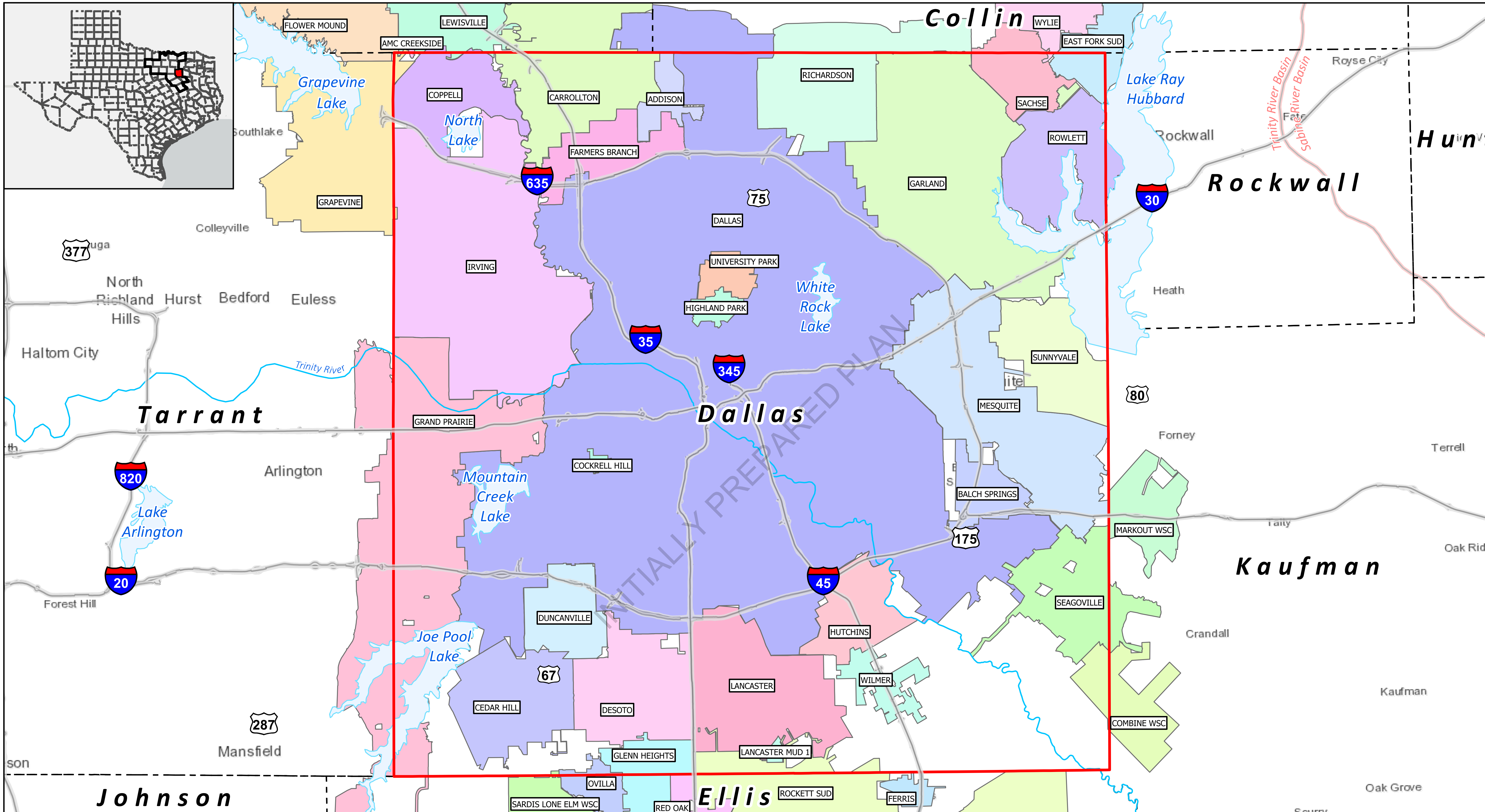
River Basins: Trinity (100%)

TABLE 5E.56 SUMMARY OF DALLAS COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**2,744,243**	**2,899,298**	**3,045,184**	**3,162,467**	**3,277,308**	**3,372,187**
Projected Demands	**588,041**	**617,407**	**645,928**	**669,521**	**692,645**	**712,879**
Municipal	553,384	581,955	609,651	632,389	654,626	673,940
Irrigation	10,468	10,468	10,468	10,468	10,468	10,468
Livestock	248	248	248	248	248	248
Manufacturing	21,497	22,292	23,117	23,972	24,859	25,779
Mining	32	32	32	32	32	32
Steam Electric	2,412	2,412	2,412	2,412	2,412	2,412
Total Existing Supplies	***537,327***	***525,659***	***515,814***	***508,503***	***503,596***	***500,912***
Need (Demand - Supply)	***50,714***	***91,748***	***130,114***	***161,018***	***189,049***	***211,967***

FIGURE 5E.5 SUMMARY OF DALLAS COUNTY





Dallas County, Texas
Figure 5E.6

Data Source(s): ESRI, TWDB, TxDOT

N

0 4 8 Mi

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.3.1 Wholesale Water Providers and Water User Groups

Water management strategies for Dallas County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs for recommended and alternative water management strategies are presented in **Section 5E.3.2. Appendix H** has more detailed cost estimates.

Addison

The City of Addison is located in northern Dallas County. The city receives treated water supplies from DWU. Water management strategies for Addison include conservation and additional water from DWU. **Table 5E.57** shows the projected population and demand, the current supplies, and the recommended water management strategies for Addison.

TABLE 5E.57 SUMMARY OF WATER USER GROUP – CITY OF ADDISON

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**20,465**	**23,069**	**24,456**	**25,276**	**26,179**	**27,173**
Projected Water Demand						
Municipal Demand	8,324	9,360	9,922	10,255	10,622	11,025
Total Projected Water Demand	***8,324***	***9,360***	***9,922***	***10,255***	***10,622***	***11,025***
Currently Available Water Supplies						
Dallas	7,669	8,222	8,276	8,218	8,174	8,209
Total Current Supplies	***7,669***	***8,222***	***8,276***	***8,218***	***8,174***	***8,209***
Need (Demand - Current Supply)	***655***	***1,138***	***1,646***	***2,037***	***2,448***	***2,816***
Water Management Strategies						
Water Conservation	347	564	663	706	760	825
Additional Supplies from DWU	308	574	983	1,331	1,688	1,991
Total Water Management Strategies	***655***	***1,138***	***1,646***	***2,037***	***2,448***	***2,816***
Addison Reserve (Shortage)	**0**	**0**	**0**	**0**	**0**	**0**

AMC Creekside

AMC Creekside serves retail customers in part of Dallas County and Denton County. Plans for AMC Creekside are covered under Denton County in **Section 5E.4**.

Balch Springs

The City of Balch Springs currently receives treated water supplies from DWU. Water management strategies for Balch Springs include conservation and additional water from DWU. **Table 5E.58** shows the projected population and demand, the current supplies, and the recommended water management strategies for Balch Springs.

TABLE 5E.58 SUMMARY OF WATER USER GROUP – CITY OF BALCH SPRINGS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**28,412**	**30,394**	**33,234**	**36,214**	**40,018**	**42,000**
Projected Water Demand						
Municipal Demand	2,854	3,033	3,316	3,614	3,993	4,191
Total Projected Demand	***2,854***	***3,033***	***3,316***	***3,614***	***3,993***	***4,191***
Currently Available Water Supplies						
Dallas	2,632	2,667	2,768	2,897	3,073	3,120
Total Current Supplies	***2,632***	***2,667***	***2,768***	***2,897***	***3,073***	***3,120***
Need (Demand - Current Supply)	***222***	***366***	***548***	***717***	***920***	***1,071***
Water Management Strategies						
Water Conservation	127	165	196	230	271	294
Additional Supplies from DWU	95	201	352	487	649	777
Total Water Management Strategies	***222***	***366***	***548***	***717***	***920***	***1,071***
Balch Springs Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Carrollton

Carrollton is located in southern Denton County, Dallas County and Collin County. The water supply for Carrollton is discussed under Denton County in **Section 5E.4.**

Cedar Hill

The City of Cedar Hill is located in southwest Dallas County, with a small part in Ellis County. Cedar Hill currently receives water supplies from the Trinity aquifer and DWU. Water management strategies for Cedar Hill include conservation and additional water from DWU. **Table 5E.59** shows the projected population and demand, the current supplies, and the recommended water management strategies for Cedar Hill.

TABLE 5E.59 SUMMARY OF WATER USER GROUP – CITY OF CEDAR HILL

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**53,645**	**58,553**	**63,911**	**69,070**	**74,646**	**80,672**
Projected Water Demand						
Municipal Demand	10,544	11,467	12,517	13,527	14,619	15,799
Total Projected Demand	***10,544***	***11,467***	***12,517***	***13,527***	***14,619***	***15,799***
Currently Available Water Supplies						
Trinity Aquifer	180	180	180	180	180	180
Dallas	9,565	9,933	10,305	10,706	11,117	11,631
Total Current Supplies	***9,745***	***10,113***	***10,485***	***10,886***	***11,297***	***11,811***
Need (Demand - Current Supply)	***799***	***1,354***	***2,032***	***2,641***	***3,322***	***3,988***
Water Management Strategies						
Water Conservation	786	1,787	2,453	2,704	2,976	3,270
Additional Supplies from DWU	26	0	0	0	383	755
Total Water Management Strategies	***812***	***1,787***	***2,453***	***2,704***	***3,359***	***4,025***
Cedar Hill Reserve (Shortage)	***13***	***433***	***421***	***63***	***37***	***37***

Cockrell Hill

The City of Cockrell Hill is in western Dallas County. The city receives treated water supplies from DWU. The recommended water management strategies for Cockrell Hill are conservation and additional water from DWU. **Table 5E.60** shows the projected population and demand, the current supplies, and the recommended water management strategies for Cockrell Hill.

TABLE 5E.60 SUMMARY OF WATER USER GROUP – CITY OF COCKRELL HILL

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,610**	**3,380**	**3,255**	**3,176**	**3,089**	**2,993**
Projected Water Demand						
Municipal Demand	525	489	471	460	447	433
Total Projected Demand	***525***	***489***	***471***	***460***	***447***	***433***
Currently Available Water Supplies						
Dallas	484	430	394	368	344	322
Total Current Supplies	***484***	***430***	***394***	***368***	***344***	***322***
Need (Demand - Current Supply)	***41***	***59***	***77***	***92***	***103***	***111***
Water Management Strategies						
Water Conservation	21	49	64	64	63	63
Additional Supplies from DWU	20	10	14	28	40	48
Total Water Management Strategies	***41***	***59***	***78***	***92***	***103***	***111***
Cockrell Hill Reserve (Shortage)	***0***	***0***	***1***	***0***	***0***	***0***

Combine WSC

Combine WSC serves parts of Kaufman and Dallas Counties. Water management strategies for Combine WSC are discussed under Kaufman County in **Section 5E.11**.

Coppell

The City of Coppell is located in northwest Dallas County with a small area in Denton County. Coppell currently receives treated water supplies from DWU. Water management strategies for Coppell include conservation and water from DWU. **Table 5E.61** shows the projected population and demand, the current supplies, and the recommended water management strategies for Coppell.

TABLE 5E.61 SUMMARY OF WATER USER GROUP – CITY OF COPPELL

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**43,777**	**43,632**	**43,757**	**43,857**	**44,000**	**44,000**
Projected Water Demand						
Municipal Demand	11,392	11,315	11,348	11,374	11,410	11,410
Total Projected Demand	***11,392***	***11,315***	***11,348***	***11,374***	***11,410***	***11,410***
Currently Available Water Supplies						
Dallas	10,514	9,958	9,479	9,123	8,785	8,496
Total Current Supplies	***10,514***	***9,958***	***9,479***	***9,123***	***8,785***	***8,496***
Need (Demand - Current Supply)	***878***	***1,357***	***1,869***	***2,251***	***2,625***	***2,914***
Water Management Strategies						
Water Conservation	474	593	667	708	750	785
Additional Supplies from DWU	404	764	1,202	1,543	1,875	2,129
Total Water Management Strategies	***878***	***1,357***	***1,869***	***2,251***	***2,625***	***2,914***
Coppell Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Dallas

Dallas is a major wholesale water provider that supplies water in Dallas, Collin, Denton, Kaufman, and Rockwall Counties. The plan for Dallas is discussed under Dallas Water Utilities (DWU) in **Chapter 5D**.

Dallas County Irrigation

The Texas Water Development Board classifies the use of potable water for golf course irrigation as a part of municipal use. The use of raw water or reuse of treated wastewater effluent for golf course irrigation is classified as irrigation use.

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. Golf course irrigation is the largest part of the irrigation water use in Dallas County. **Table 5E.62** shows the projected demand and the current supplies for Dallas County Irrigation. Dallas County Irrigation currently receives direct reuse (from DWU and from TRA through Las Colinas and Ten Mile WWTP), Joe Pool Lake (through Grand Prairie), Trinity Run-of-River, and groundwater (Trinity and Woodbine aquifers). The only recommended water management strategy for Dallas County Irrigation is conservation.

TABLE 5E.62 SUMMARY OF WATER USER GROUP – DALLAS COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***10,468***	***10,468***	***10,468***	***10,468***	***10,468***	***10,468***
Currently Available Water Supplies						
Direct Reuse from Dallas	3,661	3,496	3,331	3,144	2,958	2,771
Direct Reuse from TRA through Las Colinas	8,000	8,000	8,000	8,000	8,000	8,000
Direct Reuse from TRA through Ten Mile WWTP	125	125	125	125	125	125
Joe Pool Lake (through Grand Prairie)	300	300	300	300	300	300
Trinity Run-of-River	309	309	309	309	309	309
Trinity Aquifer	100	100	100	100	100	100
Woodbine Aquifer	100	100	100	100	100	100
Total Current Supplies	***12,595***	***12,430***	***12,265***	***12,078***	***11,892***	***11,705***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	20	333	641	803	954	1,106
Total Water Management Strategies	***20***	***333***	***641***	***803***	***954***	***1,106***
Irrigation, Dallas Reserve (Shortage)	***2,147***	***2,295***	***2,438***	***2,413***	***2,378***	***2,343***

Dallas County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. **Table 5E.63** shows the projected demand and the current supplies for Dallas County Livestock. The current supplies for Dallas County Livestock are local surface water supplies and Woodbine aquifer supplies. The current sources are sufficient to meet future demands, and there are no water management strategies.

TABLE 5E.63 SUMMARY OF WATER USER GROUP – DALLAS COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***248***	***248***	***248***	***248***	***248***	***248***
Currently Available Water Supplies						
Trinity Livestock Local Supply	51	51	51	51	51	51
Woodbine Aquifer	197	197	197	197	197	197
Total Current Supplies	***248***	***248***	***248***	***248***	***248***	***248***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Dallas Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Dallas County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. **Table 5E.64** shows the projected demand, the current supplies, and the water management strategies for Dallas County Manufacturing. Most manufacturing in Dallas County is supplied by DWU (direct and through Grand Prairie) and NTMWD (through Garland and Mesquite), with additional supplies from Irving (Lake Chapman) and groundwater (Trinity aquifer). Additional supplies from DWU and NTMWD are the water management strategies to meet projected demands. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG.

TABLE 5E.64 SUMMARY OF WATER USER GROUP – DALLAS COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***21,497***	***22,292***	***23,117***	***23,972***	***24,859***	***25,779***
Currently Available Water Supplies						
DWU	13,887	13,732	13,517	13,459	13,399	13,438
NTMWD (through Garland)	1,963	1,738	1,541	1,419	1,362	1,340
DWU (through Grand Prairie)	396	392	385	384	382	384
Lake Chapman (through Irving)	3,010	3,121	3,236	3,356	3,480	3,609
NTMWD (through Mesquite)	786	695	617	568	545	536
Trinity Aquifer	100	100	100	100	100	100
Total Current Supplies	***20,142***	***19,778***	***19,396***	***19,286***	***19,268***	***19,407***
Need (Demand - Current Supply)	***1,355***	***2,514***	***3,721***	***4,686***	***5,591***	***6,372***
Water Management Strategies						
Additional Water from DWU	1,160	1,872	2,665	3,322	4,003	4,607
Additional Water from DWU through Grand Prairie	34	54	77	95	115	132
Additional Water from NTMWD through Garland	187	491	771	978	1,124	1,238
Additional Water from NTMWD through Mesquite	74	197	308	391	449	495
Total Water Management Strategies	***1,455***	***2,614***	***3,821***	***4,786***	***5,691***	***6,472***
Manufacturing, Dallas Reserve (Shortage)	***100***	***100***	***100***	***100***	***100***	***100***

Dallas County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. **Table 5E.65** shows the projected demand and the current supplies for Dallas County Mining. Dallas County Mining is supplied from groundwater (Trinity and Woodbine aquifers). The current sources are sufficient to meet future demands, and there are no water management strategies.

TABLE 5E.65 SUMMARY OF WATER USER GROUP – DALLAS COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***32***	***32***	***32***	***32***	***32***	***32***
Currently Available Water Supplies						
Trinity Aquifer	15	15	15	15	15	15
Woodbine Aquifer	17	17	17	17	17	17
Total Current Supplies	***32***	***32***	***32***	***32***	***32***	***32***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Mining, Dallas Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Dallas County Other

Dallas County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups. Dallas County Other also includes the Dallas-Fort Worth International Airport. The municipal entities included under Dallas County Other currently receive their water supply from either groundwater (Trinity and Woodbine aquifers), Corsicana (through Rice Water Supply and Sewer Service), DWU, TRWD, or Fort Worth reuse sources. The Dallas-Fort Worth International Airport is supplied by both Fort Worth and Dallas (DWU). Water management strategies for these entities, including Dallas-Fort Worth International Airport, include conservation, additional supplies from Rice water Supply and Sewer Service, DWU, Fort Worth and TRWD. **Table 5E.66** shows the projected population and demand, the current supplies, and the water management strategies for Dallas County Other.

TABLE 5E.66 SUMMARY OF WATER USER GROUP – DALLAS COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,000**	**1,400**	**1,800**	**2,200**	**2,600**	**3,000**
Projected Water Demand						
Municipal Demand	2,037	2,851	3,665	4,479	5,294	6,108
Total Projected Water Demand	***2,037***	***2,851***	***3,665***	***4,479***	***5,294***	***6,108***
Currently Available Water Supplies						
Trinity Aquifer	50	50	50	50	50	50
Woodbine Aquifer	300	300	300	300	300	300
Corsicana (through Rice Water Supply and Sewer Service)	50	49	46	43	41	38
Dallas	1,033	1,701	2,294	2,857	3,369	3,865
Fort Worth (Direct reuse and TRWD)	597	544	515	483	459	440
Total Current Supplies	***2,030***	***2,644***	***3,205***	***3,733***	***4,219***	***4,693***
Need (Demand - Current Supply)	***7***	***207***	***460***	***746***	***1,075***	***1,415***
Water Management Strategies						
Water Conservation	19	36	59	87	119	159
Additional Supplies from Corsicana (through Rice Water Supply and Sewer Service)	0	1	4	7	9	12
Additional Supplies from DWU	76	208	409	635	909	1,190
Additional Supplies from TRWD through Fort Worth for DFW Airport	66	117	145	175	197	215
Total Water Management Strategies	***161***	***362***	***617***	***904***	***1,234***	***1,576***
County-Other, Dallas Reserve (Shortage)	***154***	***155***	***157***	***158***	***159***	***161***

Dallas County Steam Electric Power

Steam electric power demands generally represent the cooling water needs during power generation. These demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. **Table 5E.67** shows the projected demand, the current supplies, and the water management strategies for Dallas County Steam Electric Power. Dallas County Steam Electric Power is currently supplied by DWU, Mountain Creek Lake, and run-of-the-river supplies. The only water management strategy for this water user group is additional supplies from DWU. Conservation was considered for this water user group, but it is not recommended because the steam electric demand projections themselves considered items such as future efficiency programs.

TABLE 5E.67 SUMMARY OF WATER USER GROUP – DALLAS COUNTY STEAM ELECTRIC POWER

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***2,412***	***2,412***	***2,412***	***2,412***	***2,412***	***2,412***
Currently Available Water Supplies						
Dallas	923	880	836	802	770	744
Mountain Creek Lake/Reservoir	6,400	6,400	6,400	6,400	6,400	6,400
Trinity Run-of-River	1,423	1,423	1,423	1,423	1,423	1,423
Total Current Supplies	***8,746***	***8,703***	***8,659***	***8,625***	***8,593***	***8,567***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Additional Supplies from DWU	77	120	164	198	230	256
Total Water Management Strategies	***77***	***120***	***164***	***198***	***230***	***256***
Steam-Electric Power, Dallas Reserve (Shortage)	***6,411***	***6,411***	***6,411***	***6,411***	***6,411***	***6,411***

Dallas County Park Cities Municipal Utility District

Dallas County Park Cities MUD is a wholesale water provider that supplies treated water to Highland Park and University Park and plans to continue doing so through the planning period. The MUD also sells reuse water from Lake Grapevine to the City of Grapevine for municipal and irrigation purposes. Upper Trinity Regional Water District (UTRWD) has a contract with Dallas County Park Cities MUD to purchase up to 16,000 acre-feet per year of Park Cities' water from Grapevine Lake and exchange it for DWU water from Lewisville Lake. However, the firm yield for Dallas County Park Cities MUD's right out of Grapevine Lake as calculated by the approved TCEQ Water Availability Model is 17,300 acre-feet per year, declining over time due to sedimentation. The reliable supply of the MUD's water in Lake Grapevine that could be made available to UTRWD was reduced proportionally based on the permitted diversion and firm yield, approximately 5,500 acre-feet per year. UTRWD is negotiating with DWU on a contract for this exchange. There are no water management strategies recommended for Dallas County Park Cities MUD, therefore no wholesale conservation was applied. **Table 5E.68** shows the projected demand, the current supplies, and the water management strategies for Dallas County Park Cities MUD.

TABLE 5E.68 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – DALLAS COUNTY PARK CITIES MUD

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Grapevine	2,234	2,225	2,225	2,225	2,225	2,225
Irrigation, Tarrant	1,121	1,121	1,121	1,121	1,121	1,121
Highland Park	4,144	4,139	4,139	4,139	4,139	4,139
University Park	7,518	7,502	7,502	7,502	7,502	7,502
Potential Future Customers						
UTRWD (Grapevine Lake Exchange)	5,536	5,480	5,309	5,109	4,909	4,709
Total Projected Demands	***20,553***	***20,467***	***20,296***	***20,096***	***19,896***	***19,696***
Currently Available Water Supplies						
Lake Grapevine	17,300	17,125	16,950	16,750	16,550	16,350
Reuse	3,355	3,346	3,346	3,346	3,346	3,346
Total Current Supplies	***20,655***	***20,471***	***20,296***	***20,096***	***19,896***	***19,696***
Need (Demand less Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Supplies from Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Total Supplies	***20,655***	***20,471***	***20,296***	***20,096***	***19,896***	***19,696***
Reserve or (Shortage)	***102***	***4***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

DeSoto

DeSoto is in southwestern Dallas County and receives treated water supplies from DWU. Water management strategies for DeSoto include conservation and additional water from DWU. **Table 5E.69** shows the projected population and demand, the current supplies, and the water management strategies for DeSoto.

TABLE 5E.69 SUMMARY OF WATER USER GROUP – CITY OF DESOTO

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**59,901**	**63,934**	**66,069**	**67,304**	**68,664**	**70,162**
Projected Water Demand						
Municipal Demand	10,093	10,729	11,088	11,295	11,523	11,775
Total Projected Demand	***10,093***	***10,729***	***11,088***	***11,295***	***11,523***	***11,775***
Currently Available Water Supplies						
Dallas	9,315	9,442	9,262	9,060	8,871	8,768
Total Current Supplies	***9,315***	***9,442***	***9,262***	***9,060***	***8,871***	***8,768***
Need (Demand - Current Supply)	***778***	***1,287***	***1,826***	***2,235***	***2,652***	***3,007***
Water Management Strategies						
Water Conservation	465	618	676	719	769	826
Additional Supplies from DWU	313	669	1,150	1,516	1,883	2,181
Total Water Management Strategies	***778***	***1,287***	***1,826***	***2,235***	***2,652***	***3,007***
DeSoto Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Duncanville

Duncanville is located in southwestern Dallas County. The city receives its water supply from DWU. Water management strategies for Duncanville are conservation and additional water from DWU. **Table 5E.70** shows the projected population and demand, the current supplies, and the water management strategies for Duncanville.

TABLE 5E.70 SUMMARY OF WATER USER GROUP – CITY OF DUNCANVILLE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**43,672**	**45,939**	**47,157**	**47,307**	**47,307**	**47,307**
Projected Water Demand						
Municipal Demand	6,037	6,319	6,487	6,507	6,507	6,507
Total Projected Demand	***6,037***	***6,319***	***6,487***	***6,507***	***6,507***	***6,507***
Currently Available Water Supplies						
Dallas	5,564	5,554	5,414	5,216	5,008	4,845
Total Current Supplies	***5,564***	***5,554***	***5,414***	***5,216***	***5,008***	***4,845***
Need (Demand - Current Supply)	***473***	***765***	***1,073***	***1,291***	***1,499***	***1,662***
Water Management Strategies						
Water Conservation	368	730	916	935	953	973
Additional Supplies from DWU	105	35	157	356	546	689
Total Water Management Strategies	***473***	***765***	***1,073***	***1,291***	***1,499***	***1,662***
Duncanville Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

East Fork Special Utility District

East Fork SUD is located in southern Collin County and extends into Dallas and Rockwall Counties. The water management strategies for East Fork SUD are described under Collin County in **Section 5E.1**.

Farmers Branch

Farmers Branch is in northwestern Dallas County. The city receives its treated water supplies from DWU. The water management strategies for Farmers Branch include conservation and additional water from DWU. **Table 5E.71** shows the projected population and demand, the current supplies, and the water management strategies for Farmers Branch.

TABLE 5E.71 SUMMARY OF WATER USER GROUP – CITY OF FARMERS BRANCH

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**36,454**	**39,795**	**41,570**	**42,609**	**43,754**	**45,014**
Projected Water Demand						
Municipal Demand	10,602	11,536	12,050	12,352	12,683	13,049
Total Projected Demand	***10,602***	***11,536***	***12,050***	***12,352***	***12,683***	***13,049***
Currently Available Water Supplies						
Dallas	9,784	10,153	10,065	9,908	9,765	9,718
Total Current Supplies	***9,784***	***10,153***	***10,065***	***9,908***	***9,765***	***9,718***
Need (Demand - Current Supply)	***818***	***1,383***	***1,985***	***2,444***	***2,918***	***3,331***
Water Management Strategies						
Water Conservation	477	680	754	802	860	930
Additional Supplies from DWU	341	703	1,231	1,642	2,058	2,401
Total Water Management Strategies	***818***	***1,383***	***1,985***	***2,444***	***2,918***	***3,331***
Farmers Branch Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Ferris

Ferris is located in northern Ellis and southern Dallas Counties. The water management strategies for Ferris are discussed under Ellis County in **Section 5E.5**.

Garland

The City of Garland is located in northeastern Dallas County, Collin County and Rockwall County. Garland is a wholesale water provider that purchases treated water from NTMWD. Garland sells water to Dallas County Manufacturing and Collin County Steam Electric Power (Ray Olinger Power Plant). The Ray Olinger Plant is located on Lake Lavon, so Garland purchases raw water from NTMWD for the plant. The City of Garland sells some of its treated wastewater effluent to Forney for Kaufman County Steam Electric Power. The recommended strategies for Garland are to implement water conservation measures and purchase additional water from NTMWD. A summary of the recommended water plan for Garland is shown in **Table 5E.72**.

TABLE 5E.72 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – GARLAND

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Garland	40,812	43,884	45,816	47,228	47,510	47,510
Forney (for Kaufman County Steam Electric Power)	8,672	8,672	8,672	8,672	8,672	8,672
Manufacturing, Dallas	2,150	2,229	2,312	2,397	2,486	2,578
Steam Electric Power, Collin	40	40	40	40	40	40
Total Projected Water Demand	***51,674***	***54,825***	***56,840***	***58,337***	***58,708***	***58,800***
Treated Water (NTMWD)	*42,962*	*46,113*	*48,128*	*49,625*	*49,996*	*50,088*
Collin SEP – Raw Water (NTMWD)	*40*	*40*	*40*	*40*	*40*	*40*
Treated Effluent (Kaufman SEP - Forney)	*8,672*	*8,672*	*8,672*	*8,672*	*8,672*	*8,672*
Currently Available Supplies						
North Texas MWD	39,268	35,995	32,130	29,413	27,432	26,078
Total Current Treated Water Supplies	***39,268***	***35,995***	***32,130***	***29,413***	***27,432***	***26,078***
Need (Demand less Supply)	***3,734***	***10,158***	***16,038***	***20,252***	***22,604***	***24,050***
Water Management Strategies						
Conservation (retail)	1,819	2,335	2,598	2,810	2,913	3,021
Conservation (wholesale)	0	0	0	0	0	0
Additional NTMWD	1,915	7,823	13,440	17,442	19,691	21,029
Total Treated Water Supplies from Strategies	***3,734***	***10,158***	***16,038***	***20,252***	***22,604***	***24,050***
Total Treated Water Supplies	***43,002***	***46,153***	***48,168***	***49,665***	***50,036***	***50,128***
Treated Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***
Reuse (Treated Effluent)						
Demand (Kaufman County SEP)	8,672	8,672	8,672	8,672	8,672	8,672
Total Current Direct Reuse Supplies	8,672	8,672	8,672	8,672	8,672	8,672
Reuse Need (Reuse Demand less Reuse Supply)	***0***	***0***	***0***	***0***	***0***	***0***

Glenn Heights

Glenn Heights is located in southern Dallas and northern Ellis Counties. Glenn Heights provides water for in-city municipal demand. Glenn Heights gets treated water supplies from DWU and groundwater from the Trinity and Woodbine aquifers. Water management strategies for Glenn Heights include conservation and additional water from DWU. **Table 5E.73** shows the projected population and demand, the current supplies, and the water management strategies for Glenn Heights.

TABLE 5E.73 SUMMARY OF WATER USER GROUP – CITY OF GLENN HEIGHTS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**22,178**	**25,909**	**29,228**	**32,297**	**35,668**	**39,377**
Projected Water Demand						
Municipal Demand	2,382	2,769	3,123	3,452	3,812	4,209
Total Projected Demand	***2,382***	***2,769***	***3,123***	***3,452***	***3,812***	***4,209***
Currently Available Water Supplies						
Dallas	2,094	2,337	2,514	2,678	2,848	3,050
Trinity Aquifer	68	68	68	68	68	68
Woodbine Aquifer	45	45	45	45	45	45
Total Current Supplies	***2,207***	***2,450***	***2,627***	***2,791***	***2,961***	***3,163***
Need (Demand - Current Supply)	***175***	***319***	***496***	***661***	***851***	***1,046***
Water Management Strategies						
Water Conservation	171	402	558	629	708	794
Additional Supplies from DWU	12	0	0	53	164	273
Total Water Management Strategies	***183***	***402***	***558***	***682***	***872***	***1,067***
Glenn Heights Reserve (Shortage)	***8***	***83***	***62***	***21***	***21***	***21***

Grand Prairie

Grand Prairie is located in western Dallas County, eastern Tarrant County, and northwestern Ellis County. Grand Prairie currently gets most of its supplies from DWU. The city also purchases treated water from Fort Worth, Midlothian, and Mansfield. Grand Prairie meets irrigation demands (golf course irrigation) through raw water supplies from Joe Pool Lake (Trinity River Authority). County Other demands in Johnson and Ellis County are from the Prairie Ridge development which is split between the two counties. Grand Prairie also sells water for manufacturing in Dallas and Tarrant Counties.

Grand Prairie's recommended water management strategies include conservation, additional supplies from DWU, Midlothian, and Mansfield, and new supplies from Arlington along with the necessary infrastructure. A summary of the recommended water plan for Grand Prairie is shown in **Table 5E.74**.

TABLE 5E.74 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – GRAND PRAIRIE

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Grand Prairie	35,162	39,188	44,033	45,286	47,005	47,005
County-Other, Ellis	100	100	100	100	100	100
County-Other, Johnson	673	1,345	1,345	1,345	1,345	1,345
Irrigation, Dallas	300	300	300	300	300	300
Manufacturing, Dallas	430	446	462	479	497	516
Manufacturing, Tarrant	14	14	14	14	14	15
Total Projected Water Demand	***36,679***	***41,393***	***46,254***	***47,524***	***49,261***	***49,281***
Currently Available Supplies						
Joe Pool Lake (raw water)	300	300	300	300	300	300
DWU	20,706	20,311	22,347	22,232	22,355	21,637
Fort Worth (TRWD)	2,418	2,129	1,978	1,803	1,671	1,568
Mansfield (TRWD)	7,433	7,295	7,612	7,136	6,863	6,443
Midlothian (TRWD)	2,176	2,555	2,373	2,163	2,005	1,881
Total Current Supplies	***33,033***	***32,590***	***34,610***	***33,634***	***33,194***	***31,829***
Need (Demand less Supply)	***3,646***	***8,803***	***11,644***	***13,890***	***16,067***	***17,452***
Water Management Strategies						
Conservation (retail)	1,916	3,684	5,048	5,228	5,544	5,604
Conservation (wholesale)	1	1	1	2	2	3
DWU Pipeline and Additional DWU	575	782	1,563	2,511	3,486	4,188
Additional Fort Worth (TRWD)	232	410	504	676	801	901
Additional Midlothian (TRWD)	209	492	604	812	961	1,081
Additional Mansfield (TRWD)	713	1,403	1,939	2,678	3,295	3,700
Connect to Arlington (TRWD)	0	2,031	1,985	1,983	1,978	1,975
Total Supplies from Strategies	***3,646***	***8,803***	***11,644***	***13,890***	***16,067***	***17,452***
Total Supplies	***36,679***	***41,393***	***46,254***	***47,524***	***49,261***	***49,281***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

Highland Park

Highland Park is located in central Dallas County and receives its water supply from Grapevine Lake through Dallas County Park Cities MUD. The only water management strategy for Highland Park is conservation. **Table 5E.75** shows the projected population and demand, the current supplies, and the water management strategies for Highland Park.

TABLE 5E.75 SUMMARY OF WATER USER GROUP – CITY OF HIGHLAND PARK

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**9,311**	**9,311**	**9,311**	**9,311**	**9,311**	**9,311**
Projected Water Demand						
Municipal Demand	4,144	4,139	4,139	4,139	4,139	4,139
Total Projected Demand	***4,144***	***4,139***	***4,139***	***4,139***	***4,139***	***4,139***
Currently Available Water Supplies						
Dallas County Park Cities MUD	4,144	4,139	4,139	4,139	4,139	4,139
Total Current Supplies	***4,144***	***4,139***	***4,139***	***4,139***	***4,139***	***4,139***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	221	256	269	283	297	311
Total Water Management Strategies	***221***	***256***	***269***	***283***	***297***	***311***
Highland Park Reserve (Shortage)	***221***	***256***	***269***	***283***	***297***	***311***

Hutchins

Hutchins is located in southern Dallas County. The city receives treated water supplies from DWU. Water management strategies for Hutchins include conservation and additional water from DWU. **Table 5E.76** shows the projected population and demand, the current supplies, and the water management strategies for Hutchins.

TABLE 5E.76 SUMMARY OF WATER USER GROUP - CITY OF HUTCHINS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**8,346**	**9,300**	**9,808**	**10,107**	**10,436**	**10,799**
Projected Water Demand						
Municipal Demand	1,841	2,037	2,148	2,214	2,286	2,365
Total Projected Demand	***1,841***	***2,037***	***2,148***	***2,214***	***2,286***	***2,365***
Currently Available Water Supplies						
Dallas	1,699	1,793	1,794	1,776	1,760	1,761
Total Current Supplies	***1,699***	***1,793***	***1,794***	***1,776***	***1,760***	***1,761***
Need (Demand - Current Supply)	***142***	***244***	***354***	***438***	***526***	***604***
Water Management Strategies						
Water Conservation	33	45	55	68	79	91
Additional Water from DWU	109	199	299	370	447	513
Total Water Management Strategies	***142***	***244***	***354***	***438***	***526***	***604***
Hutchins Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Irving

Irving is located in northwestern Dallas County. The city provides water for in-city municipal demand and for Dallas County Manufacturing use in the city. Irving gets its water supply from Chapman Lake, TRA Central Reuse Project, and DWU. Irving has contracted with TRA for 25 MGD of wastewater effluent from the TRA Central Reuse Project. A portion of this supply is currently used to irrigate the Twin Wells Golf Course. There is no infrastructure in place to treat or deliver the remainder of the reuse water. Several alternative strategies have been considered to develop this supply, but none are recommended at this time.

Recommended water management strategies for Irving include conservation and additional water from DWU. Alternative water management strategies for Irving include infrastructure to develop the TRA Central Reuse Project supplies, direct potable reuse, and additional Lake Chapman supplies through Sulphur Springs. Several joint strategies are also alternative strategies for Irving: the Marvin Nichols Reservoir, Wright Patman Reallocation, Oklahoma Supplies (Lake Hugo), and Main Stem Balancing Reservoir. Irving also has a contract with the Upper Trinity Regional Water District which allows Irving to purchase up to 5 MGD of Lake Ralph Hall supply during the first 5 years of Lake Ralph Hall's operation. This agreement is not a water management strategy due to its temporary nature, but this provides additional supply options for Irving to meet near-term needs. **Table 5E.77** shows the projected population and demand, the current supplies, and the water management strategies for Irving.

The city of Irving also shows an unmet need in the Region C Water Plan. This need is due in part to the current status of the contracted reuse water from TRA. While Irving has purchased 25,000 acre-feet per year of reuse water from TRA, the city has not reached agreements with other providers to treat the water. The city continues to negotiate with multiple water providers on options to utilize this source. As a result, the reuse water is not shown as a recommended strategy for Irving. Irving has reached an agreement with DWU to provide some additional treated water over the planning period. Irving believes this additional supply should meet most, if not all, of its projected water needs because Irving's internal demand projections are less than projected by Region C.

TABLE 5E.77 SUMMARY OF WATER USER GROUP - CITY OF IRVING

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**285,073**	**302,931**	**303,163**	**303,400**	**303,641**	**303,641**
Projected Water Demand						
Municipal Demand	60,093	63,617	63,666	63,715	63,766	63,766
Manufacturing, Dallas	*3,010*	*3,121*	*3,236*	*3,356*	*3,480*	*3,609*
Total Projected Demand	***63,103***	***66,738***	***66,902***	***67,071***	***67,246***	***67,375***
Currently Available Water Supplies						
Lake Chapman	35,634	34,604	33,569	32,530	31,487	30,439
Manufacturing, Dallas	3,010	3,121	3,236	3,356	3,480	3,609
TRA Central Reuse Project	486	486	486	486	486	486
Dallas	4,615	4,400	4,177	4,010	3,850	3,723
Total Current Supplies	***43,745***	***42,611***	***41,468***	***40,382***	***39,303***	***38,257***
Need (Demand - Current Supply)	***19,358***	***24,127***	***25,434***	***26,689***	***27,943***	***29,118***
Water Management Strategies						
Water Conservation	2,653	3,217	3,341	3,512	3,704	3,903
Additional Supplies from DWU	164	347	561	714	860	971
Purchase Additional Supplies from DWU	5,605	11,210	17,936	17,936	17,936	17,936
Total Water Management Strategies	***8,422***	***14,774***	***21,838***	***22,162***	***22,500***	***22,810***
Irving Reserve (Shortage)	***(10,936)***	***(9,353)***	***(3,596)***	***(4,527)***	***(5,443)***	***(6,308)***
Alternative Water Management Strategies						
Additional TRA Central Reuse Project	27,539	27,539	27,539	27,539	27,539	27,539
TCWSP Supply with Reuse Swap	16,815	22,420	27,539	27,539	27,539	27,539
Direct Potable Reuse	19,277	19,277	19,277	19,277	19,277	19,277
Additional Lake Chapman Supplies from Sulphur Springs	0	2,242	2,994	2,919	2,844	2,770
Marvin Nichols Reservoir	0	0	0	16,328	16,328	16,328
Wright Patman Reallocation	0	0	0	0	0	6,380
Oklahoma Supplies	0	0	25,000	25,000	25,000	25,000
Main Stem Balancing Reservoir	0	0	25,000	25,000	25,000	25,000

Lancaster

Lancaster is in southern Dallas County and receives treated water supplies from DWU. Water management strategies for Lancaster include conservation and additional water from DWU for both Lancaster and Wilmer. **Table 5E.78** shows the projected population and demand, the current supplies, and the water management strategies for Lancaster.

TABLE 5E.78 SUMMARY OF WATER USER GROUP - CITY OF LANCASTER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**44,667**	**47,419**	**48,875**	**49,713**	**50,637**	**51,653**
Projected Water Demand						
Municipal Demand	7,427	7,847	8,088	8,226	8,379	8,547
Wilmer	*814*	*913*	*969*	*1,003*	*1,039*	*1,079*
Lancaster MUD 1	*275*	*341*	*376*	*398*	*421*	*447*
Total Projected Demand	***8,516***	***9,101***	***9,433***	***9,627***	***9,839***	***10,073***
Currently Available Water Supplies						
Dallas	6,854	6,905	6,756	6,598	6,452	6,365
Wilmer	*751*	*803*	*810*	*804*	*800*	*803*
Lancaster MUD 1	*254*	*300*	*314*	*319*	*324*	*333*
Total Current Supplies	***7,859***	***8,008***	***7,880***	***7,721***	***7,576***	***7,501***
Need (Demand - Current Supply)	***657***	***1,093***	***1,553***	***1,906***	***2,263***	***2,572***
Water Management Strategies						
Water Conservation	382	659	797	835	875	921
Wilmer	*20*	*38*	*49*	*54*	*60*	*67*
Lancaster MUD 1	*8*	*14*	*18*	*19*	*21*	*24*
Additional DWU	191	283	535	793	1,052	1,261
Wilmer	*43*	*72*	*110*	*145*	*179*	*209*
Lancaster MUD 1	*13*	*27*	*44*	*60*	*76*	*90*
Total Water Management Strategies	***657***	***1,093***	***1,553***	***1,906***	***2,263***	***2,572***
Lancaster Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Lancaster MUD 1

Lancaster MUD 1 is in southern Dallas County and receives treated water supplies from DWU through Lancaster. Water management strategies for Lancaster MUD 1 include implementing conservation measures and purchasing additional supplies from DWU. **Table 5E.79Table 5E.78** shows the projected population and demand, the current supplies, and the water management strategies for Lancaster MUD 1.

TABLE 5E.79 SUMMARY OF WATER USER GROUP – LANCASTER MUD 1

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,286**	**2,844**	**3,142**	**3,321**	**3,517**	**3,734**
Projected Water Demand						
Municipal Demand	275	341	376	398	421	447
Total Projected Demand	***275***	***341***	***376***	***398***	***421***	***447***
Currently Available Water Supplies						
DWU (through Lancaster)	254	300	314	319	324	333
Total Current Supplies	***254***	***300***	***314***	***319***	***324***	***333***
Need (Demand - Current Supply)	***21***	***41***	***62***	***79***	***97***	***114***
Water Management Strategies						
Water Conservation	8	14	18	19	21	24
Additional Supplies from DWU	13	27	44	60	76	90
Total Water Management Strategies	***21***	***41***	***62***	***79***	***97***	***114***
Lancaster MUD 1 Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Lewisville

Lewisville is located in southeastern Denton County with a small area in Dallas County. The water management strategies for Lewisville are described under Denton County in **Section 5E.4.**

Mesquite

Mesquite is located in eastern Dallas County extending into western Kaufman County. Mesquite provides water to Dallas County Manufacturing, Kaufman County MUD #11, and Kaufman County MUD #14. The city receives treated water supplies from NTMWD and water management strategies for Mesquite include conservation and additional water from NTMWD for the city and its customers. **Table 5E.80** shows the projected population and demand, the current supplies, and the water management strategies for Mesquite.

TABLE 5E.80 SUMMARY OF WATER USER GROUP - MESQUITE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**166,080**	**173,044**	**192,008**	**216,237**	**243,324**	**266,415**
Projected Water Demand						
Municipal Demand	24,067	24,950	27,685	31,178	35,084	38,413
Kaufman County MUD 11	*720*	*853*	*1,096*	*1,385*	*1,698*	*1,882*
Kaufman County MUD 14	*1,714*	*1,712*	*1,712*	*1,712*	*1,712*	*1,712*
Manufacturing, Dallas	*860*	*892*	*925*	*959*	*994*	*1,031*
Total Projected Demand	***27,361***	***28,407***	***31,418***	***35,234***	***39,488***	***43,038***
Currently Available Water Supplies						
North Texas MWD	21,976	19,454	18,460	18,454	19,222	19,969
Kaufman County MUD 11	658	665	731	820	930	978
Kaufman County MUD 14	1,565	1,335	1,142	1,013	938	890
Manufacturing, Dallas	786	695	617	568	545	536
Total Current Supplies	***24,985***	***22,149***	***20,950***	***20,855***	***21,635***	***22,373***
Need (Demand - Current Supply)	***2,376***	***6,258***	***10,468***	***14,379***	***17,853***	***20,665***
Water Management Strategies						
Water Conservation	1,555	3,030	4,256	4,972	5,749	6,395
Kaufman County MUD 11	*18*	*28*	*39*	*54*	*74*	*93*
Kaufman County MUD 14	*54*	*68*	*74*	*80*	*86*	*91*
Manufacturing, Dallas	*0*	*0*	*0*	*0*	*0*	*0*
Additional Supplies from NTMWD	536	2,466	4,969	7,752	10,113	12,049
Kaufman County MUD 11	*44*	*160*	*326*	*511*	*694*	*811*
Kaufman County MUD 14	*95*	*309*	*496*	*619*	*688*	*731*
Manufacturing, Dallas	*74*	*197*	*308*	*391*	*449*	*495*
Total Water Management Strategies	***2,376***	***6,258***	***10,468***	***14,379***	***17,853***	***20,665***
Mesquite Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Ovilla

Ovilla is located in northern Ellis County and southern Dallas County. The water management strategies for Ovilla are described under Ellis County in **Section 5E.5**.

Richardson

Richardson is located in northern Dallas County and southern Collin County. The city provides water for in-city municipal demand and for a portion of Collin County Manufacturing. The city receives treated water supplies from NTMWD, and water management strategies for Richardson include conservation and additional water from NTMWD. **Table 5E.81** shows the projected population and demand, the current supplies, and the water management strategies for Richardson.

TABLE 5E.81 SUMMARY OF WATER USER GROUP – CITY OF RICHARDSON

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**117,515**	**122,836**	**131,067**	**135,000**	**135,000**	**135,000**
Projected Water Demand						
Municipal Demand	28,983	30,210	32,234	33,202	33,202	33,202
Manufacturing, Collin	*7,330*	*7,601*	*7,882*	*8,174*	*8,476*	*8,790*
Total Projected Demand	***36,313***	***37,811***	***40,116***	***41,376***	***41,678***	***41,992***
Currently Available Water Supplies						
North Texas MWD	26,464	23,556	21,493	19,652	18,191	17,260
Manufacturing, Collin	6,693	5,926	5,256	4,838	4,644	4,570
Total Current Supplies	***33,157***	***29,482***	***26,749***	***24,490***	***22,835***	***21,830***
Need (Demand - Current Supply)	***3,156***	***8,329***	***13,367***	***16,886***	***18,843***	***20,162***
Water Management Strategies						
Water Conservation	1,944	3,903	5,235	5,476	5,518	5,594
Additional Supplies from NTMWD	575	2,751	5,506	8,074	9,493	10,348
Manufacturing, Collin	637	1,675	2,626	3,336	3,832	4,220
Total Water Management Strategies	***3,156***	***8,329***	***13,367***	***16,886***	***18,843***	***20,162***
Richardson Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Rockett Special Utility District

Rockett SUD has a large service area in northern Ellis County extending into Dallas County. Rockett SUD is a wholesale water provider, and there is a discussion of the SUD's water supply plans in **Section 5E.5.**

Rowlett

Rowlett is located in northeastern Dallas County and Rockwall County. The city currently receives treated water supplies from NTMWD, and water management strategies for Rowlett include conservation and additional water from NTMWD. **Table 5E.82** shows the projected population and demand, the current supplies, and the water management strategies for Rowlett.

TABLE 5E.82 SUMMARY OF WATER USER GROUP – CITY OF ROWLETT

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**77,875**	**81,935**	**95,181**	**100,871**	**105,095**	**105,095**
Projected Water Demand						
Municipal Demand	11,550	12,098	14,053	14,893	15,517	15,517
Total Projected Demand	***11,550***	***12,098***	***14,053***	***14,893***	***15,517***	***15,517***
Currently Available Water Supplies						
North Texas MWD	10,546	9,433	9,370	8,816	8,502	8,066
Total Current Supplies	***10,546***	***9,433***	***9,370***	***8,816***	***8,502***	***8,066***
Need (Demand - Current Supply)	***1,004***	***2,665***	***4,683***	***6,077***	***7,015***	***7,451***
Water Management Strategies						
Water Conservation	516	639	905	977	1,038	1,030
Additional Supplies from NTMWD	488	2,026	3,778	5,100	5,977	6,421
Total Water Management Strategies	***1,004***	***2,665***	***4,683***	***6,077***	***7,015***	***7,451***
Rowlett Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Sachse

Sachse is located in northeastern Dallas County and southern Collin County. Sachse receives treated water supplies from NTMWD, and water management strategies include conservation and additional water from NTMWD. **Table 5E.83** shows the projected population and demand, the current supplies, and the water management strategies for Sachse.

TABLE 5E.83 SUMMARY OF WATER USER GROUP – SACHSE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**29,507**	**31,598**	**35,828**	**37,416**	**38,462**	**38,462**
Projected Water Demand						
Municipal Demand	5,250	5,599	6,348	6,630	6,815	6,815
Total Projected Demand	***5,250***	***5,599***	***6,348***	***6,630***	***6,815***	***6,815***
Currently Available Water Supplies						
North Texas MWD	4,794	4,365	4,233	3,924	3,734	3,543
Total Current Supplies	***4,794***	***4,365***	***4,233***	***3,924***	***3,734***	***3,543***
Need (Demand - Current Supply)	***456***	***1,234***	***2,115***	***2,706***	***3,081***	***3,272***
Water Management Strategies						
Water Conservation	235	306	412	433	450	449
Additional Supplies from NTMWD	221	928	1,703	2,273	2,631	2,823
Total Water Management Strategies	***456***	***1,234***	***2,115***	***2,706***	***3,081***	***3,272***
Sachse Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Seagoville

Seagoville is located in southeastern Dallas County with some area in Kaufman County as well. Seagoville is a wholesale water provider that provides water to Combine WSC. Seagoville currently obtains its treated water supplies from Dallas Water Utilities (DWU) and plans to continue doing so. Recommended strategies for Seagoville include implementing conservation measures and purchasing additional supplies from DWU. **Table 5E.84** shows projected demand, the current supplies, and the water management strategies for Seagoville.

TABLE 5E.84 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – CITY OF SEAGOVILLE

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Seagoville	2,217	2,416	2,529	2,596	2,669	2,749
Combine WSC	330	373	426	483	548	618
Total Projected Water Demand	***2,547***	***2,789***	***2,955***	***3,079***	***3,217***	***3,367***
Currently Available Supplies						
DWU (Limited by contract)	2,346	2,449	2,464	2,468	2,475	2,507
Total Current Supplies	***2,346***	***2,449***	***2,464***	***2,468***	***2,475***	***2,507***
Need (Demand less Supply)	***201***	***340***	***491***	***611***	***742***	***860***
Water Management Strategies						
Conservation (retail)	100	134	149	161	173	187
Conservation (wholesale)	5	6	8	10	15	18
Additional DWU beyond Current Contract	96	200	334	440	554	655
Total Supplies from Strategies	***201***	***340***	***491***	***611***	***742***	***860***
Total Supplies	***2,547***	***2,789***	***2,955***	***3,079***	***3,217***	***3,367***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

Sunnyvale

Sunnyvale located in eastern Dallas County and receives treated water supplies from NTMWD. The water management strategies are conservation and additional water from NTMWD, including an increase in delivery infrastructure. **Table 5E.85** shows the projected population and demand, the current supplies, and the water management strategies for Sunnyvale.

TABLE 5E.85 SUMMARY OF WATER USER GROUP – CITY OF SUNNYVALE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**9,064**	**11,417**	**13,548**	**14,129**	**14,340**	**14,340**
Projected Water Demand						
Municipal Demand	3,010	3,782	4,488	4,680	4,750	4,750
Total Projected Demand	***3,010***	***3,782***	***4,488***	***4,680***	***4,750***	***4,750***
Currently Available Water Supplies						
North Texas MWD	2,748	2,949	2,992	2,770	2,602	2,469
Total Current Supplies	***2,748***	***2,949***	***2,992***	***2,770***	***2,602***	***2,469***
Need (Demand - Current Supply)	***262***	***833***	***1,496***	***1,910***	***2,148***	***2,281***
Water Management Strategies						
Water Conservation	40	68	100	120	139	155
Additional Supplies from NTMWD	222	765	1,396	1,790	2,009	2,126
Increase Delivery Infrastructure from NTWMD	*222*	*765*	*1,396*	*1,790*	*2,009*	*2,126*
Total Water Management Strategies	***262***	***833***	***1,496***	***1,910***	***2,148***	***2,281***
Sunnyvale Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

University Park

University Park is located in central Dallas County and receives its water supply from Grapevine Lake through Dallas County Park Cities MUD. The only water management strategy for the city is conservation. **Table 5E.86** shows the projected population and demand, the current supplies, and the water management strategy for University Park.

TABLE 5E.86 SUMMARY OF WATER USER GROUP – CITY OF UNIVERSITY PARK

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**25,656**	**25,656**	**25,656**	**25,656**	**25,656**	**25,656**
Projected Water Demand						
Municipal Demand	7,518	7,502	7,502	7,502	7,502	7,502
Total Projected Demand	***7,518***	***7,502***	***7,502***	***7,502***	***7,502***	***7,502***
Currently Available Water Supplies						
Dallas County Park Cities MUD	7,518	7,502	7,502	7,502	7,502	7,502
Total Current Supplies	***7,518***	***7,502***	***7,502***	***7,502***	***7,502***	***7,502***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	411	482	507	532	557	582
Total Water Management Strategies	***411***	***482***	***507***	***532***	***557***	***582***
University Park Reserve (Shortage)	***411***	***482***	***507***	***532***	***557***	***582***

Wilmer

Wilmer is located in southeastern Dallas County. The city receives treated water supplies from DWU (through Lancaster). Water management strategies for Wilmer include conservation, additional water from DWU (through Lancaster), and a direct connection to Dallas' 36-inch transmission line. **Table 5E.87** shows the projected population and demand, the current supplies, and the water management strategies for Wilmer.

TABLE 5E.87 SUMMARY OF WATER USER GROUP – WILMER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,902**	**6,672**	**7,081**	**7,324**	**7,591**	**7,885**
Projected Water Demand						
Municipal Demand	814	913	969	1,003	1,039	1,079
Total Projected Demand	***814***	***913***	***969***	***1,003***	***1,039***	***1,079***
Currently Available Water Supplies						
DWU (through Lancaster)	751	803	810	804	800	803
Total Current Supplies	***751***	***803***	***810***	***804***	***800***	***803***
Need (Demand - Current Supply)	***63***	***110***	***159***	***199***	***239***	***276***
Water Management Strategies						
Water Conservation	20	38	49	54	60	67
Additional Water from DWU (through Lancaster)	43	72	110	145	179	209
Direct Connection to Dallas 36" Transmission Line	*794*	*875*	*920*	*949*	*979*	*1,012*
Total Water Management Strategies	***63***	***110***	***159***	***199***	***239***	***276***
Wilmer Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Wylie

Wylie is located in southern Collin County with small areas in Dallas and Rockwall Counties. Wylie's water supply plans are discussed under Collin County in **Section 5E.1**.

5E.3.2 Summary of Costs for Dallas County

Costs for Dallas County

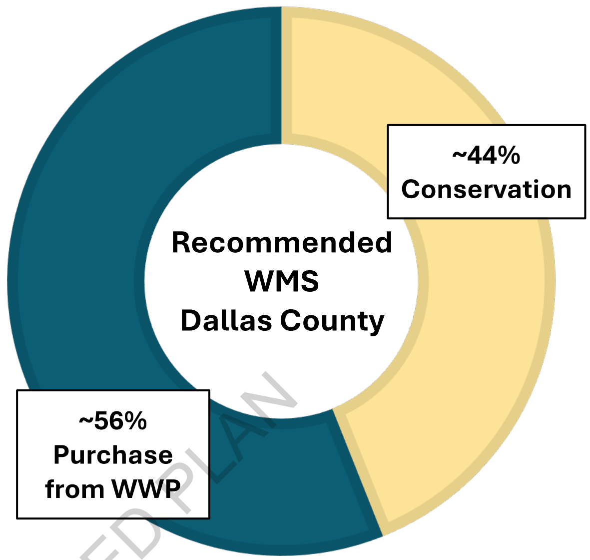


Table 5E.88 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Dallas County. Total quantities from **Table 5E.88** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.

The majority of the future supplies needed to meet demands within Dallas County are projected to come through purchases from wholesale water providers. The only other strategy in Dallas County is conservation.

Table 5E.89 summarizes the recommended water management strategies within Dallas County individually. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.88 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR DALLAS COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	84,519	$2,928,206
Purchase from WWP	107,721	$0
Additional Infrastructure	*15,987*	*$142,971,000*
Total	***192,240***	***$145,899,206***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.89 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR DALLAS COUNTY

WUG OR WWP	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Dallas County Park Cities MUD	Conservation	N/A	Included under WUGs			
Garland	Conservation (retail)	2030	3,021	$150,000	$2.92	$0.42
	Conservation (wholesale)	N/A	Included under WUGs			
	NTMWD	2030	21,029	$0	$4.00	$4.00
Grand Prairie	Conservation (retail)	2030	5,604	$150,000	$1.81	$0.81
	Conservation (wholesale)	2030	Included under WUGs			
	DWU	2030	4,188	$0	$4.00	$4.00
	Additional Delivery Infrastructure	*2030*	*4,188*	*$89,819,000*	*$4.34*	*$0.76*
	TRWD through Fort Worth	2030	901	$0	$4.00	$4.00
	TRWD through Midlothian	2030	1,081	$0	$4.00	$4.00
	TRWD through Mansfield	2030	3,700	$0	$4.00	$4.00
	TRWD through Arlington	2040	2,031	$0	$4.00	$4.00
	Connect to Arlington (TRWD)	*2040*	*2,031*	*$11,849,000*	*$1.22*	*$0.24*
Seagoville	Conservation (retail)	2030	187	$158,560	$1.65	$0.94
	Conservation (wholesale)	2030	Included under WUGs			
	DWU	2030	655	$0	$4.00	$4.00
WUGs						
Addison	Conservation	2030	825	$150,000	$1.94	$0.31
	DWU	2030	1,991	$0	$4.00	$4.00
Balch Springs	Conservation	2030	294	$159,728	$1.41	$0.96
	DWU	2030	777	$0	$4.00	$4.00
Carrollton[a]	Conservation	See Denton County.				
	DWU					
Cedar Hill[a]	Conservation	2030	3,270	$167,119	$1.17	$1.07
	DWU	2030	755	$0	$4.00	$4.00
Cockrell Hill	Conservation	2030	64	$0	$1.77	$1.27
	DWU	2030	48	$0	$4.00	$4.00
Combine WSC[a]	Conservation	See Kaufman County.				

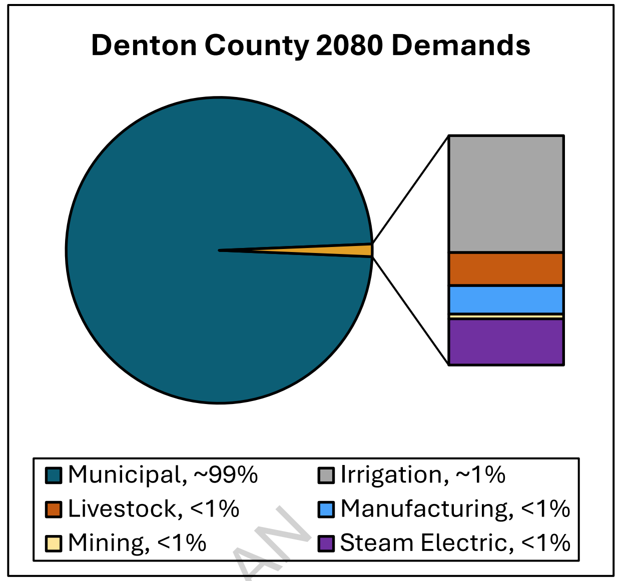
WUG OR WWP	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	DWU through Seagoville					
Coppell[a]	Conservation	2030	785	$150,000	$1.32	$0.36
	DWU	2030	2,129	$0	$4.00	$4.00
Dallas[a]	Conservation	2030	46,150	$150,000	$0.96	$0.82
	Other WMSs	See DWU in **Chapter 5D**.				
DeSoto	Conservation	2030	826	$167,119	$1.25	$0.54
	DWU	2030	2,181	$0	$4.00	$4.00
Duncanville	Conservation	2030	973	$150,000	$1.27	$0.97
	DWU	2030	689	$0	$4.00	$4.00
East Fork SUD[a]	Conservation	See Collin County.				
	NTMWD					
	Additional Delivery Infrastructure from NTMWD					
Farmers Branch	Conservation	2030	930	$150,000	$0.44	$0.25
	DWU	2030	2,401	$0	$4.00	$4.00
Ferris	Conservation	See Ellis County.				
	Rockett SUD					
Glenn Heights[a]	Conservation	2030	794	$150,000	$0.44	$0.25
	DWU	2030	273	$0	$4.00	$4.00
Highland Park	Conservation	2030	311	$0	$2.22	$0.68
Hutchins	Conservation	2030	91	$8,560	$2.71	$0.94
	DWU	2030	513	$0	$4.00	$4.00
Irving	Conservation	2030	3,903	$150,000	$0.80	$0.40
	DWU	2030	971	$0	$4.00	$4.00
	Additional DWU	2030	17,936	$0	$4.00	$4.00
	ALTERNATIVE TRA Central Reuse Project	*2030*	*27,539*	*$275,678,000*	*$3.84*	*$1.68*
	ALTERNATIVE TCWSP Supply with Reuse Project	*2030*	*27,539*	*$209,016,000*	*$5.58*	*$3.94*
	ALTERNATIVE Direct Potable Reuse	*2030*	*19,277*	*$447,302,000*	*$9.79*	*$4.78*
	ALTERNATIVE Additional Lake Chapman Supplies from Sulphur Springs	*2040*	*2,994*	*$0*	*$1.50*	*$1.50*

WUG OR WWP	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	ALTERNATIVE Marvin Nichols Reservoir	*2060*	*16,328*	*$201,397,000*	*$2.23*	*$0.35*
	ALTERNATIVE Wright Patman Reallocation	*2080*	*6,380*	*$116,548,700*	*$3.56*	*$0.58*
	ALTERNATIVE Oklahoma	*2050*	*25,000*	*$341,796,025*	*$3.53*	*$1.25*
	ALTERNATIVE Main Stem Balancing Reservoir	*2050*	*25,000*	*$159,983,000*	*$1.93*	*$0.87*
Lancaster	Conservation	2030	921	$150,000	$1.33	$0.72
	DWU	2030	1,261	$0	$4.00	$4.00
Lancaster MUD 1	Conservation	2030	24	$8,560	$3.16	$1.99
	Lancaster	2030	90	$0	$4.00	$4.00
Lewisville[a]	Conservation	See Denton County.				
	Other WMSs					
Mesquite[a]	Conservation	2030	6,395	$150,000	$1.77	$1.12
	NTMWD	2030	12,049	$0	$4.00	$4.00
Ovilla[a]	Conservation	See Ellis County.				
	DWU					
	Additional Delivery Infrastructure					
Richardson[a]	Conservation	2030	5,594	$150,000	$1.62	$1.21
	NTMWD	2030	10,348	$0	$4.00	$4.00
Rockett SUD[a]	Conservation	See Ellis County.				
	Other WMSs					
Rowlett[a]	Conservation	2030	1,038	$150,000	$1.30	$0.39
	NTMWD	2030	6,421	$0	$4.00	$4.00
	Additional Delivery Infrastructure	*2030*	*6,421*	*$5,135,000*	*$0.17*	*$0.04*
Sachse[a]	Conservation	2030	450	$150,000	$1.40	$0.44
	NTMWD	2030	2,823	$0	$4.00	$4.00
Sunnyvale	Conservation	2030	155	$0	$2.82	$0.54
	NTMWD	2030	2,126	$0	$4.00	$4.00
	Additional Delivery Infrastructure	*2030*	*2,126*	*$6,008,000*	*$0.60*	*$0.13*
University Park	Conservation	2030	582	$150,000	$1.39	$0.87
Wilmer	Conservation	2030	67	$0	$4.32	$1.74

WUG OR WWP	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	DWU	2030	209	$0	$4.00	$4.00
	Increase Capacity of Connection with Lancaster	*2030*	*209*	*$6,774,000*	*$6.12*	*$0.72*
	Direct Connection to Dallas 36" Transmission Line	*2030*	*1,012*	*$23,386,000*	*$4.38*	*$0.53*
Wylie[a]	Conservation	See Collin County.				
	NTMWD					
County Other and Non-Municipal						
County Other, Dallas	Conservation	2030	159	$8,560	$1.34	$0.35
	Rice Water Supply and Sewer Service	2040	12	$0	$4.00	$4.00
	DWU	2030	1,190	$0	$4.00	$4.00
	TRWD through Fort Worth	2030	215	$0	$4.00	$4.00
Irrigation, Dallas	Conservation	2030	1,106	$0	$0.94	$0.94
Livestock, Dallas	None	None				
Manufacturing, Dallas	DWU	2030	4,607	$0	$4.00	$4.00
	DWU through Grand Prairie	2030	132	$0	$4.00	$4.00
	NTMWD through Garland	2030	1,238	$0	$4.00	$4.00
	NTMWD through Mesquite	2030	495	$0	$4.00	$4.00
Mining, Dallas	None	None				
Steam Electric Power, Dallas	DWU	2030	256	$0	$1.50	$1.50

[a]*Water user groups extend into more than one county.*
[b]*Quantities listed are for the WUG only. They do not include the WUG's customers.*
[c]*Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.*

5E.4 Denton County



Denton County is located in the north central portion of Region C. **Figure 5E.8** shows water service areas in Denton County.

Denton County is growing rapidly, and the county's population is projected to more than double between 2030 and 2080.

Demands for the county are predominately municipal. Irrigation demands are the next largest category. Livestock, manufacturing, mining, and steam electric demands are all less than 1 percent of the overall county demand.

Dallas Water Utilities (DWU), Upper Trinity Regional Water District (UTRWD), North Texas Municipal Water District (NTMWD), and Tarrant Regional Water District (TRWD) are the major water providers that provide supplies to Denton County. Denton also provide significant supplies in the county.

An overall summary of the County's projections is shown in **Table 5E.90,** and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Denton County Quick Facts

2020 Population: 906,422

Projected 2080 Population: 2,456,768

Projected 2080 Demand: 393 MGD

County Seat: Denton

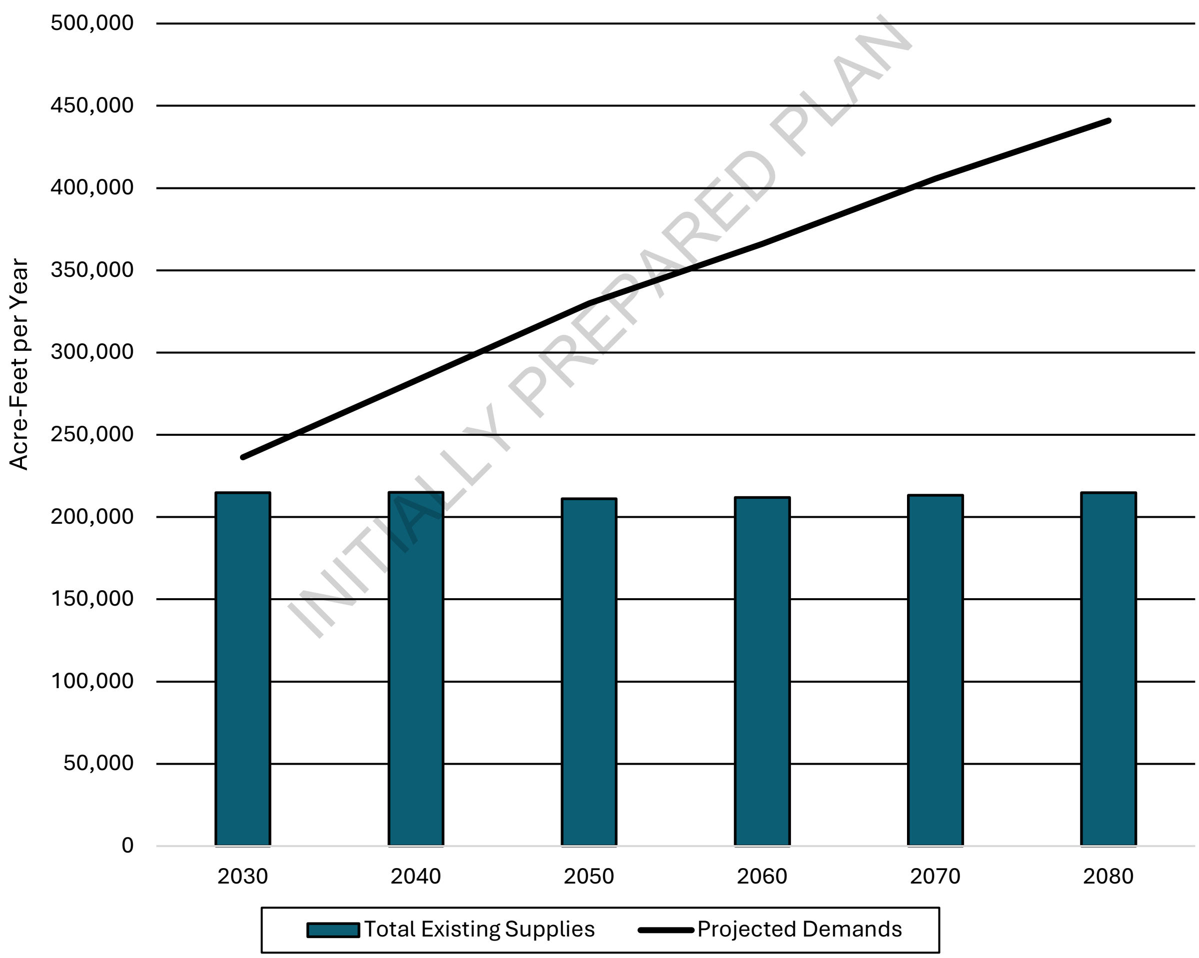
Economy: Industry; tourism; government/services

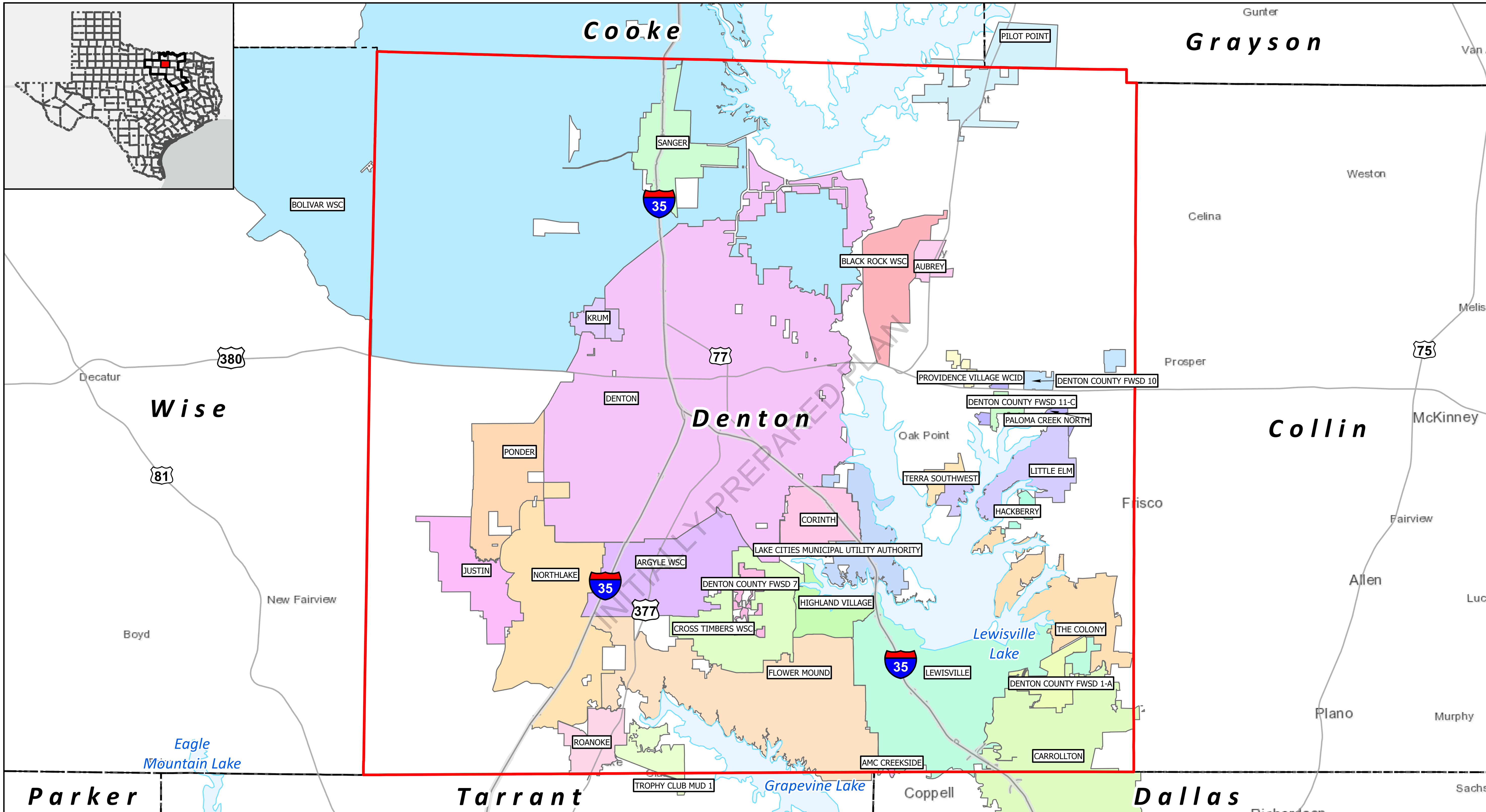
River Basins: Trinity (100%)

TABLE 5E.90 SUMMARY OF DENTON COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**1,229,659**	**1,498,214**	**1,772,935**	**1,998,120**	**2,244,614**	**2,456,768**
Projected Demands	**236,318**	**283,138**	**329,838**	**366,045**	**405,842**	**441,009**
Municipal	230,466	277,448	324,113	360,284	400,044	435,176
Irrigation	2,973	2,973	2,973	2,973	2,973	2,973
Livestock	840	840	840	840	840	840
Manufacturing	605	627	650	674	699	725
Mining	259	75	87	99	111	120
Steam Electric	1,175	1,175	1,175	1,175	1,175	1,175
Total Existing Supplies	***214,801***	***215,070***	***211,051***	***211,885***	***213,299***	***214,817***
Need (Demand - Supply)	***21,517***	***68,068***	***118,787***	***154,160***	***192,543***	***226,192***

FIGURE 5E.7 SUMMARY OF DENTON COUNTY





REGION C
Water Planning for North Texas

Denton County, Texas
Figure 5E.8

Data Source(s): ESRI, TWDB, TxDOT

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.4.1 Wholesale Water Providers and Water User Groups

Water management strategies for Denton County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs for recommended and alternative water management strategies are presented in **Section 5E.4.1. Appendix H** has more detailed cost estimates.

AMC Creekside

AMC Creekside supplies water to Denton County and a small portion of Dallas County, and receives water supplies from the Trinity aquifer and treated water supplies from UTRWD. The water management strategies include conservation and additional supplies from UTRWD. **Table 5E.91** shows the projected population and demand, the current supplies, and the water management strategies for AMC Creekside.

TABLE 5E.91 SUMMARY OF WATER USER GROUP – AMC CREEKSIDE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**13,736**	**17,803**	**23,593**	**29,159**	**33,250**	**36,250**
Projected Water Demand						
Municipal Demand	2,674	3,458	4,583	5,664	6,458	7,041
Total Projected Demand	***2,674***	***3,458***	***4,583***	***5,664***	***6,458***	***7,041***
Currently Available Water Supplies						
Trinity Aquifer	683	683	683	683	683	683
Upper Trinity Regional WD	2,054	2,066	2,201	2,535	2,637	2,663
Total Current Supplies	***2,737***	***2,749***	***2,884***	***3,218***	***3,320***	***3,346***
Need (Demand - Current Supply)	***0***	***709***	***1,699***	***2,446***	***3,138***	***3,695***
Water Management Strategies						
Water Conservation	107	179	464	712	790	836
Additional Supplies from UTRWD	0	662	1,427	1,969	2,611	3,151
Total Water Management Strategies	***107***	***841***	***1,891***	***2,681***	***3,401***	***3,987***
Argyle WSC Reserve (Shortage)	***170***	***132***	***192***	***235***	***263***	***292***

Argyle Water Supply Corporation

Argyle WSC supplies water to Denton County. The WSC receives water supplies from the Trinity aquifer and treated water supplies from UTRWD. The water management strategies for the WSC include conservation and additional supplies from UTRWD. **Table 5E.92** shows the projected population and demand, the current supplies, and the water management strategies for Argyle WSC.

TABLE 5E.92 SUMMARY OF WATER USER GROUP – ARGYLE WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**13,736**	**17,803**	**23,593**	**29,159**	**33,250**	**36,250**
Projected Water Demand						
Municipal Demand	2,674	3,458	4,583	5,664	6,458	7,041
Total Projected Demand	***2,674***	***3,458***	***4,583***	***5,664***	***6,458***	***7,041***
Currently Available Water Supplies						
Trinity Aquifer	683	683	683	683	683	683
Upper Trinity Regional WD	2,054	2,066	2,201	2,535	2,637	2,663
Total Current Supplies	***2,737***	***2,749***	***2,884***	***3,218***	***3,320***	***3,346***
Need (Demand - Current Supply)	***0***	***709***	***1,699***	***2,446***	***3,138***	***3,695***
Water Management Strategies						
Water Conservation	107	179	464	712	790	836
Additional Supplies from UTRWD	0	662	1,427	1,969	2,611	3,151
Total Water Management Strategies	***107***	***841***	***1,891***	***2,681***	***3,401***	***3,987***
Argyle WSC Reserve (Shortage)	***170***	***132***	***192***	***235***	***263***	***292***

Aubrey

Aubrey is located in northeast Denton County. The city receives its water supply from the Trinity aquifer and treated water supplies from UTRWD. Water management strategies for Aubrey include conservation, additional supplies from UTRWD, and new groundwater wells in the Trinity aquifer. Any infrastructure needed to treat and deliver water from UTRWD to Aubrey is the responsibility of UTRWD and is included in UTRWD's strategies in this plan. **Table 5E.93** shows the projected population and demand, the current supplies, and the water management strategies for Aubrey.

TABLE 5E.93 SUMMARY OF WATER USER GROUP – CITY OF AUBREY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**8,276**	**14,448**	**24,810**	**33,745**	**40,586**	**40,586**
Projected Water Demand						
Municipal Demand	949	1,650	2,833	3,853	4,634	4,634
Total Projected Water Demand	***949***	***1,650***	***2,833***	***3,853***	***4,634***	***4,634***
Currently Available Water Supplies						
Trinity Aquifer	559	559	559	559	559	559
Upper Trinity Regional WD	186	465	905	1,485	1,604	1,471
Total Current Supplies	***745***	***1,024***	***1,464***	***2,044***	***2,163***	***2,030***
Need (Demand - Current Supply)	***204***	***626***	***1,369***	***1,809***	***2,471***	***2,604***
Water Management Strategies						
Water Conservation	22	55	217	354	421	400
Additional Supplies from UTRWD	0	173	665	1,314	1,766	1,916
New Well(s) in Trinity Aquifer	500	500	500	500	500	500
Total Water Management Strategies	***522***	***728***	***1,382***	***2,168***	***2,687***	***2,816***
Aubrey Reserve (Shortage)	***318***	***102***	***13***	***359***	***216***	***212***

Black Rock Water Supply Corporation

Black Rock WSC is located in Denton County. The WSC gets its water supply from the Trinity aquifer. The water management strategies include conservation and new groundwater wells in the Trinity aquifer. **Table 5E.94** shows the projected population and demand, the current supplies, and the water management strategies for Black Rock WSC.

TABLE 5E.94 SUMMARY OF WATER USER GROUP – BLACK ROCK WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,560**	**1,959**	**2,377**	**2,804**	**3,274**	**3,791**
Projected Water Demand						
Municipal Demand	374	469	569	671	783	907
Total Projected Water Demand	***374***	***469***	***569***	***671***	***783***	***907***
Currently Available Water Supplies						
Trinity Aquifer	468	468	468	468	468	468
Total Current Supplies	***468***	***468***	***468***	***468***	***468***	***468***
Need (Demand - Current Supply)	***0***	***1***	***101***	***203***	***315***	***439***
Water Management Strategies						
Water Conservation	9	14	20	25	34	42
New Well(s) in Trinity Aquifer	0	100	150	250	350	450
Total Water Management Strategies	***9***	***114***	***170***	***275***	***384***	***492***
Black Rock WSC Reserve (Shortage)	***103***	***113***	***69***	***72***	***69***	***53***

Bolivar Water Supply Corporation

Bolivar WSC serves retail customers in northeastern Wise County and in Denton and Cooke Counties. The WSC currently gets its water from the Trinity aquifer. Water management strategies for Bolivar WSC include conservation, new groundwater well(s) in the Trinity aquifer, connecting to and purchasing water from Upper Trinity Regional Water District, and connecting to and purchasing water from Gainesville. **Table 5E.95** shows the projected population and demand, the current supplies, and the water management strategies for Bolivar WSC.

TABLE 5E.95 SUMMARY OF WATER USER GROUP – BOLIVAR WATER SUPPLY CORPORATION

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**12,220**	**14,878**	**17,544**	**20,208**	**23,992**	**28,800**
Projected Water Demand						
Municipal Demand	1,670	2,024	2,387	2,750	3,265	3,919
Total Projected Demand	***1,670***	***2,024***	***2,387***	***2,750***	***3,265***	***3,919***
Currently Available Water Supplies						
Trinity Aquifer	1,264	1,264	1,264	1,264	1,264	1,264
Total Current Supplies	***1,264***	***1,264***	***1,264***	***1,264***	***1,264***	***1,264***
Need (Demand - Current Supply)	***406***	***760***	***1,123***	***1,486***	***2,001***	***2,655***
Water Management Strategies						
Water Conservation	56	140	208	338	443	549
New Well(s) in Trinity Aquifer	250	250	250	250	250	250
Connect to UTRWD	300	545	815	1,023	1,408	1,931
Connect to Gainesville	50	75	100	125	150	175
Total Water Management Strategies	***656***	***1,010***	***1,373***	***1,736***	***2,251***	***2,905***
Bolivar WSC Reserve (Shortage)	***250***	***250***	***250***	***250***	***250***	***250***

Carrollton

Carrollton is located in southern Denton, northwestern Dallas and southwestern Collin Counties. The City of Carrollton receives most of its water supply from DWU and a small amount of groundwater from the Trinity aquifer. Water management strategies for Carrollton include conservation and additional water from DWU. **Table 5E.96** shows the projected population and demand, the current supplies, and the water management strategies for Carrollton.

TABLE 5E.96 SUMMARY OF WATER USER GROUP – CITY OF CARROLLTON

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**141,268**	**149,561**	**158,341**	**167,636**	**177,477**	**178,153**
Projected Water Demand						
Municipal Demand	25,669	27,059	28,648	30,330	32,110	32,233
Total Projected Demand	***25,669***	***27,059***	***28,648***	***30,330***	***32,110***	***32,233***
Currently Available Water Supplies						
Trinity Aquifer	25	25	25	25	25	25
Dallas	23,691	23,813	23,929	24,328	24,722	24,004
Total Current Supplies	***23,716***	***23,838***	***23,954***	***24,353***	***24,747***	***24,029***
Need (Demand - Current Supply)	***1,953***	***3,221***	***4,694***	***5,977***	***7,363***	***8,204***
Water Management Strategies						
Water Conservation	1,067	1,423	1,648	1,870	2,098	2,122
Additional Supplies from DWU	911	1,823	3,071	4,132	5,290	6,107
Total Water Management Strategies	***1,978***	***3,246***	***4,719***	***6,002***	***7,388***	***8,229***
Carrollton Reserve (Shortage)	***25***	***25***	***25***	***25***	***25***	***25***

Celina

The City of Celina is located in northwest Collin County and northeast Denton County. Water supply plans for Celina are discussed under Collin County in **Section 5E.1**.

Coppell

Coppell is located in northwest Dallas County with a small population in Denton County. Water supply plans for Coppell are discussed under Dallas County in **Section 5E.3**.

Corinth

Corinth is located in central Denton County. The city gets treated water supplies from UTRWD. Water management strategies for Corinth include conservation and additional water from UTRWD. **Table 5E.97** shows the projected population and demand, the current supplies, and the water management strategies for Corinth.

TABLE 5E.97 SUMMARY OF WATER USER GROUP – CITY OF CORINTH

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**29,174**	**31,493**	**39,215**	**40,348**	**42,000**	**42,000**
Projected Water Demand						
Municipal Demand	4,884	5,255	6,543	6,732	7,008	7,008
Total Projected Demand	***4,884***	***5,255***	***6,543***	***6,732***	***7,008***	***7,008***
Currently Available Water Supplies						
Upper Trinity Regional WD	4,873	3,774	3,567	3,312	3,091	2,829
Total Current Supplies	***4,873***	***3,774***	***3,567***	***3,312***	***3,091***	***2,829***
Need (Demand - Current Supply)	***11***	***1,481***	***2,976***	***3,420***	***3,917***	***4,179***
Water Management Strategies						
Water Conservation	298	434	665	657	688	678
Additional Supplies from UTRWD	0	1,047	2,311	2,763	3,229	3,501
Total Water Management Strategies	***298***	***1,481***	***2,976***	***3,420***	***3,917***	***4,179***
Corinth Reserve (Shortage)	***287***	***0***	***0***	***0***	***0***	***0***

Cross Timbers Water Supply Corporation

Cross Timbers WSC is located in Denton County. The WSC gets its water supply from the Trinity aquifer and UTRWD. The water management strategies for Cross Timbers WSC include conservation, new groundwater well(s) in the Trinity aquifer, additional supplies from UTRWD, and infrastructure improvements. **Table 5E.98** shows the projected population and demand, the current supplies, and the water management strategies for Cross Timbers WSC.

TABLE 5E.98 SUMMARY OF WATER USER GROUP – CROSS TIMBERS WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**9,808**	**12,310**	**14,944**	**17,622**	**20,802**	**25,403**
Projected Water Demand						
Municipal Demand	2,103	2,634	3,198	3,771	4,451	5,436
Total Projected Water Demand	***2,103***	***2,634***	***3,198***	***3,771***	***4,451***	***5,436***
Currently Available Water Supplies						
Trinity Aquifer	649	649	649	649	649	649
Upper Trinity Regional WD	1,259	1,229	1,221	1,391	1,571	1,755
Total Current Supplies	***1,908***	***1,878***	***1,870***	***2,040***	***2,220***	***2,404***
Need (Demand - Current Supply)	***195***	***756***	***1,328***	***1,731***	***2,231***	***3,032***
Water Management Strategies						
Water Conservation	53	91	125	158	384	596
New Well(s) in Trinity Aquifer	350	350	350	350	350	350
Additional Supplies from UTRWD	0	424	930	1,319	1,683	2,117
Infrastructure Improvements	*0*	*424*	*930*	*1,319*	*1,683*	*2,117*
Total Water Management Strategies	***403***	***865***	***1,405***	***1,827***	***2,417***	***3,063***
Cross Timbers WSC Reserve (Shortage)	***208***	***109***	***77***	***96***	***186***	***31***

Dallas

Dallas is a major wholesale water provider that supplies water to Dallas, Collin, Denton, Kaufman, and Rockwall Counties. The plans for Dallas are discussed under Dallas Water Utilities (DWU) in **Chapter 5D**.

Denton

The City of Denton is located in central Denton County. Denton is a wholesale water provider (WWP) that currently provides treated water to its retail customers and manufacturing in Denton County. The city also provides treated wastewater effluent to irrigation users and steam electric power generating facilities in Denton County. Potential future customers for Denton include Mustang SUD, Ponder, and rural entities in Denton County. The city is under no obligation to provide services to these entities just because they are listed in this plan as potential future customers.

Denton's current sources of water supply include Ray Roberts Lake, Lewisville Lake, and direct and indirect reuse. Denton's available supply in Ray Roberts Lake and Lewisville Lake is the city's share of the firm yield of the reservoirs. The yields of the reservoirs decrease over time due to sedimentation. The City of Denton has two water treatment plants, the Lewisville WTP and Ray Roberts WTP. The Lewisville WTP currently has a peak capacity of 28 MGD and the Ray Roberts WTP will have a peak capacity of 46 MGD by 2030. Using a peaking factor of 2, Denton will be able to treat up to 41,500 acre-feet per year for municipal supplies.

The proposed future strategies for Denton are to implement water conservation measures, additional indirect reuse with storage, direct potable reuse, aquifer storage and recover (ASR), purchase water from Dallas Water Utilities (DWU), and expand their water treatment plant capacity.

Denton currently has a bed and banks permit (CA 08-2348B) to divert 13,497 acre-feet per year from their Pecan Water Reclamation Plant to Lake Lewisville for reuse. Denton recently submitted an amendment (Amendment C) to their existing water right, to reuse an additional 10,000 acre-feet per year. The projected additional indirect reuse supply amount is based on wastewater flow projections for regional and state planning – actual supplies are contingent on what is discharged. Another component of the indirect reuse strategy would convey treated wastewater to existing city lakes for storage and discharge to Pecan Creek, ultimately diverting to the Lewisville WTP. The direct potable reuse strategy would involve piping wastewater effluent from Denton's Pecan Water Reclamation Plant to the Lewisville WTP for advanced treatment. Additional information on reuse is included in **Chapter 5B** and **Appendix G**.

A small-scale ASR strategy has been included for Denton. This potential strategy includes injecting excess treated surface water into a site located on the north side of Denton to set aside for summer peak days. Additional information on ASR is in **Appendix G**.

Denton also intends to purchase raw water from DWU in the future. This strategy includes infrastructure to convey water from Denton's intake on Lake Lewisville to the Ray Roberts WTP. To meet projected demands, Denton will need to expand their water treatment plants to reach a total treatment capacity of 147 MGD by 2080. Expansions at either of the city's water treatment plants are considered to be consistent with this strategy. The management supply factor is kept at 1.00 as Denton may purchase additional water from DWU if needed. A summary of the recommended water plan for Denton is shown on **Table 5E.99**.

TABLE 5E.99 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – DENTON

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Denton	31,573	40,291	49,891	59,284	70,931	82,318
County-Other, Denton	50	50	50	50	50	50
Irrigation, Denton	265	265	265	265	265	265
Krum	909	0	0	0	0	0
Manufacturing, Denton	472	490	505	525	545	566
Sanger	680	0	0	0	0	0
Steam Electric Power, Denton	1,175	1,175	1,175	1,175	1,175	1,175
Potential Future Customers						
County-Other, Denton	1,682	1,682	1,682	1,682	1,682	1,682
Mustang SUD	5,045	5,605	5,605	5,605	5,605	5,605
Ponder	346	461	582	706	842	991
Total Projected Demands	***42,197***	***50,019***	***59,755***	***69,292***	***81,095***	***92,652***
Currently Available Supplies						
Lake Lewisville	5,200	5,075	4,950	4,800	4,650	4,500
Lake Ray Roberts	18,600	18,480	18,360	18,207	18,053	17,900
Indirect Reuse	4,608	4,969	4,953	6,457	8,320	10,143
Direct Reuse (IRR)	265	265	265	265	265	265
Direct Reuse (SEP)	1,175	1,175	1,175	1,175	1,175	1,175
Total Currently Available Supplies	***29,848***	***29,964***	***29,703***	***30,904***	***32,463***	***33,983***
Need (Demand - Supply)	***12,349***	***20,055***	***30,052***	***38,388***	***48,632***	***58,669***
Water Management Strategies						
Conservation (retail)	1,628	3,714	5,265	6,431	7,950	9,348
Additional Indirect Reuse with Storage	3,764	4,059	4,046	5,274	6,797	8,286
Direct Potable Reuse	0	2,242	5,605	5,605	5,605	5,605
Aquifer Storage and Recovery	0	2,500	2,500	2,500	2,500	2,500
Purchase Water from DWU	6,957	7,540	12,636	18,578	25,780	32,930
Additional WTP Expansions:						
30 MGD WTP Plant Expansion	*0*	*3,388*	*11,573*	*16,815*	*16,815*	*16,815*
20 MGD WTP Plant Expansion	*0*	*0*	*0*	*3,129*	*11,210*	*11,210*
23 MGD WTP Plant Expansion	*0*	*0*	*0*	*0*	*2,203*	*12,362*
Total Supplies from Strategies	***12,435***	***20,055***	***30,052***	***38,388***	***48,632***	***58,669***
Total Supplies	***42,283***	***50,019***	***59,755***	***69,292***	***81,095***	***92,652***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

Denton County Fresh Water Supply District 1-A

Denton FWSD 1-A was annexed by Lewisville and is no longer an active Public Water System, but the demand projections in this plan are still considered separate. The District currently receives its water supply from UTRWD through Lewisville. Water management strategies for Denton County FWSD 1-A include conservation and additional water from UTRWD. **Table 5E.100** shows the projected population and demand, the current supplies, and the water management strategies for Denton County FWSD 1-A.

TABLE 5E.100 SUMMARY OF WATER USER GROUP – DENTON COUNTY FWSD 1-A

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**23,532**	**31,738**	**33,928**	**34,388**	**35,057**	**35,057**
Projected Water Demand						
Municipal Demand	3,979	5,348	5,717	5,794	5,907	5,907
Total Projected Demand	***3,979***	***5,348***	***5,717***	***5,794***	***5,907***	***5,907***
Currently Available Water Supplies						
Upper Trinity Regional WD (through Lewisville)	3,969	3,840	3,116	2,850	2,605	2,384
Total Current Supplies	***3,969***	***3,840***	***3,116***	***2,850***	***2,605***	***2,384***
Need (Demand - Current Supply)	***10***	***1,508***	***2,601***	***2,944***	***3,302***	***3,523***
Water Management Strategies						
Water Conservation	200	441	457	445	456	459
Additional Supplies from UTRWD	0	1,067	2,144	2,499	2,846	3,064
Total Water Management Strategies	***200***	***1,508***	***2,601***	***2,944***	***3,302***	***3,523***
Denton County FWSD 1-A Reserve (Shortage)	***190***	***0***	***0***	***0***	***0***	***0***

Denton County Fresh Water Supply District 7

Denton County FWSD 7 is located in south-central Denton County. The District currently receives all of its treated water supplies from UTRWD. Water management strategies for Denton County FWSD 7 include conservation and additional water from UTRWD. **Table 5E.101** shows the projected population and demand, the current supplies, and the water management strategies for Denton County FWSD 7.

TABLE 5E.101 SUMMARY OF WATER USER GROUP – DENTON COUNTY FWSD 7

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**12,779**	**13,500**	**13,500**	**13,500**	**13,500**	**13,500**
Projected Water Demand						
Municipal Demand	3,194	3,367	3,367	3,367	3,367	3,367
Total Projected Demand	***3,194***	***3,367***	***3,367***	***3,367***	***3,367***	***3,367***
Currently Available Water Supplies						
Upper Trinity Regional WD	3,186	2,418	1,835	1,656	1,485	1,359
Total Current Supplies	***3,186***	***2,418***	***1,835***	***1,656***	***1,485***	***1,359***
Need (Demand - Current Supply)	***8***	***949***	***1,532***	***1,711***	***1,882***	***2,008***
Water Management Strategies						
Water Conservation	119	161	173	184	195	206
Additional Supplies from UTRWD	0	788	1,359	1,527	1,687	1,802
Total Water Management Strategies	***119***	***949***	***1,532***	***1,711***	***1,882***	***2,008***
Denton County FWSD 7 Reserve (Shortage)	***111***	***0***	***0***	***0***	***0***	***0***

Denton County Fresh Water Supply District 10

Denton County FWSD 10 is located in eastern Denton County. The District currently receives treated water supplies from Upper Trinity Regional Water District, with a portion of that supply being provided through Mustang SUD. Water management strategies for Denton County FWSD 10 include conservation, additional water from UTRWD through Mustang SUD, and additional water directly from Upper Trinity Regional Water District. **Table 5E.102** shows the projected population and demand, the current supplies, and the water management strategies for Denton County FWSD 10.

TABLE 5E.102 SUMMARY OF WATER USER GROUP – DENTON COUNTY FWSD 10

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,246**	**6,246**	**6,246**	**6,246**	**6,246**	**6,246**
Projected Water Demand						
Municipal Demand	1,158	1,155	1,155	1,155	1,155	1,155
Total Projected Demand	***1,158***	***1,155***	***1,155***	***1,155***	***1,155***	***1,155***
Currently Available Water Supplies						
Upper Trinity Regional WD (through Mustang SUD)	832	597	454	409	367	336
Upper Trinity Regional WD	323	232	176	159	142	130
Total Current Supplies	***1,155***	***829***	***630***	***568***	***509***	***466***
Need (Demand - Current Supply)	***3***	***326***	***525***	***587***	***646***	***689***
Water Management Strategies						
Water Conservation	37	49	53	56	60	64
Additional Supplies from UTRWD (through Mustang SUD)	0	200	340	383	422	450
Additional Supplies from UTRWD	0	77	132	148	164	175
Total Water Management Strategies	***37***	***326***	***525***	***587***	***646***	***689***
Denton County FWSD 10 Reserve (Shortage)	***34***	***0***	***0***	***0***	***0***	***0***

Denton County Fresh Water Supply District 11-C

Denton County FWSD 11-C is located in eastern Denton County. The District currently receives treated water supplies from Upper Trinity Regional Water District. Water management strategies for Denton County FWSD 11-C include conservation and additional water from UTRWD. **Table 5E.103** shows the projected population and demand, the current supplies, and the water management strategies for Denton County FWSD 11-C.

TABLE 5E.103 SUMMARY OF WATER USER GROUP – DENTON COUNTY FRESH WATER SUPPLY DISTRICT 11 – C

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,406**	**8,467**	**11,690**	**14,965**	**18,573**	**22,547**
Projected Water Demand						
Municipal Demand	363	569	786	1,006	1,248	1,515
Total Projected Demand	***363***	***569***	***786***	***1,006***	***1,248***	***1,515***
Currently Available Water Supplies						
Upper Trinity Regional WD	362	409	428	495	550	611
Total Current Supplies	***362***	***409***	***428***	***495***	***550***	***611***
Need (Demand - Current Supply)	***1***	***160***	***358***	***511***	***698***	***904***
Water Management Strategies						
Water Conservation	11	23	37	51	67	141
Additional Supplies from UTRWD	0	137	321	460	631	763
Total Water Management Strategies	***11***	***160***	***358***	***511***	***698***	***904***
Denton County FWSD 11-C Reserve (Shortage)	***10***	***0***	***0***	***0***	***0***	***0***

Denton County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. Most irrigation in Collin County is for golf course irrigation. **Table 5E.104** shows the projected demand, the current supplies, and the water management strategies for Denton County Irrigation. As shown in **Table 5E.104**, direct reuse from several sources (DWU, Denton, Trophy Club MUD 1, and UTRWD) and groundwater (Woodbine and Trinity aquifers) all provide water for irrigation in Denton County. These sources are sufficient to meet the water needs for Denton County Irrigation. However, it is expected that irrigation demands will increase over time with growth and development of new golf courses. To meet these anticipated needs, water management strategies include additional direct reuse water from UTRWD and additional water from DWU.

TABLE 5E.104 SUMMARY OF WATER USER GROUP – DENTON COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***2,973***	***2,973***	***2,973***	***2,973***	***2,973***	***2,973***
Currently Available Water Supplies						
Dallas	923	880	836	802	770	744
Denton	265	265	265	265	265	265
Trophy Club MUD 1	800	800	800	800	800	800
Upper Trinity Regional WD	897	897	897	897	897	897
Trinity Aquifer	100	100	100	100	100	100
Woodbine Aquifer	100	100	100	100	100	100
Total Current Supplies	***3,085***	***3,042***	***2,998***	***2,964***	***2,932***	***2,906***
Need (Demand - Current Supply)	***0***	***0***	***0***	***9***	***41***	***67***
Water Management Strategies						
Water Conservation	4	64	124	155	184	213
Additional Direct Reuse Supplies from UTRWD	0	0	0	0	0	0
Additional Water from DWU	76	98	122	146	168	184
Total Water Management Strategies	***80***	***162***	***246***	***301***	***352***	***397***
Irrigation, Denton Reserve (Shortage)	***192***	***231***	***271***	***292***	***311***	***330***

Denton County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. **Table 5E.105** shows the projected demand, current supplies, and water management strategies for Denton County Livestock. The current supplies for Denton County Livestock are local surface water supplies and groundwater (Trinity and Woodbine aquifers). The sources are sufficient to meet future demands, and there are no water management strategies.

TABLE 5E.105 SUMMARY OF WATER USER GROUP – DENTON COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***840***	***840***	***840***	***840***	***840***	***840***
Currently Available Water Supplies						
Trinity Livestock Local Supply	618	618	618	618	618	618
Trinity Aquifer	100	100	100	100	100	100
Woodbine Aquifer	122	122	122	122	122	122
Total Current Supplies	***840***	***840***	***840***	***840***	***840***	***840***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Denton Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Denton County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. **Table 5E.106** shows the projected demand, the current supplies, and the water management strategies for Denton County Manufacturing. Current supplies include DWU, Denton, Frisco, TRWD (through Northlake), and UTRWD. Additional supplies from all the current sources are the water management strategies to meet demands. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG.

TABLE 5E.106 SUMMARY OF WATER USER GROUP – DENTON COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***605***	***627***	***650***	***674***	***699***	***725***
Currently Available Water Supplies						
Dallas	62	61	60	59	59	60
Denton	472	490	415	364	316	283
Frisco	27	24	22	20	20	19
TRWD (through Northlake)	5	4	5	4	4	4
Upper Trinity Regional WD	30	22	18	17	15	15
Total Current Supplies	***596***	***601***	***520***	***464***	***414***	***381***
Need (Demand - Current Supply)	***9***	***26***	***130***	***210***	***285***	***344***
Water Management Strategies						
Additional Supplies from UTRWD	0	9	15	17	20	21
Additional Supplies from DWU	5	8	12	16	19	20
Additional Supplies from NTMWD	3	7	11	14	15	17
Additional Supplies from Denton	0	0	90	161	229	283
Additional Supplies from TRWD (through Northlake)	1	2	2	3	3	3
Total Water Management Strategies	***9***	***26***	***130***	***211***	***286***	***344***
Manufacturing, Denton Reserve (Shortage)	**0**	**0**	**0**	**1**	**1**	**0**

Denton County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. **Table 5E.107** shows the projected demand, the current supplies, and the water management strategies for Denton County Mining. Denton County Mining is supplied from local supplies and groundwater (Trinity aquifer). The sources are sufficient to meet decreasing future demands, and there are no water management strategies.

TABLE 5E.107 SUMMARY OF WATER USER GROUP – DENTON COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***259***	***75***	***87***	***99***	***111***	***120***
Currently Available Water Supplies						
Trinity Other Local Supply	764	764	764	764	764	764
Trinity Aquifer	50	50	50	50	50	50
Total Current Supplies	***814***	***814***	***814***	***814***	***814***	***814***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Mining, Denton Reserve (Shortage)	***555***	***739***	***727***	***715***	***703***	***694***

Denton County Other

Denton County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups. The entities included under Denton County Other include individual properties as well as numerous Denton County Fresh Water Supply Districts not named as individual WUGs. The entities included under Denton County Other currently receive their water supply from UTRWD (through Flower Mound), Denton, and groundwater (Trinity and Woodbine aquifers). Water management strategies for these entities include conservation, additional supplies from UTRWD through Flower Mound, additional supplies from Denton, and new wells in the Trinity and Woodbine aquifers. **Table 5E.108** shows the projected population and demand, the current supplies, and the water management strategies for Denton County Other.

TABLE 5E.108 SUMMARY OF WATER USER GROUP – DENTON COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**51,205**	**80,964**	**110,723**	**140,482**	**185,121**	**214,880**
Projected Water Demand						
Municipal Demand	6,119	9,640	13,184	16,727	22,043	25,586
Total Projected Water Demand	***6,119***	***9,640***	***13,184***	***16,727***	***22,043***	***25,586***
Currently Available Water Supplies						
UTRWD (through Flower Mound)	35	25	19	17	15	14
Denton	50	50	41	35	29	25
Trinity Aquifer	1,079	1,079	1,079	1,079	1,079	1,079
Woodbine Aquifer	610	610	610	610	610	610
Total Current Supplies	***1,774***	***1,764***	***1,749***	***1,741***	***1,733***	***1,728***
Need (Demand - Current Supply)	***4,345***	***7,876***	***11,435***	***14,986***	***20,310***	***23,858***
Water Management Strategies						
Water Conservation	56	121	210	322	497	663
Additional Supplies from UTRWD (through Flower Mound)	0	10	15	17	19	20
Additional Supplies from Denton	1,682	1,682	1,691	1,697	1,703	1,707
Connect to UTRWD	3,032	4,759	6,487	8,203	10,773	12,461
New Well(s) in Trinity Aquifer	0	1,000	2,200	3,900	6,000	7,700
New Well(s) in Woodbine Aquifer	0	500	1,000	1,000	1,500	1,500
Total Water Management Strategies	***4,770***	***8,072***	***11,603***	***15,139***	***20,492***	***24,051***
County-Other, Denton Reserve (Shortage)	***425***	***196***	***168***	***153***	***182***	***193***

Denton County Steam Electric Power

Steam electric power demands generally represent the cooling water needs during power generation. These demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. **Table 5E.109** shows the projected demand, the current supplies and the water management strategies for Denton County Steam Electric Power. Denton County Steam Electric Power is currently supplied by direct reuse from Denton. This source is sufficient to meet future demands, and there are no water management strategies.

TABLE 5E.109 SUMMARY OF WATER USER GROUP – DENTON COUNTY SEP

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,175***	***1,175***	***1,175***	***1,175***	***1,175***	***1,175***
Currently Available Water Supplies						
Direct Reuse	1,175	1,175	1,175	1,175	1,175	1,175
Total Current Supplies	***1,175***	***1,175***	***1,175***	***1,175***	***1,175***	***1,175***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Steam-Electric Power, Denton Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

East Fork Special Utility District

East Fork SUD is located in southern Collin County and extends into Dallas and Rockwall Counties. The water management strategies for East Fork SUD are described under Collin County in **Section 5E.1**.

Flower Mound

Flower Mound is located in southern Denton County with a small area in northern Tarrant County. The city obtains its water supply from UTRWD, DWU, and direct reuse from TRA's Denton Creek Regional Wastewater System. Water management strategies for Flower Mound are conservation, additional water from UTRWD, additional water from DWU, and Long Prairie direct reuse. **Table 5E.110** shows the projected population and demand, the current supplies, and the water management strategies for Flower Mound.

TABLE 5E.110 SUMMARY OF WATER USER GROUP – CITY OF FLOWER MOUND

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**95,690**	**119,876**	**145,420**	**145,481**	**145,555**	**145,555**
Projected Water Demand						
Municipal Demand	23,750	29,693	36,020	36,035	36,054	36,054
County-Other, Denton	*35*	*35*	*35*	*35*	*35*	*35*
Total Projected Demand	***23,785***	***29,728***	***36,055***	***36,070***	***36,089***	***36,089***
Currently Available Water Supplies						
Upper Trinity Regional WD	15,402	14,925	14,725	13,297	11,927	10,914
County-Other, Denton	35	25	19	17	15	14
Dallas	6,166	6,166	6,166	6,166	6,166	6,166
Direct Reuse from TRA through Denton Creek RWS	222	556	556	556	556	556
Total Current Supplies	***21,825***	***21,672***	***21,466***	***20,036***	***18,664***	***17,650***
Need (Demand - Current Supply)	***1,960***	***8,056***	***14,589***	***16,034***	***17,425***	***18,439***
Water Management Strategies						
Water Conservation	988	2,028	2,776	2,455	2,357	2,365
Additional Water from UTRWD	0	4,450	10,223	11,905	13,365	14,373
Additional Water from DWU	1,587	1,616	1,632	1,711	1,738	1,736
Long Prairie Direct Reuse	1,355	4,066	4,066	4,066	4,066	4,066
Total Water Management Strategies	***3,930***	***12,160***	***18,697***	***20,137***	***21,526***	***22,540***
Flower Mound Reserve (Shortage)	***1,970***	***4,104***	***4,108***	***4,103***	***4,101***	***4,101***

Fort Worth

Fort Worth is a major wholesale water provider. Plans for Fort Worth are presented in **Chapter 5D**.

Frisco

The City of Frisco is a rapidly growing community in west Collin County and east Denton County. Water supply strategies are discussed under Collin County in **Section 5E.1**.

Hackberry

Hackberry is located in eastern Denton County. The city receives treated water supplies from NTMWD through Frisco. Water management strategies for Hackberry include conservation and additional water from NTMWD, including additional delivery infrastructure from NTWMD. **Table 5E.111** shows the projected population and demand, the current supplies, and the water management strategies for Hackberry.

TABLE 5E.111 SUMMARY OF WATER USER GROUP – CITY OF HACKBERRY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population (In City Only)	**5,999**	**8,480**	**11,092**	**13,748**	**16,673**	**19,894**
Projected Water Demand						
Municipal Demand	1,435	2,025	2,648	3,282	3,981	4,750
Total Projected Demand	***1,435***	***2,025***	***2,648***	***3,282***	***3,981***	***4,750***
Currently Available Water Supplies						
North Texas MWD (through Frisco)	1,310	1,579	1,766	1,942	2,181	2,469
Total Current Supplies	***1,310***	***1,579***	***1,766***	***1,942***	***2,181***	***2,469***
Need (Demand - Current Supply)	***125***	***446***	***882***	***1,340***	***1,800***	***2,281***
Water Management Strategies						
Water Conservation	49	88	126	173	223	282
Additional Water from NTMWD	76	358	756	1,167	1,577	1,999
Increase Delivery Infrastructure from NTWMD	*76*	*358*	*756*	*1,167*	*1,577*	*1,999*
Total Water Management Strategies	***125***	***446***	***882***	***1,340***	***1,800***	***2,281***
Hackberry Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Highland Village

The City of Highland Village is located in southern Denton County. The city receives its water supply from groundwater (Trinity aquifer) and UTRWD. Water management strategies for Highland Village include conservation and additional water from UTRWD. **Table 5E.112** shows the projected population and demand, the current supplies, and the water management strategies for Highland Village.

TABLE 5E.112 SUMMARY OF WATER USER GROUP – CITY OF HIGHLAND VILLAGE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**16,656**	**17,822**	**18,020**	**18,020**	**18,020**	**18,020**
Projected Water Demand						
Municipal Demand	3,667	3,914	3,957	3,957	3,957	3,957
Total Projected Demand	***3,667***	***3,914***	***3,957***	***3,957***	***3,957***	***3,957***
Currently Available Water Supplies						
Trinity Aquifer	1,411	1,411	1,411	1,411	1,411	1,411
Upper Trinity Regional WD	2,251	1,899	1,541	1,463	1,373	1,256
Total Current Supplies	***3,662***	***3,310***	***2,952***	***2,874***	***2,784***	***2,667***
Need (Demand - Current Supply)	***5***	***604***	***1,005***	***1,083***	***1,173***	***1,290***
Water Management Strategies						
Water Conservation	90	134	156	169	182	195
Additional Water from UTRWD	0	654	1,175	1,384	1,596	1,703
Total Water Management Strategies	***90***	***788***	***1,331***	***1,553***	***1,778***	***1,898***
Highland Village Reserve (Shortage)	***85***	***184***	***326***	***470***	***605***	***608***

Justin

Justin is located in southwest Denton County. The city receives its water supply from groundwater (Trinity aquifer) and UTRWD. Water management strategies for Justin include conservation and additional water from UTRWD. **Table 5E.113** shows the projected population and demand, the current supplies, and the water management strategies for Justin.

TABLE 5E.113 SUMMARY OF WATER USER GROUP – CITY OF JUSTIN

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,949**	**9,741**	**13,654**	**19,140**	**26,830**	**37,608**
Projected Water Demand						
Municipal Demand	1,196	1,671	2,342	3,284	4,603	6,452
*County-Other, Wise (future)**	*0*	*0*	*0*	*0*	*0*	*0*
Total Projected Demand	***1,196***	***1,671***	***2,342***	***3,284***	***4,603***	***6,452***
Currently Available Water Supplies						
Upper Trinity Regional WD	1,193	1,200	1,277	1,616	2,030	2,604
Trinity Aquifer	242	242	242	242	242	242
Total Current Supplies	***1,435***	***1,442***	***1,519***	***1,858***	***2,272***	***2,846***
Need (Demand - Current Supply)	***0***	***229***	***823***	***1,426***	***2,331***	***3,606***
Water Management Strategies						
Water Conservation	33	86	149	222	524	881
Additional Water from UTRWD	0	385	916	1,446	2,049	2,967
Total Water Management Strategies	***33***	***471***	***1,065***	***1,668***	***2,573***	***3,848***
Justin Reserve (Shortage)	***272***	***242***	***242***	***242***	***242***	***242***

Krum

The City of Krum is located in central Denton County. The city receives its water supply from groundwater (Trinity aquifer), Denton, and UTRWD. UTRWD is currently purchasing wholesale treated water from Denton, and Denton is delivering the treated water to Krum on UTRWD's behalf. This is an interim service by Denton to Krum until UTRWD has a direct connection. Water management strategies for Krum include conservation and additional water from UTRWD. **Table 5E.114** shows the projected population and demand, the current supplies, and the water management strategies for Krum.

TABLE 5E.114 SUMMARY OF WATER USER GROUP – CITY OF KRUM

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**7,146**	**9,532**	**12,715**	**16,961**	**22,625**	**30,180**
Projected Water Demand						
Municipal Demand	1,559	2,074	2,767	3,691	4,923	6,567
Total Projected Demand	***1,559***	***2,074***	***2,767***	***3,691***	***4,923***	***6,567***
Currently Available Water Supplies						
Denton	909	0	0	0	0	0
Upper Trinity Regional WD	0	1,023	1,154	1,496	1,885	2,388
Trinity Aquifer	650	650	650	650	650	650
Total Current Supplies	***1,559***	***1,673***	***1,804***	***2,146***	***2,535***	***3,038***
Need (Demand - Current Supply)	***0***	***401***	***963***	***1,545***	***2,388***	***3,529***
Water Management Strategies						
Water Conservation	82	267	463	635	1,049	1,513
Additional Water from UTRWD	0	218	609	1,022	1,478	2,166
Total Water Management Strategies	***82***	***485***	***1,072***	***1,657***	***2,527***	***3,679***
Krum Reserve (Shortage)	***82***	***84***	***109***	***112***	***139***	***150***

Lake Cities Municipal Utilities Authority

Lake Cities Municipal Utility Authority is located in Denton County and provides retail treated water service to Hickory Creek, Lake Dallas, and Shady Shores. The MUA currently gets treated water supplies from UTRWD. The water management strategies include conservation and additional supplies from UTRWD. **Table 5E.115** shows the projected population and demand, the current supplies, and the water management strategies for Lake Cities MUA.

TABLE 5E.115 SUMMARY OF WATER USER GROUP – LAKE CITIES MUA

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**17,721**	**21,502**	**22,513**	**22,753**	**22,897**	**22,897**
Projected Water Demand						
Municipal Demand	2,411	2,913	3,050	3,082	3,102	3,102
Total Projected Water Demand	***2,411***	***2,913***	***3,050***	***3,082***	***3,102***	***3,102***
Currently Available Water Supplies						
Upper Trinity Regional WD	2,405	2,092	1,663	1,516	1,368	1,252
Total Current Supplies	***2,405***	***2,092***	***1,663***	***1,516***	***1,368***	***1,252***
Need (Demand - Current Supply)	***6***	***821***	***1,387***	***1,566***	***1,734***	***1,850***
Water Management Strategies						
Water Conservation	76	223	264	264	269	274
Additional Supplies from UTRWD	0	598	1,123	1,302	1,465	1,576
Total Water Management Strategies	***76***	***821***	***1,387***	***1,566***	***1,734***	***1,850***
Lake Cities MUA Reserve (Shortage)	***70***	***0***	***0***	***0***	***0***	***0***

Lewisville

Lewisville is located in southern Denton County, with a small area in Dallas County. Lewisville recently annexed Denton FWSD 1-A, but the demand projections in this plan are still considered and listed separately. Lewisville receives raw water supplies from DWU and operates its own water treatment plant. Lewisville also receives treated supplies from UTRWD for the portion that was formerly Denton FWSD 1-A. Its water management strategies include conservation and additional water from DWU and UTRWD with future treatment plant expansions. **Table 5E.116** shows the projected population and demand, the current supplies, and the water management strategies for Lewisville.

TABLE 5E.116 SUMMARY OF WATER USER GROUP – CITY OF LEWISVILLE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**115,256**	**115,977**	**123,981**	**125,659**	**128,105**	**128,105**
Projected Water Demand						
Municipal Demand	19,405	19,446	20,787	21,068	21,478	21,478
Denton County FWSD 1-A	*3,979*	*5,348*	*5,717*	*5,794*	*5,907*	*5,907*
Total Projected Demand	***23,384***	***24,794***	***26,504***	***26,862***	***27,385***	***27,385***
Currently Available Water Supplies						
Upper Trinity RWD						
Denton County FWSD 1-A	*3,969*	*3,840*	*3,116*	*2,850*	*2,605*	*2,384*
Dallas	17,869	17,081	17,338	16,882	16,529	15,992
Total Current Supplies	***21,838***	***20,921***	***20,454***	***19,732***	***19,134***	***18,376***
Need (Demand - Current Supply)	***1,546***	***3,873***	***6,050***	***7,130***	***8,251***	***9,009***
Water Management Strategies						
Water Conservation	1,233	2,460	3,353	3,444	3,577	3,625
Denton County FWSD 1-A	200	441	457	445	456	459
Additional Water from UTRWD	0	1,067	2,144	2,499	2,846	3,064
Additional Water from DWU	303	0	96	742	1,372	1,861
3 MGD WTP Expansion	*303*	*0*	*96*	*742*	*1,372*	*1,861*
Total Water Management Strategies	***1,736***	***3,968***	***6,050***	***7,130***	***8,251***	***9,009***
Lewisville Reserve (Shortage)	***190***	***95***	***0***	***0***	***0***	***0***

Little Elm

The Town of Little Elm is located in eastern Denton County. Little Elm provides wholesale supplies to a portion of Terra Southwest. The town receives treated water supplies from NTMWD. Water management strategies for Little Elm include conservation and additional water from NTMWD. **Table 5E.117** shows the projected population and demand, the current supplies, and the water management strategies for Little Elm.

TABLE 5E.117 SUMMARY OF WATER USER GROUP – TOWN OF LITTLE ELM

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**44,322**	**42,372**	**44,739**	**46,710**	**48,000**	**48,000**
Projected Water Demand						
Municipal Demand	5,915	5,620	5,934	6,195	6,366	6,366
Terra Southwest	*35*	*97*	*164*	*232*	*307*	*389*
Total Projected Demand	***5,950***	***5,717***	***6,098***	***6,427***	***6,673***	***6,755***
Currently Available Water Supplies						
North Texas MWD	5,401	4,382	3,957	3,666	3,487	3,309
Terra Southwest	*32*	*76*	*109*	*137*	*169*	*202*
Total Current Supplies	***5,433***	***4,458***	***4,066***	***3,803***	***3,656***	***3,511***
Need (Demand - Current Supply)	***517***	***1,259***	***2,032***	***2,624***	***3,017***	***3,244***
Water Management Strategies						
Water Conservation	266	339	431	477	508	516
Terra Southwest	7	11	16	21	25	32
Additional Water from NTMWD	248	899	1,546	2,052	2,371	2,541
Terra Southwest	2	17	48	84	123	166
Total Water Management Strategies	***523***	***1,266***	***2,041***	***2,634***	***3,027***	***3,255***
Little Elm Reserve (Shortage)	***6***	***7***	***9***	***10***	***10***	***11***

Mountain Spring Water Supply Corporation

Mountain Spring WSC is located in northern Denton County and southern Cooke County. Since most of the population is in Cooke County, its water supply plans are discussed in **Section 5E.2** under Cooke County.

Mustang Special Utility District

Mustang Special Utility District (SUD) is a wholesale water provider (WWP) and a customer of Upper Trinity Regional Water District (UTRWD). The SUD provides retail water service to customers within its service area. In addition to providing retail service to its customers, Mustang SUD is the contract operator for the WUGs of Denton County FWSD No. 10, Gunter, Paloma Creek North, and Paloma Creek South. These special districts own their respective retail water systems and are wholesale water customers of UTRWD. Mustang SUD provides general operational functions (billing, operations and maintenance, etc). Over time, the special districts will transfer ownership of the retail systems to Mustang SUD, but the demand projections in this plan have maintained separate amounts for each of the special districts. Since the *2021 Region C Plan*, Mustang SUD has acquired Marilee SUD, and the demands for the area formerly served by Marilee SUD are included in Mustang SUD's retail demands. Mustang SUD is may acquire portions of Dorchester's CCN for two new proposed developments: Burlington Mobile Homes and Cottonwood Subdivision.

The SUD is currently supplied from the Trinity and Woodbine aquifers, treated surface water purchased from UTRWD, and supplies from Sherman for the area that was formerly served by Marilee SUD. The recommended water management strategies for Mustang SUD include implementing water conservation measures, new groundwater wells in the Trinity Aquifer, direct potable reuse, participating in the new GTUA Regional Water System, purchasing additional supplies from Sherman, purchasing additional supplies from UTRWD, and connecting to and purchasing supplies from Denton. A summary of the recommended water plan for Mustang SUD is shown in **Table 5E.118**.

TABLE 5E.118 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – MUSTANG SUD

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Mustang SUD	16,348	23,179	30,927	38,611	44,765	50,059
Denton County FWSD No. 10	834	832	832	832	832	832
Gunter	130	179	220	261	305	353
Paloma Creek North	1,198	1,194	1,194	1,194	1,194	1,194
Paloma Creek South	1,841	1,835	1,835	1,835	1,835	1,835
Total Projected Water Demand	***20,351***	***27,219***	***35,008***	***42,733***	***48,931***	***54,273***
Currently Available Supplies						
Trinity Aquifer	1,604	1,604	1,604	1,604	1,604	1,604
Woodbine Aquifer	71	71	71	71	71	71
Sherman	138	90	86	84	81	78
Upper Trinity Regional WD	17,042	17,049	16,554	18,175	18,622	18,876
Total Current Supplies	***18,855***	***18,814***	***18,315***	***19,934***	***20,378***	***20,629***
Needs (Demand less Supply)	***1,496***	***8,405***	***16,693***	***22,799***	***28,553***	***33,644***
Water Management Strategies						
Conservation (retail)	1,032	2,357	3,415	4,336	4,962	5,499
Conservation (wholesale)	9	339	405	419	436	453
New Well(s) in Trinity Aquifer	100	100	100	100	100	100
Direct Potable Reuse	2,803	2,803	2,803	2,803	2,803	2,803
New GTUA Regional Water System	0	2,000	6,800	6,800	6,800	6,800
Additional Supplies from Sherman	62	110	114	116	119	122
Additional UTRWD Supplies	0	4,351	10,507	14,661	18,940	22,761
Purchase Water from Denton	5,045	5,605	5,605	5,605	5,605	5,605
Total from Strategies	***9,051***	***17,665***	***29,749***	***34,840***	***39,765***	***44,143***
Total Supplies	***27,906***	***36,479***	***48,064***	***54,774***	***60,143***	***64,772***
Reserve or (Shortage)	***7,555***	***9,260***	***13,056***	***12,041***	***11,212***	***10,499***
Management Supply Factor	***1.37***	***1.34***	***1.37***	***1.28***	***1.23***	***1.19***

Northlake

Northlake is located in southwestern Denton County and is supplied from groundwater (Woodbine aquifer), Fort Worth (TRWD), and UTRWD. Northlake supplies a small amount of Denton County Manufacturing demand. Water management strategies for Northlake include conservation and additional water from Fort Worth and UTRWD. **Table 5E.119** shows the projected population and demand, the current supplies, and the water management strategies for Northlake.

TABLE 5E.119 SUMMARY OF WATER USER GROUP – CITY OF NORTHLAKE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**26,264**	**29,172**	**36,205**	**42,530**	**48,940**	**53,700**
Projected Water Demand						
Municipal Demand	5,222	5,783	7,177	8,431	9,701	10,645
Manufacturing, Denton	*6*	*6*	*7*	*7*	*7*	*7*
Total Projected Demand	***5,228***	***5,789***	***7,184***	***8,438***	***9,708***	***10,652***
Currently Available Water Supplies						
Woodbine Aquifer	95	95	95	95	95	95
Fort Worth	1,475	1,441	1,666	1,788	1,908	1,968
Manufacturing, Denton	*5*	*4*	*5*	*4*	*4*	*4*
Upper Trinity Regional WD	3,410	2,723	2,573	2,734	2,824	2,839
Total Current Supplies	***4,985***	***4,263***	***4,339***	***4,621***	***4,831***	***4,906***
Need (Demand - Current Supply)	***243***	***1,526***	***2,845***	***3,817***	***4,877***	***5,746***
Water Management Strategies						
Water Conservation	217	344	552	688	815	884
Additional Supplies from Fort Worth	163	342	513	764	1,025	1,257
Manufacturing, Denton	1	2	2	3	3	3
Additional Supplies from Upper Trinity Regional Water District	0	843	1,785	2,370	3,042	3,610
Total Water Management Strategies	***381***	***1,531***	***2,852***	***3,825***	***4,885***	***5,754***
Northlake Reserve (Shortage)	***138***	***5***	***7***	***8***	***8***	***8***

Paloma Creek North

Paloma Creek North is located in Denton County. The entity currently gets its water supply from UTRWD through Mustang SUD. The water management strategies include conservation and additional supplies from UTRWD. **Table 5E.120** shows the projected population and demand, the current supplies, and the water management strategies for Paloma Creek North.

TABLE 5E.120 SUMMARY OF WATER USER GROUP – PALOMA CREEK NORTH

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,853**	**5,853**	**5,853**	**5,853**	**5,853**	**5,853**
Projected Water Demand						
Municipal Demand	1,198	1,194	1,194	1,194	1,194	1,194
Total Projected Water Demand	***1,198***	***1,194***	***1,194***	***1,194***	***1,194***	***1,194***
Currently Available Water Supplies						
UTRWD (through Mustang SUD)	1,195	857	651	587	527	482
Total Current Supplies	***1,195***	***857***	***651***	***587***	***527***	***482***
Need (Demand - Current Supply)	***3***	***337***	***543***	***607***	***667***	***712***
Water Management Strategies						
Water Conservation	55	67	71	75	79	83
Additional Supplies from UTRWD through Mustang SUD	0	270	472	532	588	629
Total Water Management Strategies	***55***	***337***	***543***	***607***	***667***	***712***
Paloma Creek North Reserve (Shortage)	***52***	***0***	***0***	***0***	***0***	***0***

Paloma Creek South

Paloma Creek South is located in Denton County. The entity currently gets its water supply from UTRWD through Mustang SUD. The water management strategies include conservation and additional supplies from UTRWD. **Table 5E.121** shows the projected population and demand, the current supplies, and the water management strategies for Paloma Creek South.

TABLE 5E.121 SUMMARY OF WATER USER GROUP - PALOMA CREEK SOUTH

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**9,088**	**9,088**	**9,088**	**9,088**	**9,088**	**9,088**
Projected Water Demand						
Municipal Demand	1,841	1,835	1,835	1,835	1,835	1,835
Total Projected Water Demand	***1,841***	***1,835***	***1,835***	***1,835***	***1,835***	***1,835***
Currently Available Water Supplies						
UTRWD (through Mustang SUD)	1,837	1,318	1,000	903	809	741
Total Current Supplies	***1,837***	***1,318***	***1,000***	***903***	***809***	***741***
Need (Demand - Current Supply)	***4***	***517***	***835***	***932***	***1,026***	***1,094***
Water Management Strategies						
Water Conservation	110	231	288	294	301	307
Additional Supplies from UTRWD through Mustang SUD	0	286	547	638	725	787
Total Water Management Strategies	***110***	***517***	***835***	***932***	***1,026***	***1,094***
Paloma Creek South Reserve (Shortage)	***106***	***0***	***0***	***0***	***0***	***0***

Pilot Point

Pilot Point is located in northern Denton County. The city receives its water supply from groundwater (Trinity aquifer) and UTRWD. Water management strategies for Pilot Point include conservation, new well(s) in the Trinity aquifer, and additional water from UTRWD. Pilot Point is currently developing their Master Plan and are considering future water reclamation. **Table 5E.122** shows the projected population and demand, the current supplies, and the water management strategies for Pilot Point.

TABLE 5E.122 SUMMARY OF WATER USER GROUP – CITY OF PILOT POINT

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,354**	**8,200**	**14,137**	**20,282**	**21,892**	**21,892**
Projected Water Demand						
Municipal Demand	844	1,085	1,871	2,684	2,897	2,897
Total Projected Demand	***844***	***1,085***	***1,871***	***2,684***	***2,897***	***2,897***
Currently Available Water Supplies						
Trinity Aquifer	571	571	571	571	571	571
Upper Trinity Regional WD	82	306	598	905	941	920
Total Current Supplies	***653***	***877***	***1,169***	***1,476***	***1,512***	***1,491***
Need (Demand - Current Supply)	***191***	***208***	***702***	***1,208***	***1,385***	***1,406***
Water Management Strategies						
Water Conservation	20	35	68	217	262	249
New Well(s) in Trinity Aquifer	200	200	200	200	200	200
Additional Supplies from UTRWD	0	114	484	822	1,035	1,199
Total Water Management Strategies	***220***	***349***	***752***	***1,239***	***1,497***	***1,648***
Pilot Point Reserve (Shortage)	***29***	***141***	***50***	***31***	***112***	***242***

Plano

Plano is located in southwest Collin County and southeast Denton County. The water supply plans for Plano are discussed under Collin County in **Section 5E.1**.

Ponder

Ponder is located in western Denton County. The city receives its water supply from groundwater (Trinity aquifer) and UTRWD. Water management strategies for Ponder include conservation, purchasing water from Denton, and additional supplies from UTRWD. **Table 5E.123** shows the projected population and demand, the current supplies, and the water management strategies for Ponder.

TABLE 5E.123 SUMMARY OF WATER USER GROUP – CITY OF PONDER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,798**	**6,403**	**8,093**	**9,811**	**11,703**	**13,786**
Projected Water Demand						
Municipal Demand	692	921	1,164	1,411	1,683	1,982
Total Projected Demand	***692***	***921***	***1,164***	***1,411***	***1,683***	***1,982***
Currently Available Water Supplies						
Trinity Aquifer	385	385	385	385	385	385
Upper Trinity Regional WD	169	259	372	442	510	590
Total Current Supplies	***554***	***644***	***757***	***827***	***895***	***975***
Need (Demand - Current Supply)	***138***	***277***	***407***	***584***	***788***	***1,007***
Water Management Strategies						
Water Conservation	19	35	49	64	84	109
Connect to and Purchase Water from Denton	346	461	582	706	842	991
Additional Supplies from UTRWD	0	95	297	433	609	815
Total Water Management Strategies	***365***	***591***	***928***	***1,203***	***1,535***	***1,915***
Ponder Reserve (Shortage)	***227***	***314***	***521***	***619***	***747***	***908***

Prosper

The City of Prosper is located in western Collin County and eastern Denton County. Water management strategies for Prosper are described under Collin County in **Section 5E.1**.

Providence Village Water Control and Improvement District (WCID)

Providence Village WCID is located in central/eastern Denton County and receives treated water supplies from UTRWD. Water management strategies for Providence Village WCID include conservation and additional supplies from UTRWD. **Table 5E.124** shows the projected population and demand, the current supplies, and the water management strategies for Providence Village WCID.

TABLE 5E.124 SUMMARY OF WATER USER GROUP – PROVIDENCE VILLAGE WCID

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**7,235**	**7,235**	**7,235**	**7,235**	**7,235**	**7,235**
Projected Water Demand						
Municipal Demand	909	904	904	904	904	904
Total Projected Demand	***909***	***904***	***904***	***904***	***904***	***904***
Currently Available Water Supplies						
Upper Trinity Regional WD	907	649	493	445	399	365
Total Current Supplies	***907***	***649***	***493***	***445***	***399***	***365***
Need (Demand - Current Supply)	***2***	***255***	***411***	***459***	***505***	***539***
Water Management Strategies						
Water Conservation	30	38	41	44	47	50
Additional Supplies from UTRWD	0	217	370	415	458	489
Total Water Management Strategies	***30***	***255***	***411***	***459***	***505***	***539***
Providence Village WCID Reserve (Shortage)	***28***	***0***	***0***	***0***	***0***	***0***

Roanoke

Roanoke is located in southwestern Denton County. The city receives treated water supplies from Fort Worth (TRWD). Water management strategies for Roanoke include conservation and additional water from Fort Worth. **Table 5E.125** shows the projected population and demand, the current supplies, and the water management strategies for Roanoke.

TABLE 5E.125 SUMMARY OF WATER USER GROUP – CITY OF ROANOKE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**13,999**	**13,658**	**13,952**	**14,185**	**14,524**	**14,524**
Projected Water Demand						
Municipal Demand	3,915	3,810	3,892	3,957	4,052	4,052
Total Projected Demand	***3,915***	***3,810***	***3,892***	***3,957***	***4,052***	***4,052***
Currently Available Water Supplies						
Fort Worth	3,377	2,895	2,746	2,545	2,414	2,267
Total Current Supplies	***3,377***	***2,895***	***2,746***	***2,545***	***2,414***	***2,267***
Need (Demand - Current Supply)	***538***	***915***	***1,146***	***1,412***	***1,638***	***1,785***
Water Management Strategies						
Water Conservation	100	119	134	150	167	180
Additional Supplies from TRWD through Fort Worth	438	796	1,012	1,262	1,471	1,605
Total Water Management Strategies	***538***	***915***	***1,146***	***1,412***	***1,638***	***1,785***
Roanoke Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Sanger

Sanger is located in northern Denton County. The city gets its water supply from groundwater (Trinity aquifer), Denton, and UTRWD. UTRWD is currently purchasing wholesale treated water from Denton, and Denton is delivering the treated water to Sanger on UTRWD's behalf. This is an interim service by Denton to Sanger until UTRWD has a direct connection. Water management strategies for Sanger include conservation and additional water from UTRWD. **Table 5E.126** shows the projected population and demand, the current supplies, and the water management strategies for Sanger.

TABLE 5E.126 SUMMARY OF WATER USER GROUP – CITY OF SANGER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**11,153**	**14,002**	**17,000**	**22,119**	**27,933**	**35,269**
Projected Water Demand						
Municipal Demand	1,505	1,882	2,285	2,972	3,754	4,740
Total Projected Demand	***1,505***	***1,882***	***2,285***	***2,972***	***3,754***	***4,740***
Currently Available Water Supplies						
Denton	680	0	0	0	0	0
Trinity Aquifer	825	825	825	825	825	825
Upper Trinity Regional WD	0	759	796	1,056	1,292	1,580
Total Current Supplies	***1,505***	***1,584***	***1,621***	***1,881***	***2,117***	***2,405***
Need (Demand - Current Supply)	***0***	***298***	***664***	***1,091***	***1,637***	***2,335***
Water Management Strategies						
Water Conservation	83	121	155	229	329	431
Additional Supplies from UTRWD	0	230	565	926	1,380	1,979
Total Water Management Strategies	***83***	***351***	***720***	***1,155***	***1,709***	***2,410***
Sanger Reserve (Shortage)	***83***	***53***	***56***	***64***	***72***	***75***

Southlake

Southlake is located in northwestern Tarrant County, with some area in southern Denton County. Water management strategies for Southlake are described under Tarrant County in **Section 5E.15.**

Terra Southwest

Terra Southwest is located in the center of Denton County. Terra Southwest gets its water supply from groundwater (Trinity and Woodbine aquifers) and Little Elm (NTMWD). Water management strategies for Terra Southwest include conservation and new groundwater wells in the Trinity aquifer. **Table 127-** shows the projected population and demand, the current supplies, and the water management strategies for Sanger.

TABLE 127 SUMMARY OF WATER USER GROUP – TERRA SOUTHWEST

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,143**	**3,996**	**4,895**	**5,808**	**6,814**	**7,922**
Projected Water Demand						
Municipal Demand	235	297	364	432	507	589
Total Projected Demand	***235***	***297***	***364***	***432***	***507***	***589***
Currently Available Water Supplies						
Trinity Aquifer	100	100	100	100	100	100
Woodbine Aquifer	100	100	100	100	100	100
Little Elm	32	76	109	137	169	202
Total Current Supplies	***232***	***276***	***309***	***337***	***369***	***402***
Need (Demand - Current Supply)	***3***	***21***	***55***	***95***	***138***	***187***
Water Management Strategies						
Water Conservation	7	11	16	21	25	32
New Well(s) in Trinity Aquifer	50	50	50	100	150	200
Total Water Management Strategies	***57***	***61***	***66***	***121***	***175***	***232***
Terra Southwest Reserve (Shortage)	***54***	***40***	***11***	***26***	***37***	***45***

The Colony

The Colony is located in southeastern Denton County. The city receives its water supply from groundwater (Trinity aquifer), DWU, and Plano (NTWMD). Water management strategies for The Colony include conservation, additional water from DWU, and additional water from Plano. **Table 5E.128** shows the projected population and demand, the current supplies, and the water management strategies for The Colony.

TABLE 5E.128 SUMMARY OF WATER USER GROUP – CITY OF THE COLONY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**51,496**	**60,502**	**67,600**	**67,600**	**67,600**	**67,600**
Projected Water Demand						
Municipal Demand	7,638	8,939	9,988	9,988	9,988	9,988
Total Projected Demand	***7,638***	***8,939***	***9,988***	***9,988***	***9,988***	***9,988***
Currently Available Water Supplies						
Trinity Aquifer	1,015	1,015	1,015	1,015	1,015	1,015
Dallas	5,001	5,208	5,652	5,429	5,213	5,043
Plano	1,096	1,559	1,467	1,303	1,206	1,144
Total Current Supplies	***7,112***	***7,782***	***8,134***	***7,747***	***7,434***	***7,202***
Need (Demand - Current Supply)	***526***	***1,157***	***1,854***	***2,241***	***2,554***	***2,786***
Water Management Strategies						
Water Conservation	328	548	663	636	639	658
Additional Supplies from DWU	189	353	671	913	1,127	1,284
Additional Water from Plano	52	318	587	757	853	911
Total Water Management Strategies	***569***	***1,219***	***1,921***	***2,306***	***2,619***	***2,853***
The Colony Reserve (Shortage)	***43***	***62***	***67***	***65***	***65***	***67***

Trophy Club Municipal Utility District #1

Trophy Club MUD #1 provides retail service to the city of Trophy Club in southern Denton County. The MUD currently receives its water supply from groundwater (Trinity aquifer), Fort Worth (TRWD), and direct reuse. Water management strategies for Trophy Club include conservation and additional water from Fort Worth. **Table 5E.129** shows the projected population and demand, the current supplies, and the water management strategies for Trophy Club.

TABLE 5E.129 SUMMARY OF WATER USER GROUP – TROPHY CLUB MUD #1

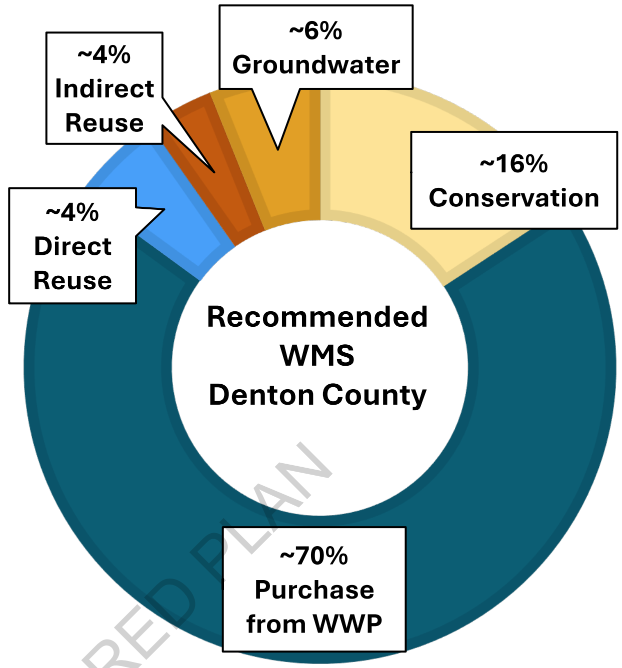
(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**14,247**	**14,534**	**14,773**	**14,969**	**15,185**	**15,421**
Projected Water Demand						
Municipal Demand	5,382	5,482	5,572	5,646	5,727	5,816
Irrigation, Denton	800	800	800	800	800	800
Total Projected Demand	***6,182***	***6,282***	***6,372***	***6,446***	***6,527***	***6,616***
Currently Available Water Supplies						
Trinity Aquifer	555	555	555	555	555	555
Fort Worth	4,643	4,165	3,932	3,632	3,414	3,253
Direct Reuse for Irrigation	800	800	800	800	800	800
Total Current Supplies	***5,998***	***5,520***	***5,287***	***4,987***	***4,769***	***4,608***
Need (Demand - Current Supply)	***184***	***762***	***1,085***	***1,459***	***1,758***	***2,008***
Water Management Strategies						
Water Conservation	302	515	634	660	690	720
Additional Supplies from Fort Worth	437	802	1,006	1,354	1,623	1,843
Total Water Management Strategies	***739***	***1,317***	***1,640***	***2,014***	***2,313***	***2,563***
Trophy Club Reserve (Shortage)	***555***	***555***	***555***	***555***	***555***	***555***

Westlake

Westlake is located in northern Tarrant County and southern Denton County. Since most of the population is in Tarrant County, its water supply plans are discussed under Tarrant County in **Section 5E.15.**

5E.4.2 Summary of Costs for Denton County

Table 5E.130 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Denton County. Total quantities from **Table 5E.130** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Denton County are projected to come through purchases from wholesale water providers. Other strategies include conservation, groundwater, indirect reuse, and direct reuse.

Table 5E.131 summarizes the recommended water management strategies within Denton County individually. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.130 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR DENTON COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	35,630	$3,181,187
Purchase from WWP	156,409	$279,072,000
Additional Infrastructure	*47,355*	*$635,881,000*
Direct Reuse	11,911	$237,597,000
Indirect Reuse	8,286	$86,482,000
Groundwater	13,650	$79,175,000
Total	***225,886***	***$1,321,388,187***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.131 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR DENTON COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Denton	Conservation (retail)	2030	9,348	$150,000	$1.56	$0.41
	Conservation (wholesale)	N/A	Included with WUGs.			
	Additional Indirect Reuse with Storage	2030	8,286	$86,482,000	$2.08	$0.44
	Direct Potable Reuse	2040	5,605	$197,321,000	$11.83	$5.96
	Aquifer Storage and Recovery	2040	2,500	$11,232,000	$1.32	$0.57
	Purchase Water from DWU	2030	32,930	$248,303,000	$1.87	$0.61
	30 MGD WTP Plant Expansion	*2040*	*16,815*	*$218,234,000*	*$4.10*	*$1.94*
	20 MGD WTP Plant Expansion	*2060*	*11,210*	*$160,826,000*	*$4.53*	*$2.14*
	23 MGD WTP Plant Expansion	*2070*	*12,362*	*$178,047,000*	*$4.36*	*$2.06*
Mustang SUD	Conservation (retail)	2030	5,499	$167,119	$1.05	$0.48
	Conservation (wholesale)	2030	Included with WUGs.			
	New Well(s) in Trinity Aquifer	2030	100	$3,924,000	$9.82	$1.35
	Direct Potable Reuse	2030	2803	$42,067,000	$4.09	$1.58
	New GTUA Regional Water System	2040	6,800	$0	$12.45	$6.65
	Additional Supplies from Sherman	2030	122	$0	$4.00	$4.00
	Additional UTRWD Supplies	2040	22,761	$0	$4.00	$4.00
	Connect to and Purchase Water from Denton	*2030*	*5,605*	*$30,769,000*	*$1.13*	*$0.21*
WUGs						
Argyle WSC	Conservation	2030	836	$158,560	$2.21	$0.66

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	UTRWD	2030	3,151	$0	$4.00	$4.00
Aubrey	Conservation	2030	421	$150,000	$4.47	$1.36
	Connect to UTRWD	2030	1,916	$0	$4.00	$4.00
	New Well(s) in Trinity Aquifer	2030	500	$7,142,000	$3.91	$0.82
Black Rock WSC	Conservation	2030	42	$0	$14.90	$1.18
	New Well(s) in Trinity Aquifer	2040	450	$4,943,000	$2.87	$0.50
Bolivar WSC[a]	Conservation	2030	549	$158,560	$3.84	$1.35
	New Well(s) in Trinity Aquifer	2030	250	$4,601,000	$4.79	$0.81
	Connect to UTRWD	2030	1,931	$0	$4.00	$4.00
	Connect to Gainesville	2030	175	$0	$4.00	$4.00
Carrollton[a]	Conservation	2030	2122	$150,000	$0.50	$0.29
	DWU	2030	6,107	$0	$4.00	$4.00
Celina[a]	Conservation	See Collin County.				
	Other WMSs					
Coppell[a]	Conservation	See Dallas County.				
	DWU					
Corinth	Conservation	2030	688	$159,989	$2.01	$0.62
	UTRWD	2030	3,501	$0	$4.00	$4.00
Cross Timbers WSC	Conservation	2030	596	$158,560	$2.40	$1.40
	New Well(s) in Trinity Aquifer	2030	350	$5,339,000	$3.98	$0.68
	UTRWD	2040	2,117	$0	$4.00	$4.00
	Additional Delivery Infrastructure	*2040*	*2,117*	*$10,363,000*	*$0.92*	*$0.11*
Dallas[a]	Conservation	See DWU in **Chapter 5D**.				
	Other WMSs					
Denton County FWSD 1-A	Conservation	2030	459	$150,000	$1.62	$0.65
	UTRWD	2040	3,064	$0	$4.00	$4.00
Denton County FWSD 10	Conservation	2030	64	$8,560	$2.25	$1.36
	UTRWD through Mustang	2040	450	$0	$4.00	$4.00
	UTRWD	2040	175	$0	$4.00	$4.00
Denton County FWSD 11-C	Conservation	2030	141	$158,560	$6.33	$3.42
	UTRWD	2040	763	$0	$4.00	$4.00
Denton County FWSD 7	Conservation	2030	206	$8,560	$2.07	$0.93
	UTRWD	2040	1,802	$0	$4.00	$4.00

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
Flower Mound	Conservation	2030	2776	$150,000	$0.42	$0.18
	DWU	2030	1,738	$0	$4.00	$4.00
	UTRWD	2030	14,373	$0	$4.00	$4.00
	Long Prairie Direct Reuse	2030	4,066	$40,276,000	$1.94	$0.29
Fort Worth[a]	Conservation	See Fort Worth in **Chapter 5D**.				
	Other WMSs					
Frisco[a]	Conservation	See Collin County.				
	Direct reuse					
	NTMWD					
	Infrastructure Improvements					
Hackberry	Conservation	2030	282	$8,560	$2.23	$1.04
	NTMWD	2030	1,999	$0	$4.00	$4.00
	Additional Delivery Infrastructure	*2030*	*1,999*	*$8,442,000*	*$0.87*	*$0.17*
Highland Village	Conservation	2030	195	$0	$4.36	$1.14
	UTRWD	2040	1,703	$0	$4.00	$4.00
Justin	Conservation	2030	881	$158,560	$3.63	$1.32
	UTRWD	2040	2,967	$0	$4.00	$4.00
Krum	Conservation	2030	1513	$158,560	$2.39	$1.28
	UTRWD	2040	2,166	$0	$4.00	$4.00
Lake Cities MUA	Conservation	2030	274	$158,560	$2.86	$1.14
	UTRWD	2040	1,576	$0	$4.00	$4.00
Lewisville[a]	Conservation	2030	3,625	$150,000	$1.02	$1.06
	DWU	2030	1,861	$0	$4.00	$4.00
	3 MGD WTP Expansion	*2030*	*1,861*	*$46,846,000*	*$8.23*	*$4.03*
Little Elm	Conservation	2030	516	$150,000	$3.70	$0.79
	NTMWD	2030	2,541	$0	$4.00	$4.00
Mountain Springs WSC[a]	Conservation	See Cooke County.				
	Connect to Gainesville					
Northlake	Conservation	2030	884	$150,000	$0.58	$0.27
	TRWD through Fort Worth	2030	1,257	$0	$1.50	$1.50
	UTRWD	2030	3,610	$0	$4.00	$4.00
	Conservation	2030	83	$8,560	$1.36	$0.96

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
Paloma Creek North CRU	UTRWD through Mustang SUD	2030	629	$0	$4.00	$4.00
Paloma Creek South CRU	Conservation	2030	307	$8,560	$1.73	$1.24
	UTRWD through Mustang SUD	2030	787	$0	$4.00	$4.00
Pilot Point	Conservation	2030	262	$150,000	$3.22	$2.05
	New Well(s) in Trinity Aquifer	2030	200	$5,859,000	$7.39	$1.07
	Connect to UTRWD	2040	1,199	$0	$4.00	$4.00
Plano[a]	Conservation	See Collin County.				
	NTMWD					
Ponder	Conservation	2030	109	$8,560	$3.61	$1.87
	Denton	2030	991	$0	$4.00	$4.00
	Connect to Denton	*2030*	*991*	*$13,123,000*	*$2.81*	*$0.60*
	UTRWD	2040	815	$0	$4.00	$4.00
Prosper[a]	Conservation	See Collin County.				
	NTMWD					
Providence Village WCID	Conservation	2030	50	$8,560	$3.04	$2.00
	UTRWD	2040	489	$0	$4.00	$4.00
Roanoke	Conservation	2030	180	$8,560	$1.96	$0.57
	TRWD through Fort Worth	2030	1,605	$0	$1.50	$1.50
Sanger	Conservation	2030	431	$150,000	$3.66	$1.80
	UTRWD	2040	1,979	$0	$4.00	$4.00
Southlake[a]	Conservation	See Tarrant County.				
	TRWD through Fort Worth					
	Additional Delivery Infrastructure					
Terra Southwest	Conservation	2030	32	$8,560	$5.16	$3.41
	New Well(s) in Trinity Aquifer	2030	200	$4,057,000	$5.28	$0.91
The Colony	Conservation	2030	663	$150,000	$0.81	$0.44
	DWU	2030	1,284	$0	$4.00	$4.00
	NTMWD through Plano	2030	911	$0	$4.00	$4.00
Trophy Club MUD 1	Conservation	2030	720	$0	$2.02	$1.14
	Fort Worth	2030	1,843	$0	$4.00	$4.00
Westlake[a]	Conservation	See Tarrant County				
	TRWD through Fort Worth					

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL) WITH DEBT SERVICE	UNIT COST ($/1000 GAL) AFTER DEBT SERVICE
County Other and Non-Municipal						
County Other, Denton	Conservation	2030	663	$17,119	$6.57	$1.42
	Flower Mound	2040	20	$0	$4.00	$4.00
	Denton	2030	1,707	$0	$4.00	$4.00
	UTRWD	2030	12,461	$0	$4.00	$4.00
	New Well(s) in Woodbine Aquifer	2040	1,500	$10,054,000	$2.07	$0.63
	New Well(s) in Trinity Aquifer	2040	7,700	$25,948,000	$1.12	$0.40
Irrigation, Denton	Conservation	2030	213	$0	$0.94	$0.94
	DWU	2030	184	$0	$4.00	$4.00
	Direct Reuse from UTRWD	2030	2,240	See UTRWD in **Chapter 5D**.		
Livestock, Denton	None	None				
Manufacturing, Denton	Denton	2050	283	$0	$4.00	$4.00
	DWU	2030	20	$0	$4.00	$4.00
	NTMWD	2030	17	$0	$4.00	$4.00
	UTRWD	2040	21	$0	$4.00	$4.00
	Northlake	2030	3	$0	$4.00	$4.00
Mining, Denton	None	None				
Steam Electric Power, Denton	None	None				

[a]*Water User Groups extend into more than one county*

[b]*Quantities listed are for the WUG only. They do not include the WUG's customers.*

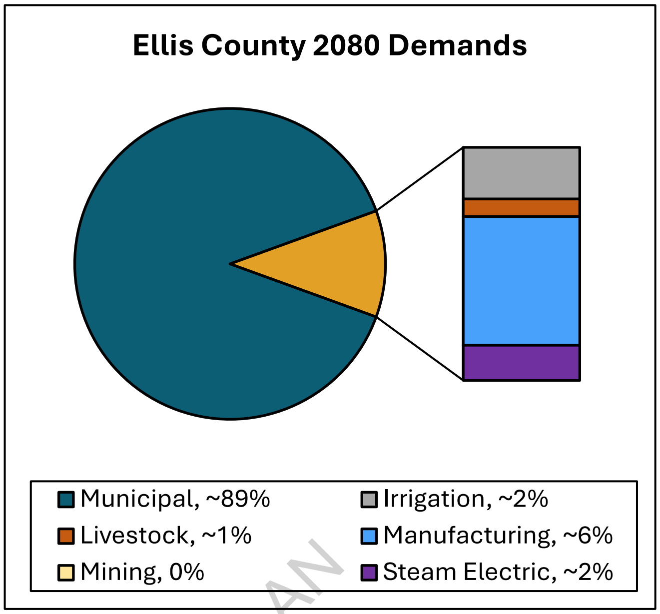
[c]*Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.*

5E.5 Ellis County

Ellis County is located in the south central portion of Region C. **Figure 5E.10** shows water service areas in Ellis County**.**

Ellis County's population is projected to more than double between 2030 and 2080.

Demands for the County are predominately municipal. The second largest demands are manufacturing. The county has relatively minimal irrigation, livestock, and steam electric demands and no mining demands.



Historical groundwater use for Ellis County is higher than can be shown as available in the *2026 Region C Regional Water Plan* due to the MAG limitations. The limited availability of groundwater within the county as quantified by the modeled available groundwater causes unmet needs for Ellis County Irrigation and requires other water users to show less groundwater usage than planned for. Tarrant Regional Water District (TRWD) and Dallas Water Utility (DWU) are among the major water providers that provide surface water supplies to Ellis County.

An overall summary of the County's projections is shown in **Table 5E.132**, and water management strategies for individual WWPs and WUGs are discussed on the following pages.

TABLE 5E.132 SUMMARY OF ELLIS COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**241,747**	**290,486**	**346,554**	**397,716**	**455,844**	**513,797**
Projected Demands	**57,400**	**67,132**	**78,443**	**88,594**	**99,681**	**110,919**
Municipal	46,238	55,761	66,855	76,781	87,634	98,630
Irrigation	2,725	2,725	2,725	2,725	2,725	2,725
Livestock	923	923	923	923	923	923
Manufacturing	5,660	5,869	6,086	6,311	6,545	6,787
Mining	0	0	0	0	0	0
Steam Electric	1,854	1,854	1,854	1,854	1,854	1,854
Total Existing Supplies	***48,694***	***51,825***	***56,065***	***58,811***	***60,909***	***62,502***
Need (Demand - Supply)	***8,706***	***15,307***	***22,378***	***29,783***	***38,772***	***48,417***

Ellis County Quick Facts

2020 Population: 192,455

Projected 2080 Population: 513,797

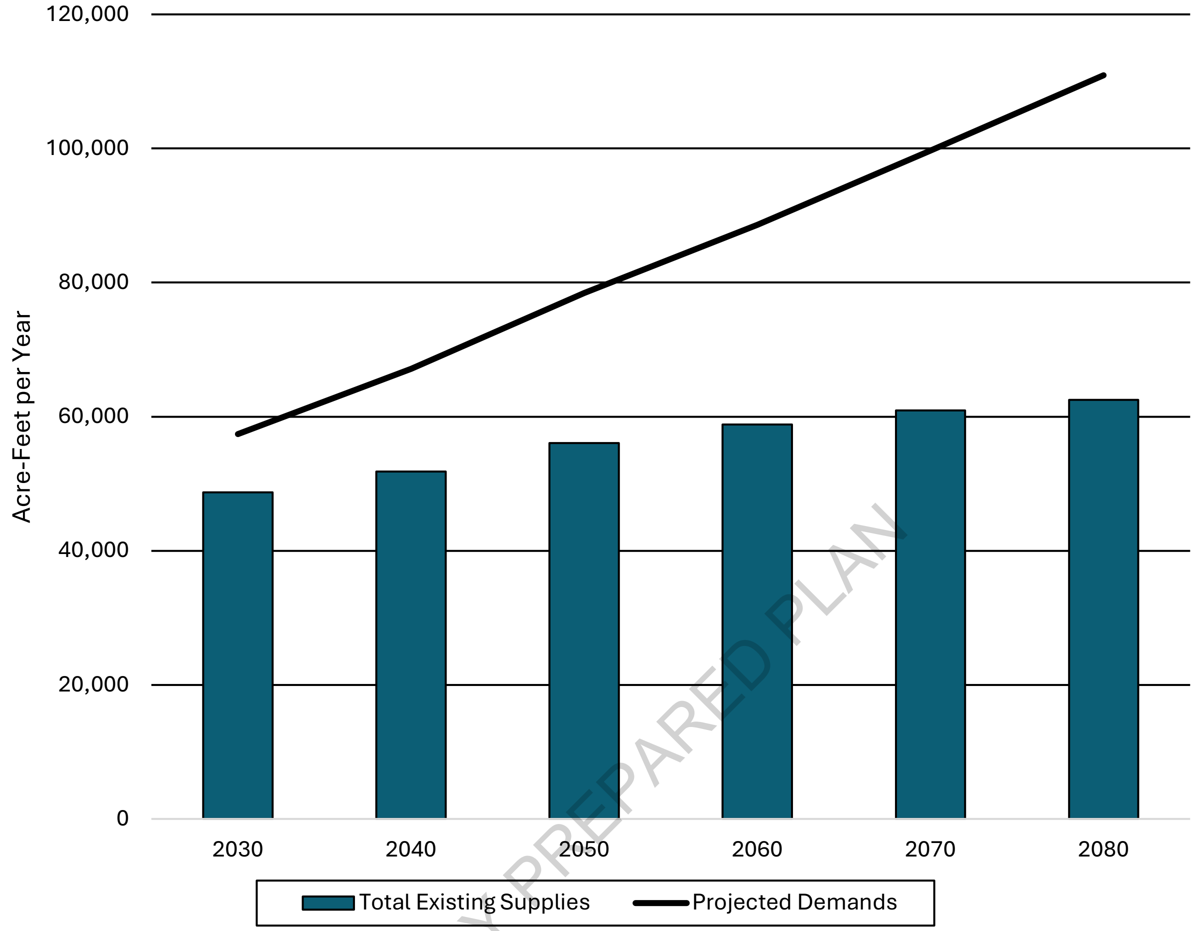
Projected 2080 Demand: 99 MGD

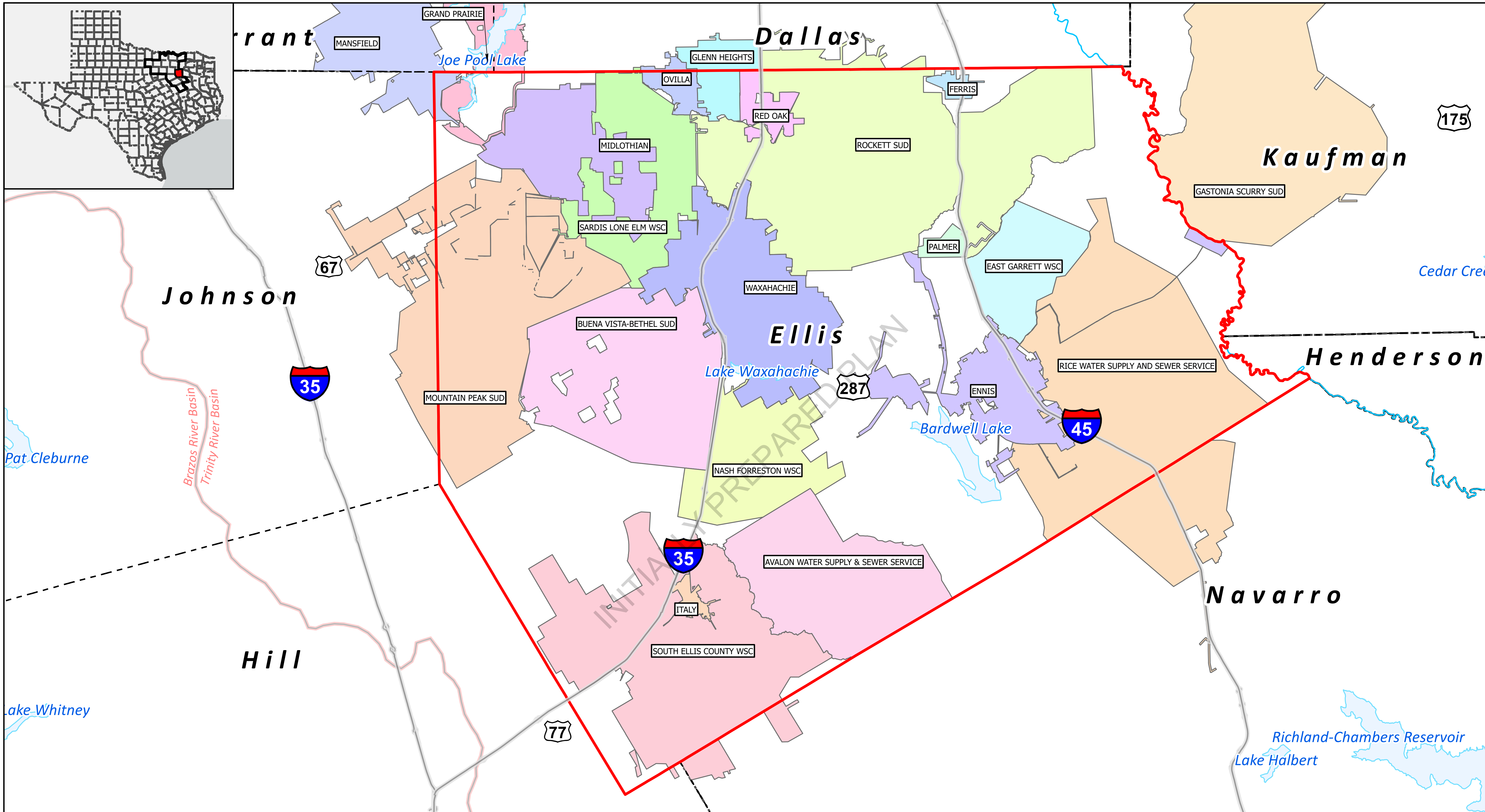
County Seat: Waxahachie

Economy: Cement, steel production; warehousing and distribution; government/services

River Basins: Trinity (100%)

FIGURE 5E.9 SUMMARY OF ELLIS COUNTY





Water Planning for North Texas

Ellis County, Texas
Figure 5E.10

N
0 4.5 9 Mi

Data Source(s): ESRI, TWDB, TxDOT

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.5.1 Wholesale Water Provider and Water User Groups

Water management strategies for Ellis County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs for recommended and alternative water management strategies are presented in **Section 5E.5.2. Appendix H** has more detailed cost estimates.

Avalon Water Supply and Sewer Service

Avalon Water Supply and Sewer Service is located in Ellis County. The Water Supply and Sewer Service gets its water supply from the Trinity aquifer. The water management strategies include conservation and TRWD supplies through TRA through Waxahachie. **Table 5E.133** shows the projected population and demand, the current supplies, and the water management strategies for Avalon Water Supply and Sewer Service.

TABLE 5E.133 SUMMARY OF WATER USER GROUP – AVALON WATER SUPPLY AND SEWER SERVICE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**992**	**1,109**	**1,236**	**1,360**	**1,498**	**1,650**
Projected Water Demand						
Municipal Demand	122	136	151	166	183	202
Total Projected Water Demand	***122***	***136***	***151***	***166***	***183***	***202***
Currently Available Water Supplies						
Trinity Aquifer	149	149	149	149	149	149
Total Current Supplies	***149***	***149***	***149***	***149***	***149***	***149***
Need (Demand - Current Supply)	***0***	***0***	***2***	***17***	***34***	***53***
Water Management Strategies						
Water Conservation	5	12	17	19	22	25
TRWD Supplies through TRA through Waxahachie	0	23	44	89	178	275
Total Water Management Strategies	***5***	***35***	***61***	***108***	***200***	***300***
Avalon Water Supply & Sewer Service Reserve (Shortage)	***32***	***48***	***59***	***91***	***166***	***247***

Brandon-Irene Water Supply Corporation

Brandon-Irene Water Supply Corporation is located in Ellis, Hill and Navarro Counties. The majority of the WSC's service area is in Hill County in the Brazos G region, so the water supply plans would be covered in more detail in the Brazos G Regional Water Plan. Plans for Region C are covered under Navarro County in **Section 5E.12.**

Buena Vista-Bethel Special Utility District

Buena Vista-Bethel SUD is located in central and western Ellis County. The SUD gets its water supply from groundwater (Trinity aquifer), water purchased from TRWD through Waxahachie, and treated water purchased directly from Waxahachie. Water management strategies for Buena Vista-Bethel SUD include conservation and new groundwater wells in the Trinity aquifer. **Table 5E.134** shows the projected population and demand, the current supplies, and the water management strategies for Buena Vista-Bethel SUD.

TABLE 5E.134 SUMMARY OF WATER USER GROUP – BUENA VISTA-BETHEL SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**7,152**	**8,701**	**10,384**	**12,081**	**13,948**	**16,004**
Projected Water Demand						
Municipal Demand	1,961	2,382	2,842	3,307	3,818	4,381
County-Other, Ellis	*150*	*150*	*150*	*150*	*150*	*150*
Total Projected Demand	***2,111***	***2,532***	***2,992***	***3,457***	***3,968***	***4,531***
Currently Available Water Supplies						
Trinity Aquifer	50	50	100	100	100	100
Waxahachie	1,567	1,905	2,195	2,460	2,723	2,991
County-Other, Ellis	*124*	*123*	*121*	*116*	*110*	*104*
Total Current Supplies	***1,741***	***2,078***	***2,416***	***2,676***	***2,933***	***3,195***
Need (Demand - Current Supply)	***370***	***454***	***576***	***781***	***1,035***	***1,336***
Water Management Strategies						
Water Conservation	133	415	648	769	902	1,049
New Well(s) in the Trinity Aquifer	500	500	500	500	500	500
County-Other, Ellis	26	27	29	34	40	46
Total Water Management Strategies	***659***	***942***	***1,177***	***1,303***	***1,442***	***1,595***
Buena Vista-Bethel SUD Reserve (Shortage)	***289***	***488***	***601***	***522***	***407***	***259***

Cedar Hill

The City of Cedar Hill is located in southwest Dallas County, with a small part in Ellis County. The city's water supply plans are discussed under Dallas County in **Section 5E.3**.

East Garrett Water Supply Corporation

East Garrett Water Supply Corporation is located in Ellis County. The WSC gets its water supply from Bardwell Lake and TRWD through Ennis. The water management strategies include conservation and additional supplies from Ennis. **Table 5E.135** shows the projected population and demand, the current supplies, and the water management strategies for East Garrett WSC.

TABLE 5E.135 SUMMARY OF WATER USER GROUP – EAST GARRETT WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,806**	**2,295**	**2,825**	**3,363**	**3,954**	**4,605**
Projected Water Demand						
Municipal Demand	291	369	454	540	635	740
Total Projected Water Demand	***291***	***369***	***454***	***540***	***635***	***740***
Currently Available Water Supplies						
Ennis	291	369	454	540	632	710
Total Current Supplies	***291***	***369***	***454***	***540***	***632***	***710***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***3***	***30***
Water Management Strategies						
Water Conservation	22	73	119	143	172	202
Additional Supplies from Ennis	0	0	0	0	1	12
Total Water Management Strategies	***22***	***73***	***119***	***143***	***173***	***214***
East Garrett WSC Reserve (Shortage)	***22***	***73***	***119***	***143***	***170***	***184***

Ellis County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. The water supplies for Ellis County Irrigation are surface water (Trinity Run-of-River) and groundwater (Trinity and Woodbine aquifers). Historical groundwater use for Ellis County Irrigation is higher than can be shown as available in the *Region C Regional Water Plan* due to the MAG limitations. The limited availability of groundwater within the county as quantified by the modeled available groundwater causes unmet needs for this WUG. **Table 5E.136** shows the projected demand, the current supplies, and the water management strategies for Ellis County Irrigation.

TABLE 5E.136 SUMMARY OF WATER USER GROUP – ELLIS COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***2,725***	***2,725***	***2,725***	***2,725***	***2,725***	***2,725***
Currently Available Water Supplies						
Trinity Run-of-River	1	1	1	1	1	1
Trinity Aquifer	1,500	1,500	1,500	1,500	1,500	1,500
Woodbine Aquifer	670	670	670	670	670	670
Total Current Supplies	***2,171***	***2,171***	***2,171***	***2,171***	***2,171***	***2,171***
Need (Demand - Current Supply)	***554***	***554***	***554***	***554***	***554***	***554***
Water Management Strategies						
Water Conservation	1	17	33	42	50	58
Total Water Management Strategies	***1***	***17***	***33***	***42***	***50***	***58***
Irrigation, Ellis Reserve (Shortage)	***(553)***	***(537)***	***(521)***	***(512)***	***(504)***	***(496)***

Ellis County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. The water supplies for Ellis County Livestock are local surface water supplies and groundwater (Woodbine aquifer). This supply is sufficient to meet demand, and there are no water management strategies. **Table 5E.137** shows the projected demand, current supplies, and water management strategies for Ellis County Livestock.

TABLE 5E.137 SUMMARY OF WATER USER GROUP – ELLIS COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***923***	***923***	***923***	***923***	***923***	***923***
Currently Available Water Supplies						
Trinity Livestock Local Supply	931	931	931	931	931	931
Woodbine Aquifer	30	30	30	30	30	30
Total Current Supplies	***961***	***961***	***961***	***961***	***961***	***961***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Ellis Reserve (Shortage)	***38***	***38***	***38***	***38***	***38***	***38***

Ellis County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. The water supplies for Ellis County Manufacturing includes groundwater (Trinity and Woodbine aquifers) and water purchased from Ennis, Midlothian, and Waxahachie. Water management strategies for Ellis County Manufacturing include additional water from Midlothian, Ennis, and Waxahachie. **Table 5E.138** shows the projected demand, the current supplies, and the water management strategies for Ellis County Manufacturing. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG. Region C shows unmet needs for Ellis County Manufacturing due to limited MAG. Current suppliers have not committed to increasing existing contracts and future contracts would be negotiated between the buyer and seller.

TABLE 5E.138 SUMMARY OF WATER USER GROUP – ELLIS COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***5,660***	***5,869***	***6,086***	***6,311***	***6,545***	***6,787***
Currently Available Water Supplies						
Trinity Aquifer	600	800	800	800	800	800
Woodbine Aquifer	270	270	270	270	270	270
Midlothian	566	587	609	631	655	679
Ennis	1,132	1,174	1,217	1,262	1,303	1,303
Waxahachie	1,840	1,833	1,794	1,721	1,641	1,567
Total Current Supplies	***4,408***	***4,664***	***4,690***	***4,684***	***4,669***	***4,619***
Need (Demand - Current Supply)	***1,252***	***1,205***	***1,396***	***1,627***	***1,876***	***2,168***
Water Management Strategies						
Additional Supplies from Midlothian	0	0	0	0	0	0
Additional Supplies from Ennis	0	0	0	0	6	54
Additional Supplies from Waxahachie	402	409	448	521	601	675
Total Water Management Strategies	**402**	**409**	**448**	**521**	**607**	**729**
Manufacturing, Ellis Reserve (Shortage)	**(850)**	**(796)**	**(948)**	**(1,106)**	**(1,269)**	**(1,439)**

Ellis County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. There is currently no mining demand in Ellis County.

Ellis County Other

Ellis County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups. The water supplies for Ellis County Other are groundwater (Trinity aquifer) and water purchased from Buena Vista Bethel SUD, Ennis, Rockett SUD, Files Valley WSC, and Grand Prairie. Water management strategies for Ellis County Other include conservation and purchasing additional water from Rockett SUD, Buena Vista Bethel SUD, Ennis, and Grand Prairie. **Table 5E.139** shows the projected population and demand, the current supplies, and the water management strategies for Ellis County Other.

TABLE 5E.139 SUMMARY OF WATER USER GROUP – ELLIS COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,500**	**6,960**	**7,420**	**7,880**	**8,340**	**8,800**
Projected Water Demand						
Municipal Demand	772	823	877	931	986	1,040
Total Projected Water Demand	***772***	***823***	***877***	***931***	***986***	***1,040***
Currently Available Water Supplies						
Trinity Aquifer	530	530	530	530	530	530
Buena Vista-Bethel SUD	124	123	121	116	110	104
Ennis	100	100	100	100	100	96
Files Valley WSC	84	84	84	84	84	84
Grand Prairie	92	88	83	80	77	74
Rockett SUD	187	168	157	144	134	125
Total Current Supplies	***1,117***	***1,093***	***1,075***	***1,054***	***1,035***	***1,013***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***27***
Water Management Strategies						
Water Conservation	7	9	13	18	22	27
Additional Supplies from Buena Vista-Bethel SUD	26	27	29	34	40	46
Additional Supplies from Ennis	0	0	0	0	0	4
Additional Supplies from Grand Prairie	7	11	16	18	21	23
Additional Supplies from Rockett SUD	26	46	56	68	77	84
Total Water Management Strategies	***66***	***93***	***114***	***138***	***160***	***184***
County-Other, Ellis Reserve (Shortage)	***411***	***363***	***312***	***261***	***209***	***157***

Ellis County Steam Electric Power

Steam electric power demands generally represent the cooling water needs during power generation. These demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. The water supplies for Ellis County Steam Electric Power are purchased from Ennis (direct reuse) and Midlothian. The current sources are sufficient to meet future demands, and there are no water management strategies. Conservation was considered as a strategy for this water user group but not recommended because the steam electric demand projections themselves considered items such as future efficiency programs. **Table 5E.140** shows the projected demand, the current supplies, and the water management strategies for Ellis County Steam Electric Power.

TABLE 5E.140 SUMMARY OF WATER USER GROUP – ELLIS COUNTY SEP

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,854***	***1,854***	***1,854***	***1,854***	***1,854***	***1,854***
Currently Available Water Supplies						
Direct Reuse through Ennis	1,574	1,574	1,574	1,574	1,574	1,574
Midlothian	280	280	280	280	280	280
Total Current Supplies	***1,854***	***1,854***	***1,854***	***1,854***	***1,854***	***1,854***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Steam-Electric Power, Ellis Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Ennis

Ennis is located in southeastern Ellis County. Ennis is a wholesale water provider (WWP) that provides treated water to all or portions of East Garrett WSC, Ellis County Other, Rice Water Supply and Sewer Service, and manufacturing in Ellis County. Ennis also sells reclaimed water in Ellis County for steam electric power purposes. Ennis is expected to continue providing water supplies to these customers throughout the planning period.

Current water supplies for the City of Ennis are Bardwell Lake (Trinity River Authority), water purchased from Tarrant Regional Water District, and reuse. Ennis' contract amount from Bardwell Lake is 5,200 acre-feet per year. A few customers within the City of Ennis are provided retail water service by Rockett Special Utility District. The City of Ennis WTP has a current peak capacity of 12 MGD. Using a peaking factor of 2, Ennis can treat up to 6,700 acre-feet per year for municipal supplies.

The recommended water management strategies for Ennis include implementing water conservation measures, purchasing additional TRWD raw water through TRA, and expanding treatment capacity. **Table 5E.141** shows the projected demand, the current supplies, and the water management strategies for Ennis.

TABLE 5E.141 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – CITY OF ENNIS

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Ennis	3,721	3,892	4,092	4,272	4,476	4,704
County-Other, Ellis	100	100	100	100	100	100
East Garrett WSC	291	369	454	540	635	740
Manufacturing, Ellis	1,132	1,174	1,217	1,262	1,309	1,357
Rice Water Supply and Sewer Service	50	50	50	50	50	50
Steam Electric Power, Ellis	1,574	1,574	1,574	1,574	1,574	1,574
Total Demand	***6,868***	***7,159***	***7,487***	***7,798***	***8,144***	***8,525***
Currently Available Supplies						
Bardwell Lake (TRA)[a]	5,175	4,955	4,735	4,558	4,380	4,202
Indirect Reuse	890	2,122	2,122	2,122	2,122	2,122
Direct Reuse	1,574	1,574	1,574	1,574	1,574	1,574
Tarrant Regional WD[b]	0	0	0	0	41	351
Total Current Supplies	***7,639***	***8,651***	***8,431***	***8,254***	***8,117***	***8,249***
Total Current Supplies Limited by WTP Capacity (12 MGD Ennis WTP)	***7,639***	***8,300***	***8,300***	***8,254***	***8,117***	***8,249***
Need (Demand less Supply)	***0***	***0***	***0***	***0***	***27***	***276***
Water Management Strategies						
Conservation (retail)	284	572	732	781	835	894
Conservation (wholesale customers)	0	0	0	0	2	18
Additional TRWD	0	0	0	0	16	178
1 MGD WTP Plant Expansion	*0*	*0*	*0*	*0*	*16*	*178*
Total Supplies from Strategies	***284***	***572***	***732***	***781***	***853***	***1,090***
Total Supplies	***7,923***	***8,872***	***9,032***	***9,035***	***8,970***	***9,339***
Surplus or (Shortage)	***1,055***	***1,713***	***1,545***	***1,237***	***826***	***814***
Management Supply Factor	***1.15***	***1.24***	***1.21***	***1.16***	***1.10***	***1.10***

[a]Ennis has a contract with the Trinity River Authority for 5,200 acre-feet per year. The yield of Bardwell Lake is decreasing.
[b]Ennis has a contract for up to 3,988 acre-feet per year from TRWD (TRA). Availability from TRWD is limited based off of Ennis's remaining needs and TRWD's current supplies.

Ferris

Ferris is located in northern Ellis and southern Dallas Counties. Ferris gets treated water supplies from Rockett SUD. Water management strategies for Ferris include conservation, purchasing additional water from Rockett SUD, and additional delivery infrastructure from Rockett SUD. **Table 5E.142** shows the projected population and demand, the current supplies, and the water management strategies for Ferris.

TABLE 5E.142 SUMMARY OF WATER USER GROUP – CITY OF FERRIS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,455**	**2,602**	**2,761**	**2,907**	**3,072**	**3,256**
Projected Water Demand						
Municipal Demand	474	501	531	559	591	626
Total Projected Demand	***474***	***501***	***531***	***559***	***591***	***626***
Currently Available Water Supplies						
Rockett SUD	442	422	416	403	395	392
Total Current Supplies	***442***	***422***	***416***	***403***	***395***	***392***
Need (Demand - Current Supply)	***32***	***79***	***115***	***156***	***196***	***234***
Water Management Strategies						
Water Conservation	48	129	179	190	203	218
Additional Water from Rockett SUD	17	0	0	9	36	58
Increase Delivery Infrastructure from Rockett SUD	*17*	*0*	*0*	*9*	*36*	*58*
Total Water Management Strategies	***65***	***129***	***179***	***199***	***239***	***276***
Ferris Reserve (Shortage)	***33***	***50***	***64***	***43***	***43***	***42***

Files Valley Water Supply Corporation

Files Valley WSC is located in western Ellis County in Region C and eastern Hill County in Region G. Files Valley provides water to residents in its service area as well as Ellis County Other. The WSC purchases treated water from the Aquilla Water Supply District, which is located in Hill County in the Brazos G region. The only recommended water management strategy for the WSC is conservation (Region G). An alternative water management strategy for Files Valley WSC is to connect to and purchase water from Waxahachie. **Table 5E.143** shows the projected population and demand, the current supplies, and the water management strategies for Files Valley WSC.

TABLE 5E.143 SUMMARY OF WATER USER GROUP – FILES VALLEY WATER SUPPLY CORPORATION

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,342**	**3,592**	**3,830**	**4,071**	**4,338**	**4,634**
Projected Water Demand						
Municipal Demand	872	925	975	1,027	1,084	1,147
County-Other, Ellis	*84*	*84*	*84*	*84*	*84*	*84*
Total Projected Region C Demand	***956***	***1,009***	***1,059***	***1,111***	***1,168***	***1,231***
Currently Available Water Supplies						
Aquilla WSC	729	729	729	729	729	729
County-Other, Ellis	84	84	84	84	84	84
Total Current Supplies	***813***	***813***	***813***	***813***	***813***	***813***
Need (Demand - Current Supply)	***143***	***196***	***246***	***298***	***355***	***418***
Water Management Strategies						
Water Conservation (Region G)	69	183	193	203	214	227
Total Water Management Strategies	***69***	***183***	***193***	***203***	***214***	***227***
Files Valley WSC Reserve (Shortage)	***(74)***	***(13)***	***(53)***	***(95)***	***(141)***	***(191)***
Alternative Water Management Strategies						
Connect to Waxahachie	0	200	200	200	200	200

Glenn Heights

Glenn Heights is located in southern Dallas and northern Ellis Counties. The city's water supply plans are discussed under Dallas County in **Section 5E.3**.

Grand Prairie

Grand Prairie is located in western Dallas County, eastern Tarrant County, and northwestern Ellis County. The city is a wholesale water provider, and there is a discussion of Grand Prairie's water supply plans in **Section 5E.3.**

Hilco United Services

Hilco United Services is located in Ellis County and gets its water supply from groundwater (Trinity and Woodbine aquifer) and Brazos River Authority. This source is sufficient to meet future demands, and the only water management strategy is conservation (Region G). **Table 5E.144** shows the projected population and demand, the current supplies, and the water management strategies for Hilco United Services. The demands, supplies, and strategies shown are only for the portion of the WUG located within Region C. Information on the Region D portion can be found in the Northeast Texas Regional Water Plan.

TABLE 5E.144 SUMMARY OF WATER USER GROUP – HILCO UNITED SERVICES (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**605**	**651**	**701**	**748**	**801**	**860**
Projected Water Demand						
Municipal Demand	124	133	143	152	163	175
Total Projected Water Demand	***124***	***133***	***143***	***152***	***163***	***175***
Currently Available Water Supplies						
Brazos River Authority	14	14	15	15	15	15
Trinity Aquifer	76	79	82	84	87	90
Woodbine Aquifer	34	36	36	36	36	36
Total Current Supplies	***124***	***129***	***133***	***135***	***138***	***141***
Need (Demand - Current Supply)	***0***	***4***	***10***	***17***	***25***	***34***
Water Management Strategies						
Water Conservation (Region G)	10	23	33	35	38	40
Total Water Management Strategies	***10***	***23***	***33***	***35***	***38***	***40***
Hilco United Services (Region C Only) Reserve (Shortage)	***10***	***19***	***23***	***18***	***13***	***6***

Italy

Italy is located in southwest Ellis County. The water supplies for the city are groundwater (Trinity and Woodbine aquifers), and the only recommended water management strategy is conservation. An alternative water management strategy for Italy is connecting to and purchasing from Waxahachie. **Table 5E.145** shows the projected population and demand, the current supplies, and the water management strategies for Italy.

TABLE 5E.145 SUMMARY OF WATER USER GROUP – CITY OF ITALY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,939**	**1,942**	**1,944**	**1,933**	**1,923**	**1,915**
Projected Water Demand						
Municipal Demand	249	248	248	247	246	245
Total Projected Demand	***249***	***248***	***248***	***247***	***246***	***245***
Currently Available Water Supplies						
Trinity Aquifer	79	78	78	77	76	75
Woodbine Aquifer	170	170	170	170	170	170
Total Current Supplies	***249***	***248***	***248***	***247***	***246***	***245***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	6	8	8	9	10	11
Total Water Management Strategies	***6***	***8***	***8***	***9***	***10***	***11***
Italy Reserve (Shortage)	***6***	***8***	***8***	***9***	***10***	***11***
Alternative Water Management Strategy						
Connect to Waxahachie	0	248	248	247	246	245

Mansfield

The City of Mansfield is located in Ellis, Johnson and Tarrant Counties. The water supply for Mansfield is discussed under Tarrant County in **Section 5E.15**.

Midlothian

The City of Midlothian is located in northwestern Ellis County. Midlothian is a wholesale water provider (WWP) and supplies water to Grand Prairie, Ellis County Manufacturing (retail supply within the city), Mountain Peak SUD, Rockett SUD, Sardis Lone Elm WSC, Ellis County Steam Electric Power, and Venus.

Midlothian gets raw water from Trinity River Authority's (TRA) supply in Joe Pool Lake, reuse of treated wastewater from TRA, and Tarrant Regional Water District (TRWD). The reliable (firm yield) supply from Joe Pool Lake decreases over time due to sedimentation. Midlothian has contracted to use treated wastewater from TRA's Mountain Creek Regional Wastewater System (MCRWS), which flows to Joe Pool Lake. Midlothian has the first right of refusal for additional reuse supplies as discharges increase. The city's current contract for TRWD raw water is for 20,391 acre-feet per year (supplying Midlothian, Sardis Lone Elm WSC, Grand Prairie, and Venus), but the supplies are limited by the current treatment capacity of the Auger WTP.

The City of Midlothian has two water treatment plants, the Tayman WTP and the Auger WTP. The Tayman WTP treats supplies from Joe Pool Lake, and the Auger WTP treats supplies from TRWD. The Tayman WTP has a current peak capacity of 11.5 MGD (8 MGD average day base), and the Auger WTP has a peak capacity of 24 MGD.

The recommended water management strategies for Midlothian include implementing water conservation measures, additional indirect reuse, developing treatment capacity to use additional supplies from TRWD, and water treatment plant expansions.

The recommended additional indirect reuse project utilizes increasing discharges from the TRA MCRWS and will augment Joe Pool Lake supplies. Currently, TRA is authorized to divert up to 4,368 acre-feet per year of this reclaimed water (93.5% of discharges, with 6.5% lost in transit).It is assumed that TRA will seek additional reuse water rights as the plant is expanded and that Midlothian can then contract with TRA to utilize the increased discharges. **Table 5E.146** shows the projected demand, the current supplies, and the water management strategies for Midlothian.

TABLE 5E.146 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – MIDLOTHIAN

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Midlothian	7,672	8,752	10,446	12,038	13,700	15,005
Grand Prairie	2,522	3,363	3,363	3,363	3,363	3,363
Manufacturing, Ellis	566	587	609	631	655	679
Mountain Peak SUD	1,121	1,121	1,121	1,121	1,121	1,121
Rockett SUD	2,242	2,242	2,242	2,242	2,242	2,242
Sardis Lone Elm WSC	3,206	3,206	3,206	3,206	3,206	3,206
Steam Electric Power, Ellis	280	280	280	280	280	280
Venus	442	412	386	358	332	308
Total Projected Water Demand	***18,051***	***19,963***	***21,653***	***23,239***	***24,899***	***26,204***
Currently Available Supplies						
Joe Pool Lake[a]	5,506	5,379	5,251	5,147	5,043	4,938
Indirect Reuse	3,206	3,206	3,206	3,206	3,206	3,206
Tarrant Regional WD	8,057	8,645	9,312	9,575	9,924	10,102
Total Current Supplies	***16,769***	***17,230***	***17,769***	***17,928***	***18,173***	***18,246***
Need (Demand less Supply)	***1,282***	***2,733***	***3,884***	***5,311***	***6,726***	***7,958***
Water Management Strategies						
Conservation (retail)	494	942	1,329	1,579	1,840	2,044
Conservation (wholesale customers)	305	579	675	665	664	667
Additional Indirect Reuse	2,498	2,625	2,753	2,857	2,961	3,066
Expand Tayman WTP and Raw Water Delivery to 20 MGD (8 MGD Expansion)	*2,498*	*2,625*	*2,753*	*2,857*	*2,961*	*3,066*
Additional TRWD Supplies with WTP Expansions as below:	0	0	0	745	1,792	2,702
Expand Auger WTP to 36 MGD (12 MGD Expansion)	*0*	*0*	*0*	*745*	*1,792*	*2,702*
Total Supplies from Strategies	***3,297***	***4,146***	***4,757***	***5,846***	***7,257***	***8,479***
Total Supplies	***20,066***	***21,376***	***22,526***	***23,774***	***25,430***	***26,725***
Reserve or (Shortage)	***2,015***	***1,413***	***873***	***535***	***531***	***521***
Management Supply Factor	***1.11***	***1.07***	***1.04***	***1.02***	***1.02***	***1.02***

[a]Midlothian's contracted supply from Joe Pool Lake with the Trinity River Authority is 6,674 acre-feet per year. The yield of Joe Pool (as calculated by TCEQ WAM) is less than the permitted amount and reduces over time due to sedimentation, and Midlothian's share of the reduced yield is shown here.

Mountain Peak Special Utility District

Mountain Peak SUD serves customers in western Ellis County. Water supplies for this SUD include groundwater (Trinity aquifer) and treated water from Midlothian. The SUD's water purchase contract with Midlothian will expire by 2040, and it may not be renewed. Groundwater supplies from Region G will meet the demands of the Region G portion of this WUG. Water management strategies for the Region C part of the SUD include conservation and purchasing treated water from Mansfield, which gets its water from Tarrant Regional Water District. **Table 5E.147** shows the projected demand, the current supplies, and the water management strategies for Mountain Peak SUD in Region C.

TABLE 5E.147 SUMMARY OF WATER USER GROUP – MOUNTAIN PEAK SUD (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**25,798**	**34,002**	**43,100**	**52,686**	**63,468**	**75,633**
Projected Water Demand						
Municipal Demand	8,004	10,533	13,351	16,321	19,660	23,429
Total Projected Demand	***8,004***	***10,533***	***13,351***	***16,321***	***19,660***	***23,429***
Currently Available Water Supplies						
Trinity Aquifer	2,291	2,284	2,291	2,284	2,292	2,292
Midlothian	1,121	1,121	1,121	1,121	1,121	1,121
Total Current Supplies	***3,412***	***3,405***	***3,412***	***3,405***	***3,413***	***3,413***
Need (Demand - Current Supply)	***4,592***	***7,128***	***9,939***	***12,916***	***16,247***	***20,016***
Water Management Strategies						
Water Conservation	650	1,856	2,910	3,599	4,401	5,272
Mansfield	4,219	5,872	7,773	10,068	12,610	15,512
Total Water Management Strategies	***4,869***	***7,728***	***10,683***	***13,667***	***17,011***	***20,784***
Mountain Peak SUD Reserve (Shortage)	***277***	***600***	***744***	***751***	***764***	***768***

Nash Forreston WSC

Nash Forreston WSC is located in southern Ellis County. Water supplies for this WSC include groundwater (Trinity aquifer) and supplies from Waxahachie. Water management strategies for the WSC include conservation and additional supplies from Waxahachie. **Table 148** shows the projected demand, the current supplies, and the water management strategies for Nash Forreston WSC

TABLE 148 SUMMARY OF WATER USER GROUP – NASH FORRESTON WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,095**	**2,514**	**2,970**	**3,428**	**3,933**	**4,489**
Projected Water Demand						
Municipal Demand	230	274	324	374	429	489
Total Projected Demand	***230***	***274***	***324***	***374***	***429***	***489***
Currently Available Water Supplies						
Trinity Aquifer	100	100	100	100	100	100
Waxahachie	189	224	259	287	315	342
Total Current Supplies	***289***	***324***	***359***	***387***	***415***	***442***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***14***	***47***
Water Management Strategies						
Water Conservation	6	9	12	16	21	25
Additional Water from Waxahachie	41	48	61	80	103	132
Total Water Management Strategies	***47***	***57***	***73***	***96***	***124***	***157***
Nash Forreston WSC Reserve (Shortage)	***106***	***107***	***108***	***109***	***110***	***110***

Ovilla

Ovilla is located in northern Ellis County and southern Dallas County. The city purchases treated water supplies from DWU. Water management strategies include conservation, purchasing additional water from DWU, and additional delivery infrastructure from DWU. **Table 5E.149** shows the projected population and demand, the current supplies, and the water management strategies for Ovilla.

TABLE 5E.149 SUMMARY OF WATER USER GROUP – CITY OF OVILLA

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,438**	**6,827**	**8,337**	**9,871**	**11,556**	**13,411**
Projected Water Demand						
Municipal Demand	1,278	1,602	1,956	2,316	2,712	3,148
Total Projected Demand	***1,278***	***1,602***	***1,956***	***2,316***	***2,712***	***3,148***
Currently Available Water Supplies						
Dallas	1,179	1,410	1,634	1,857	2,089	2,345
Total Current Supplies	***1,179***	***1,410***	***1,634***	***1,857***	***2,089***	***2,345***
Need (Demand - Current Supply)	***99***	***192***	***322***	***459***	***623***	***803***
Water Management Strategies						
Water Conservation	41	116	184	227	278	338
Additional Supplies from DWU	58	76	138	232	345	465
Increase Delivery Infrastructure from DWU	*0*	*0*	*203*	*520*	*865*	*1,241*
Total Water Management Strategies	***99***	***192***	***322***	***459***	***623***	***803***
Ovilla Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Palmer

Palmer is located in northeastern Ellis County. The city purchases treated water supplies from Rockett SUD. Water management strategies for Palmer include conservation and purchasing additional water from Rockett SUD, including additional delivery infrastructure from Rockett SUD. **Table 5E.150** shows the projected population and demand, the current supplies, and the water management strategies for Palmer.

TABLE 5E.150 SUMMARY OF WATER USER GROUP – CITY OF PALMER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,543**	**3,053**	**3,606**	**4,162**	**4,775**	**5,449**
Projected Water Demand						
Municipal Demand	276	329	389	449	515	588
Total Projected Demand	***276***	***329***	***389***	***449***	***515***	***588***
Currently Available Water Supplies						
Rockett SUD	258	277	305	324	344	368
Total Current Supplies	***258***	***277***	***305***	***324***	***344***	***368***
Need (Demand - Current Supply)	***18***	***52***	***84***	***125***	***171***	***220***
Water Management Strategies						
Water Conservation	7	12	15	18	24	30
Additional Supplies from Rockett SUD	31	68	100	142	184	229
Increase Delivery Infrastructure from Rockett SUD	*0*	*0*	*0*	*0*	*0*	*0*
Total Water Management Strategies	***38***	***80***	***115***	***160***	***208***	***259***
Palmer Reserve (Shortage)	***20***	***28***	***31***	***35***	***37***	***39***

Red Oak

Red Oak is located in northern Ellis County. The city purchases water from DWU. Water management strategies for Red Oak include conservation and purchasing additional water from DWU. **Table 5E.151** shows the projected population and demand, the current supplies, and the water management strategies for Red Oak.

TABLE 5E.151 SUMMARY OF WATER USER GROUP – CITY OF RED OAK

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**12,039**	**15,009**	**18,237**	**21,502**	**25,093**	**29,044**
Projected Water Demand						
Municipal Demand	1,753	2,177	2,645	3,119	3,640	4,213
Total Projected Demand	***1,753***	***2,177***	***2,645***	***3,119***	***3,640***	***4,213***
Currently Available Water Supplies						
Dallas	1,618	1,916	2,209	2,501	2,803	3,137
Total Current Supplies	***1,618***	***1,916***	***2,209***	***2,501***	***2,803***	***3,137***
Need (Demand - Current Supply)	***135***	***261***	***436***	***618***	***837***	***1,076***
Water Management Strategies						
Water Conservation	39	61	82	220	308	370
Additional Water from DWU	96	200	354	398	529	706
Total Water Management Strategies	***135***	***261***	***436***	***618***	***837***	***1,076***
Red Oak Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Rice Water Supply and Sewer Service

Rice Water Supply and Sewer Service provides retail service to northern Navarro County and southeastern Ellis County. Rice Water Supply and Sewer Service gets most of its water supply from Corsicana, with a small supply from Ennis. Water management strategies for Rice Water Supply and Sewer Service include conservation, additional water from Corsicana, and additional water from Ennis. **Table 5E.152** shows the projected population and demand, the current supplies, and the water management strategies for Rice Water Supply and Sewer Service.

TABLE 5E.152 SUMMARY OF WATER USER GROUP – RICE WATER SUPPLY AND SEWER SERVICE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**9,518**	**11,375**	**13,469**	**15,738**	**18,327**	**21,287**
Projected Water Demand						
Municipal Demand	1,106	1,316	1,559	1,821	2,121	2,463
County-Other, Dallas	*50*	*50*	*50*	*50*	*50*	*50*
Total Projected Demand	***1,156***	***1,366***	***1,609***	***1,871***	***2,171***	***2,513***
Currently Available Water Supplies						
Corsicana	1,056	1,236	1,384	1,535	1,689	1,852
County-Other, Dallas	50	49	46	43	41	38
Ennis	50	50	50	50	50	48
Total Current Supplies	***1,156***	***1,335***	***1,480***	***1,628***	***1,780***	***1,938***
Need (Demand - Current Supply)	***0***	***31***	***129***	***243***	***391***	***575***
Water Management Strategies						
Water Conservation	28	45	60	75	94	202
Additional Supplies from Ennis	0	0	0	0	0	2
Additional Supplies from Corsicana	0	1	69	168	297	371
Total Water Management Strategies	***28***	***46***	***129***	***243***	***391***	***575***
Rice Water Supply and Sewer Service Reserve (Shortage)	***28***	***15***	***0***	***0***	***0***	***0***

Rockett Special Utility District

Rockett Special Utility District (SUD) is a wholesale water provider (WWP) that provides retail service in northern Ellis County and southern Dallas County and supplies water to a number of water user groups. Wholesale customers of the District include Palmer, Ellis County Other, Sardis-Lone Elm WSC, and Ferris. Rockett SUD's retail service area includes customers in many nearby cities. The current supplies for Rockett SUD include treated water purchased from Midlothian and raw water from TRWD.

Rockett SUD jointly owns the Robert W. Sokoll WTP with the City of Waxahachie. The plant was commissioned in December 2009 with a peak treatment capacity of 20 MGD (shared equally between the City of Waxahachie and Rockett SUD). Using a peaking factor of 2, Rockett SUD can treat up to 5,600 acre-feet per year of supplies from TRWD.

The recommended water management strategies for Rockett SUD include implementing water conservation measures, purchasing additional TRWD water, and expanding the Sokoll WTP.

Table 5E.153 shows the projected demand, the current supplies, and the water management strategies for Rockett SUD.

TABLE 5E.153 SUMMARY OF WATER WHOLESALE WATER PROVIDER AND CUSTOMERS – ROCKETT SUD

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Rockett SUD	4,371	5,189	6,208	7,135	8,586	9,763
County-Other, Ellis	200	200	200	200	200	200
Ferris	474	501	531	559	591	626
Palmer	276	329	389	449	515	588
Sardis Lone Elm WSC	1,121	1,121	1,121	1,121	1,121	1,121
Total Projected Water Demand	***6,442***	***7,340***	***8,449***	***9,464***	***11,013***	***12,298***
Currently Available Supplies						
Midlothian	2,242	2,242	2,242	2,242	2,242	2,242
TRWD	3,771	3,942	4,381	4,589	5,117	5,462
Total Current Supplies	***6,013***	***6,184***	***6,623***	***6,831***	***7,359***	***7,704***
Need (Demand less Supply)	***429***	***1,156***	***1,826***	***2,633***	***3,654***	***4,594***
Water Management Strategies						
Conservation (retail)	266	578	828	975	1,220	1,404
Conservation (wholesale customers)	116	225	275	308	323	345
Additional TRWD with Treatment as below:	502	961	1,384	2,094	2,906	3,670
7 MGD Expansion at Sokoll	*502*	*961*	*1,384*	*2,094*	*2,906*	*3,670*
Total Supplies from Strategies	***884***	***1,764***	***2,487***	***3,377***	***4,449***	***5,419***
Total Supplies	***6,897***	***7,948***	***9,110***	***10,208***	***11,808***	***13,123***
Surplus or (Shortage)	***455***	***608***	***661***	***744***	***795***	***825***
Management Supply Factor	***1.07***	***1.08***	***1.08***	***1.08***	***1.07***	***1.07***

Sardis-Lone Elm Water Supply Corporation

Sardis-Lone Elm WSC is located in northern Ellis County. The WSC currently gets water supplies from groundwater (Trinity and Woodbine aquifers), Rockett SUD, and Midlothian. Historical groundwater use for Sardis-Lone Elm WSC is higher than can be shown as available in the *Region C Water Plan* due to the MAG limitations. Water management strategies include conservation, additional supply from Rockett SUD, additional supply from Midlothian, and supplies from TRWD. The shortages from Sardis-Lone Elm WSC are shown to be met through additional sales from TRWD. **Table 5E.154** shows the projected population and demand, the current supplies, and the water management strategies for Sardis-Lone Elm WSC.

TABLE 5E.154 SUMMARY OF WATER USER GROUP – SARDIS-LONE ELM WATER SUPPLY CORPORATION

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**20,865**	**25,783**	**31,135**	**32,524**	**32,524**	**32,524**
Projected Water Demand						
Municipal Demand	5,534	6,825	8,242	8,610	8,610	8,610
Total Projected Demand	***5,534***	***6,825***	***8,242***	***8,610***	***8,610***	***8,610***
Currently Available Water Supplies						
Trinity Aquifer	956	450	450	450	450	450
Woodbine Aquifer	898	898	898	898	898	898
Rockett SUD	1,046	944	878	810	749	702
Midlothian	2,766	2,436	2,263	2,062	1,911	1,793
Total Current Supplies	***5,666***	***4,728***	***4,489***	***4,220***	***4,008***	***3,843***
Need (Demand - Current Supply)	***0***	***2,097***	***3,753***	***4,390***	***4,602***	***4,767***
Water Management Strategies						
Water Conservation	290	557	740	739	708	707
Additional Supplies from Midlothian (TRWD)	272	508	655	869	1,031	1,150
Additional Supplies from Rockett SUD (TRWD)	94	178	229	304	360	402
Supplies from TRWD	0	1,056	2,337	2,683	2,694	2,694
Direct Connection to TRWD	*0*	*1,056*	*2,337*	*2,683*	*2,694*	*2,694*
Total Water Management Strategies	***656***	***2,299***	***3,961***	***4,595***	***4,793***	***4,953***
Sardis Lone Elm WSC Reserve (Shortage)	***788***	***202***	***208***	***205***	***191***	***186***

South Ellis County Water Supply Corporation

South Ellis County WSC provides water in Ellis and Navarro Counties. The WSC gets its water supply from the Trinity aquifer. The WSC's water management strategies include conservation and supplies from TRWD through TRA through Waxahachie. **Table 5E.155** shows the projected population and demand, the current supplies, and the water management strategies for South Ellis County WSC.

TABLE 5E.155 SUMMARY OF WATER USER GROUP – SOUTH ELLIS COUNTY WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,526**	**1,833**	**2,161**	**2,492**	**2,855**	**3,256**
Projected Water Demand						
Municipal Demand	567	680	802	924	1,060	1,208
Total Projected Water Demand	***567***	***680***	***802***	***924***	***1,060***	***1,208***
Currently Available Water Supplies						
Trinity Aquifer	450	450	450	450	450	450
Total Current Supplies	***450***	***450***	***450***	***450***	***450***	***450***
Need (Demand - Current Supply)	***117***	***230***	***352***	***474***	***610***	***758***
Water Management Strategies						
Water Conservation	14	22	28	35	44	54
Supplies from TRWD through TRA through Waxahachie	114	223	340	456	585	724
Total Water Management Strategies	***128***	***245***	***368***	***491***	***629***	***778***
South Ellis County WSC Reserve (Shortage)	***11***	***15***	***16***	***17***	***19***	***20***

Venus

Venus is located in eastern Johnson County and western Ellis County. Most of the city's population is in Johnson County which is located in Region G. The city's water supplies are groundwater (Woodbine aquifer from Region G) and water purchased from Midlothian. Water management strategies for Venus include conservation (Region G) and purchasing additional water from Midlothian. **Table 5E.156** shows the projected population and demand, the current supplies, and the water management strategies for the City of Venus.

TABLE 5E.156 SUMMARY OF WATER USER GROUP – CITY OF VENUS (REGIONS C AND G)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,416**	**2,266**	**2,121**	**1,967**	**1,824**	**1,691**
Projected Water Demand						
Municipal Demand	442	412	386	358	332	308
Total Projected Demand	***442***	***412***	***386***	***358***	***332***	***308***
Currently Available Water Supplies						
Woodbine Aquifer through Region G	103	103	103	103	103	103
Midlothian	381	313	272	230	198	172
Total Current Supplies	***484***	***416***	***375***	***333***	***301***	***275***
Need (Demand - Current Supply)	***0***	***0***	***11***	***25***	***31***	***33***
Water Management Strategies						
Water Conservation	33	57	53	50	46	43
Additional Supplies from Midlothian	28	42	61	78	88	93
Total Water Management Strategies	***61***	***99***	***114***	***128***	***134***	***136***
Venus Reserve (Shortage)	***103***	***103***	***103***	***103***	***103***	***103***

Waxahachie

Waxahachie is a wholesale water provider (WWP) that provides water to Buena Vista-Bethel SUD, Ellis County Other, Ellis County Manufacturing, and Nash Forreston WSC. Potential future customers include Avalon Water Supply and Sewer Service, Files Valley WSC, Italy, and South Ellis County WSC.

Waxahachie obtains its water supply from Lake Waxahachie, Bardwell Lake (by contract with TRA), indirect reuse from Bardwell Lake, and water from TRWD through TRA. Supplies are treated at the Sokoll WTP (a joint project of Rockett SUD and Waxahachie) and the Howard WTP (Waxahachie only). The Sokoll WTP has a current peak capacity of 20 MGD (equally shared between Waxahachie and Rockett SUD), and the Howard WTP has a current peak capacity of 18 MGD. Using a peaking factor of 2, Rockett SUD can treat up to 15,600 acre-feet per year.

The recommended strategies for Waxahachie are to implement water conservation measures, develop additional indirect reuse, purchase additional supplies from TRWD, and make infrastructure improvements needed to treat and deliver additional supplies.

The additional indirect reuse strategy is to capture any existing or future flows following potential city wastewater treatment plant expansions above the current water right permit allowance for reuse in Lake Bardwell. At the time of this Regional Plan, the city is not sure whether reuse flows associated with this strategy will continue to go to Lake Bardwell or discharge to Lake Waxahachie. Waxahachie will explore water rights and infrastructure for additional indirect reuse to both Lake Bardwell and Lake Waxahachie. Either configuration is considered consistent for this strategy and the *Region C Water Plan*.

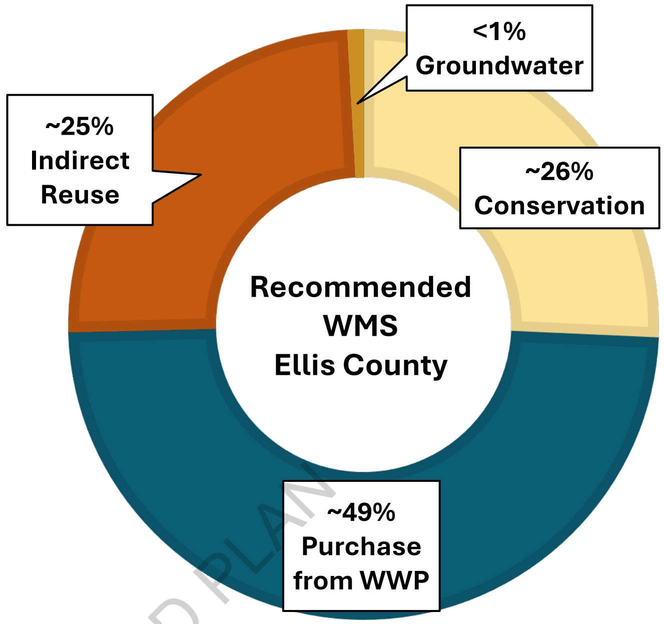
Additionally, Waxahachie will need infrastructure improvements to treat and deliver additional supplies. Waxahachie will need to expand water treatment plants to reach a total treatment capacity of 58 MGD by 2080. The city anticipates serving multiple wholesale customers in southern Ellis County through a joint delivery system. These entities include Avalon WSC, South Ellis WSC, Ellis County Other, additional portions of Buena Vista-Bethel SUD, and potentially Italy and Files Valley. **Table 5E.157** shows the projected demand, the current supplies, and the water management strategies for the City of Waxahachie.

TABLE 5E.157 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS - WAXAHACHIE

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Waxahachie	8,654	10,663	12,873	15,107	17,564	20,267
Buena Vista-Bethel SUD	1,911	2,332	2,742	3,207	3,718	4,281
County-Other, Ellis	*150*	*150*	*150*	*150*	*150*	*150*
Manufacturing, Ellis	2,242	2,242	2,242	2,242	2,242	2,242
Nash Forreston WSC	230	274	324	374	429	489
Potential Future Customers						
Avalon Water Supply and Sewer Service	0	25	50	100	200	300
Files Valley WSC	0	0	0	0	0	0
Italy	0	0	0	0	0	0
South Ellis County WSC	117	230	352	474	610	758
Total Projected Water Demand	***13,304***	***15,916***	***18,733***	***21,654***	***24,913***	***28,487***
Currently Available Supplies						
Lake Waxahachie	2,980	2,910	2,840	2,773	2,707	2,640
TRA (Bardwell)	4,235	4,055	3,875	3,729	3,583	3,438
Indirect Reuse	5,129	5,129	5,129	5,129	5,129	5,129
TRWD for Sokoll WTP	728	2,709	4,580	6,079	7,260	7,578
Total Current Supplies	***13,072***	***14,803***	***16,424***	***17,710***	***18,679***	***18,785***
Total Current Supplies Limited by WTP Capacity (10 MGD Sokoll WTP; 18 MGD Howard WTP)	***10,817***	***12,798***	***14,669***	***15,694***	***15,694***	***15,694***
Need (Demand less Supply)	***2,487***	***3,118***	***4,064***	***5,960***	***9,219***	***12,793***
Water Management Strategies						
Conservation (retail)	455	793	1,038	1,271	1,533	1,830
Conservation (wholesale customers)	26	46	59	73	92	112
Additional Indirect Reuse	1,259	4,106	8,200	9,469	10,739	12,008
Existing Supplies from WTP Expansions	2,255	2,005	1,755	2,016	2,985	3,091
Additional Supplies from TRWD	135	382	647	956	1,320	1,695
WTP and Infrastructure needed to treat and deliver additional supplies as below:						
15 MGD Expansion WTP	*3,649*	*6,493*	*8,408*	*8,408*	*8,408*	*8,408*
15 MGD Expansion WTP	*0*	*0*	*2,194*	*4,033*	*6,636*	*8,386*
Delivery infrastructure to Customers in South Ellis County	*117*	*255*	*402*	*574*	*810*	*1,058*
Total Supplies from Strategies	***4,130***	***7,332***	***11,699***	***13,785***	***16,669***	***18,736***
Total Supplies	***14,947***	***20,130***	***26,368***	***29,479***	***32,363***	***34,430***
Surplus or (Shortage)	***1,643***	***4,214***	***7,635***	***7,825***	***7,450***	***5,943***
Management Supply Factor	***1.12***	***1.26***	***1.41***	***1.36***	***1.30***	***1.21***

5E.5.2 Summary of Costs for Ellis County

Table 5E.158 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Ellis County. Total quantities from **Table 5E.158** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Ellis County are projected to come through purchases from wholesale water providers. Other strategies include conservation, indirect reuse, and groundwater.

Table 5E.159 summarizes the recommended water management strategies within Ellis County individually. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.158 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR ELLIS COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	15,815	$1,263,177
Purchase from WWP	30,082	$0
Additional Infrastructure	*31,650*	*$555,002,000*
Indirect Reuse	15,074	$0
Groundwater	546	$6,796,000
Total	***61,517***	***$563,061,177***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.159 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR ELLIS COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Ennis	Conservation (retail)	2030	894	$158,560	$1.54	$1.16
	Conservation (wholesale)	2070	Included with WUGs.			
	Additional TRWD	2070	178	$0	$1.50	$1.50
	1 MGD WTP Plant Expansion	*2070*	*178*	*$10,828,000*	*$6.51*	*$3.29*
Midlothian	Conservation (retail)	2030	2,044	$150,000	$1.63	$0.75
	Conservation (wholesale)	2030	Included with WUGs.			
	Additional Indirect Reuse	2030	3,066	No costs associated.		
	Expand Tayman WTP and Raw Water Delivery to 20 MGD (8 MGD Expansion)	*2030*	*3,066*	*$63,061,000*	*N/A*	*N/A*
	TRWD	2060	2,662	$0	$1.50	$1.50
	Expand Auger WTP to 36 MGD (12 MGD Expansion)	*2060*	*2,662*	*$45,178,000*	*$1.06*	*$0.52*
Rockett SUD	Conservation (retail)	2030	1,404	$163,137	$2.01	$1.01
	Conservation (wholesale)	2030	Included with WUGs.			
	TRWD	2030	3,670	$0	$1.50	$1.50
	7 MGD Expansion at Sokoll	*2030*	*3,670*	*$79,172,000*	*$6.43*	*$3.07*
Waxahachie	Conservation (retail)	2030	1,830	$150,000	$1.86	$0.52
	Conservation (wholesale)	2030	Included with WUGs.			
	Additional Indirect Reuse	2030	12,008	$0	$1.50	$1.50
	15 MGD Expansion WTP	*2030*	*8,408*	*$132,121,000*	*$4.97*	*$2.34*
	15 MGD Expansion WTP	*2050*	*8,386*	*$132,121,000*	*$4.98*	*$2.35*
	Delivery infrastructure to	*2030*	*1,058*	*$41,399,000*	*$0.54*	*$0.13*

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	Customers in South Ellis County					
WUGs						
Avalon Water Supply and Sewer Service	Conservation	2030	25	$0	$4.42	$1.30
	Waxahachie	2040	275	$0	$4.00	$4.00
Brandon-Irene WSC[a] (Region C only)	Conservation	See Navarro County.				
	Other WMSs					
Buena Vista-Bethel SUD	Conservation	2030	1049	$8,560	$1.82	$1.29
	New Well(s) in Trinity Aquifer	2030	546	$6,796,000	$3.51	$0.83
Cedar Hill[a]	Conservation	See Dallas County.				
	DWU					
East Garrett WSC	Conservation	2030	202	$0	$2.10	$1.35
	Ennis	2070	12	$0	$1.50	$1.50
Ferris	Conservation	2030	218	$8,560	$1.66	$1.38
	Rockett SUD	2030	58	$0	$4.00	$4.00
	Additional Delivery Infrastructure from Rockett SUD	*2050*	*58*	*$3,091,000*	*$5.50*	*$0.86*
Files Valley WSC	Conservation	See 2026 Region G Plan.				
	ALTERNATIVE Connect to Waxahachie					
Glenn Heights[a]	Conservation	See Dallas County.				
	DWU					
Grand Prairie[a]	Conservation	See Dallas County.				
	Other WMSs					
Hilco United Services	Conservation	See 2026 Region G Plan.				
Italy	Conservation	2030	11	$0	$3.58	$2.21
	ALTERNATIVE Connect to Waxahachie	*2030*	*248*	*$0*	*$4.00*	*$4.00*
Mansfield[a]	Conservation	See Tarrant County.				
	Other WMSs					
Mountain Peak SUD[a]	Conservation	2030	5272	$123,000	$1.43	$1.01
	Midlothian	2030	15,512	$0	$4.00	$4.00

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
Nash Forreston WSC	Conservation	2030	25	$8,560	$4.45	$2.61
	Waxahachie	2030	132	$0	$4.00	$4.00
Ovilla[a]	Conservation	2030	338	$8,560	$2.36	$1.07
	DWU	2030	465	$0	$4.00	$4.00
	Additional Delivery Infrastructure from DWU	*2050*	*1,241*	*$3,962,000*	*$0.72*	*$0.19*
Palmer	Conservation	2030	30	$8,560	$4.43	$2.45
	Rockett SUD	2030	229	$0	$4.00	$4.00
	Additional Delivery Infrastructure from Rockett SUD	*2030*	*229*	*$19,390,000*	*$16.41*	*$2.29*
Red Oak	Conservation	2030	370	$158,560	$1.72	$0.97
	DWU	2030	706	$0	$4.00	$4.00
Rice WSC[a]	Conservation	2030	202	$158,560	$4.28	$2.26
	Ennis	2080	2	$0	$4.00	$4.00
	Corsicana	2040	371	$0	$4.00	$4.00
Sardis-Lone Elm WSC	Conservation	2030	740	$158,560	$1.01	$0.50
	Rockett SUD	2030	402	$0	$4.00	$4.00
	Supplies from TRWD	2040	2,694	$0	$1.50	$1.50
	Connect to TRWD	*2040*	*2,694*	*$24,679,000*	*$7.24*	*$5.71*
	Midlothian	2030	1,150	$0	$4.00	$4.00
South Ellis County WSC	Conservation	2030	54	$0	$2.22	$0.81
	TRWD through Waxahachie	2050	724	$0	$1.50	$1.50
Venus[a]	Conservation	See 2026 Region G Plan.				
	Midlothian					
County Other and Non-Municipal						
County Other, Ellis	Conservation	2030	1,049	$0	$4.38	$0.30
	Ennis	2080	4	$0	$4.00	$4.00
	Rockett SUD	2030	84	$0	$4.00	$4.00
	Grand Prairie	2030	23	$0	$4.00	$4.00
Irrigation, Ellis	Conservation	2030	58	$0.00	$0.94	$0.94
Livestock, Ellis	None	None				
Manufacturing, Ellis	Ennis	2070	54	$0	$4.00	$4.00
	Waxahachie	2030	675	$0	$5.67	$5.67
Mining, Ellis	None	None				

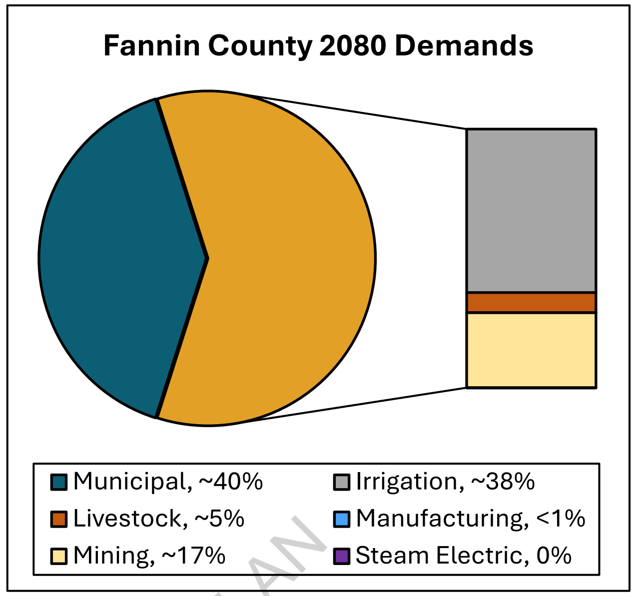
WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
Steam Electric Power, Ellis	None	None				

[a]Water user groups extend into more than one county.

[b]Quantities listed are for the WUG only. They do not include the WUG's customers.

[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.6 Fannin County



Fannin County is located in the northeast corner of Region C. **Figure 5E.12** shows water service areas in Fannin County.

Fannin County is growing rapidly, and the county's population is projected to more than double between 2030 and 2080.

Projected 2080 demands for the county are predominately municipal and irrigation at over 40 and 38 percent of the total demand, respectively. A significant portion of the remaining demand comes from mining demands. Manufacturing demands are less than 1 percent of the total demand and there are no steam electric demands.

Most of the county currently uses groundwater or water from Lake Bonham. Over time more surface water is expected to supply municipal use. NTMWD will cooperate with Fannin County entities to develop a treated water supply system for Fannin County water users from Bois d'Arc Lake based on demands. This is referred to throughout this section as the Fannin County Water Supply Project.

An overall summary of the County's projections are shown in **Table 5E.160** and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Fannin County Quick Facts

2020 Population: 35,662

Projected 2080 Population: 84,502

Projected 2080 Demand: 26 MGD

County Seat: Bonham

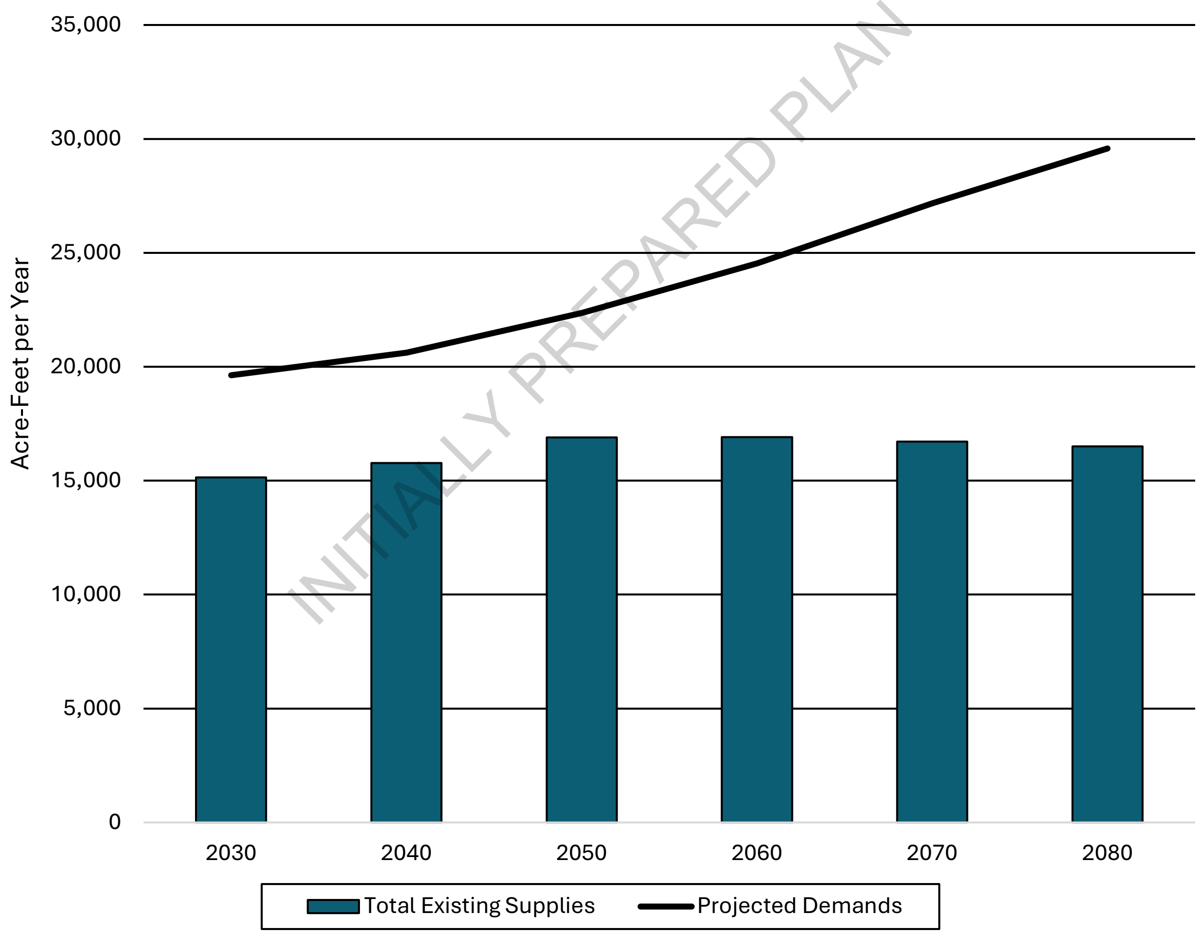
Economy: Communications; agriculture; government/services; petroleum distribution; tourism; varied manufacturing

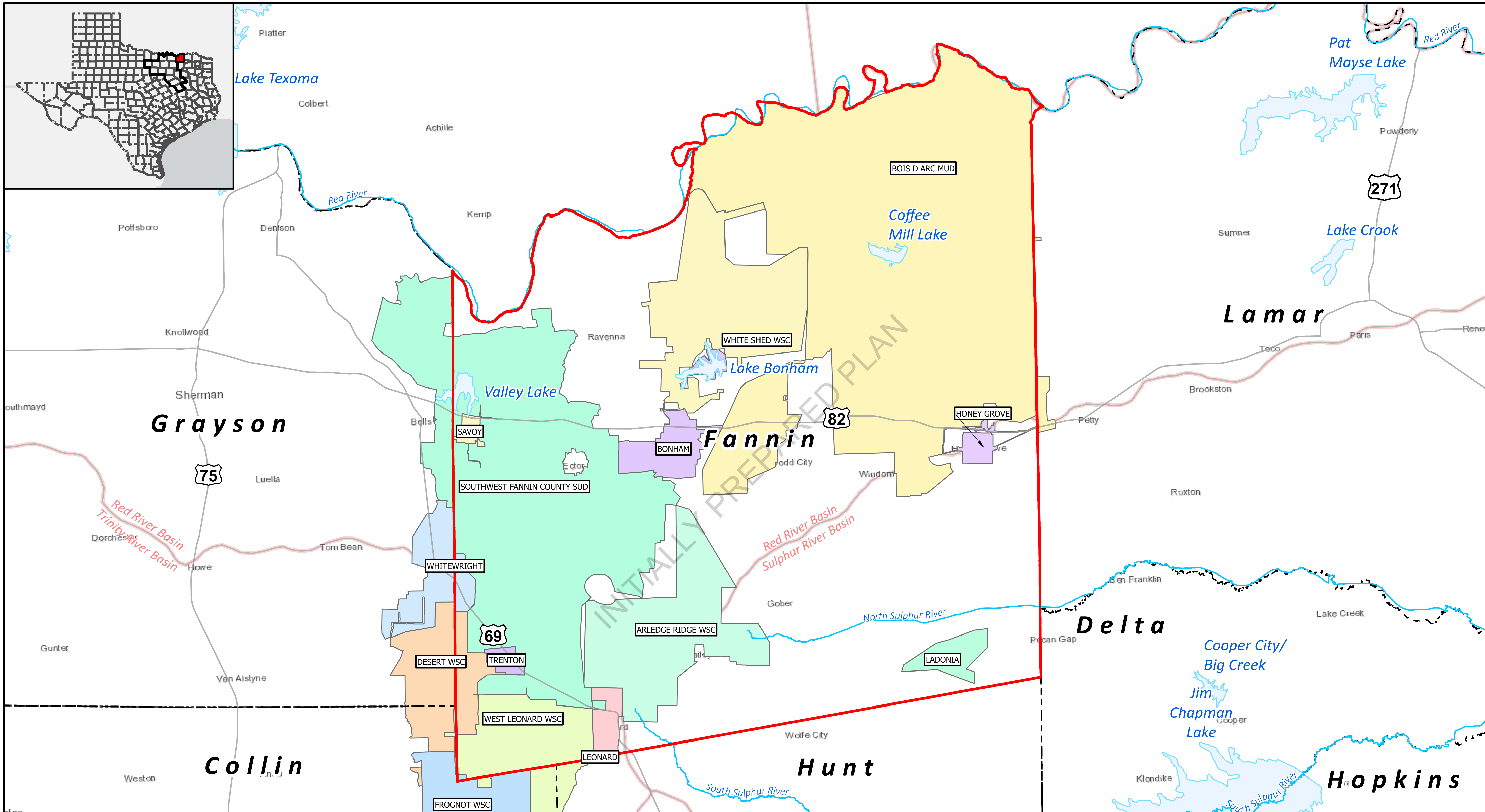
River Basins: Trinity (5%), Red (72%), Sulphur (23%)

TABLE 5E.160 SUMMARY OF FANNIN COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**40,069**	**44,955**	**53,396**	**62,521**	**74,244**	**84,502**
Projected Demands	**19,627**	**20,619**	**22,364**	**24,540**	**27,177**	**29,580**
Municipal	5,314	5,983	7,237	8,598	10,353	11,884
Irrigation	11,186	11,186	11,186	11,186	11,186	11,186
Livestock	1,375	1,375	1,375	1,375	1,375	1,375
Manufacturing	5	5	5	5	5	5
Mining	1,747	2,070	2,561	3,376	4,258	5,130
Steam Electric	0	0	0	0	0	0
Total Existing Supplies	***15,141***	***15,771***	***16,892***	***16,918***	***16,710***	***16,509***
Need (Demand - Supply)	***4,486***	***4,848***	***5,472***	***7,622***	***10,467***	***13,071***

FIGURE 5E.11 SUMMARY OF FANNIN COUNTY





REGION C
Water Planning for North Texas

Fannin County, Texas

Figure 5E.12

Data Source(s): ESRI, TWDB, TxDOT

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.6.1 Wholesale Water Providers and Water User Groups

There are no wholesale water providers in Fannin County. Water management strategies for Fannin County water user groups are discussed below (in alphabetical order). The costs for Fannin County water user groups and a summary for Fannin County are presented in **Section 5E.6.2.**

Arledge Ridge Water Supply Corporation

Arledge Ridge WSC supplies water in south-central Fannin County. The WSC gets its water supply from the Woodbine aquifer. The water management strategies include conservation and additional groundwater wells. **Table 5E.161** shows the projected population and demand, the current supplies, and the water management strategies for Arledge Ridge WSC.

TABLE 5E.161 SUMMARY OF WATER USER GROUP – ARLEDGE RIDGE WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,364**	**1,474**	**1,531**	**1,578**	**1,629**	**1,684**
Projected Water Demand						
Municipal Demand	230	248	257	265	274	283
Total Projected Water Demand	***230***	***248***	***257***	***265***	***274***	***283***
Currently Available Water Supplies						
Woodbine Aquifer	230	248	257	265	274	283
Total Current Supplies	***230***	***248***	***257***	***265***	***274***	***283***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	5	8	9	10	11	13
New Well(s) in Woodbine Aquifer	50	50	50	50	50	50
Total Water Management Strategies	***55***	***58***	***59***	***60***	***61***	***63***
Arledge Ridge WSC Reserve (Shortage)	***55***	***58***	***59***	***60***	***61***	***63***

Bois d'Arc Municipal Utility District

Bois d'Arc MUD supplies water in northeastern Fannin County. The MUD gets its water supply from the Woodbine aquifer. The water management strategies include conservation and connecting to NTMWD to purchase treated water. **Table 5E.162** shows the projected population and demand, the current supplies, and the water management strategies for Bois d'Arc MUD.

TABLE 5E.162 SUMMARY OF WATER USER GROUP – BOIS D'ARC MUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,047**	**3,196**	**3,285**	**3,341**	**3,402**	**3,469**
Projected Water Demand						
Municipal Demand	343	358	368	374	381	389
Total Projected Water Demand	***343***	***358***	***368***	***374***	***381***	***389***
Currently Available Water Supplies						
Woodbine Aquifer	343	309	274	240	206	172
Total Current Supplies	***343***	***309***	***274***	***240***	***206***	***172***
Need (Demand - Current Supply)	***0***	***49***	***94***	***134***	***175***	***217***
Water Management Strategies						
Water Conservation	8	11	13	14	16	18
Connect to and Purchase Water from NTMWD (4 MGD)	0	47	91	129	168	207
Total Water Management Strategies	***8***	***58***	***104***	***143***	***184***	***225***
Bois D Arc MUD Reserve (Shortage)	***8***	***9***	***10***	***9***	***9***	***8***

Bonham

Bonham is located in central Fannin County. The city uses raw water from Lake Bonham, which is treated by NTMWD at the Bonham Water Treatment Plant. The WTP is owned and operated by NTMWD. Although the capacity of the WTP is less than the permitted diversion from Lake Bonham, the intake is located in a shallow portion of the lake. Accessing the remaining supplies from Bonham Lake would require a new intake and a water treatment plant expansion.

Water management strategies for Bonham include conservation and participation in the Fannin County Water Supply Project. The Fannin County Water Supply Project would be developed by Fannin County WUGs and NTMWD to provide a treated water supply system for Fannin County after Bois d'Arc Lake is completed. Supplies would be treated at the Leonard WTP and then conveyed through a pipeline to participating entities. **Table 5E.163** shows the projected population and demand, the current supplies, and the water management strategies for Bonham.

TABLE 5E.163 SUMMARY OF WATER USER GROUP – CITY OF BONHAM

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**12,465**	**15,204**	**21,585**	**28,467**	**37,686**	**45,834**
Projected Water Demand						
Municipal Demand	1,944	2,362	3,353	4,422	5,855	7,120
Manufacturing, Fannin	*5*	*5*	*5*	*5*	*5*	*5*
Total Projected Water Demand	***1,949***	***2,367***	***3,358***	***4,427***	***5,860***	***7,125***
Currently Available Water Supplies						
North Texas MWD	1,944	2,362	3,353	3,528	3,462	3,395
Manufacturing, Fannin	*5*	5	5	5	5	5
Total Current Supplies	***1,949***	***2,367***	***3,358***	***3,533***	***3,467***	***3,400***
Need (Demand - Current Supply)	***0***	***0***	***0***	***894***	***2,393***	***3,725***
Water Management Strategies						
Water Conservation for Bonham	94	271	599	845	1,143	1,402
Fannin County Water Supply Project for Bonham	0	0	0	49	1,250	2,323
Manufacturing, Fannin	*0*	*0*	*0*	*0*	*0*	*0*
Total Water Management Strategies	***94***	***271***	***599***	***894***	***2,393***	***3,725***
Bonham Reserve (Shortage)	***94***	***271***	***599***	***0***	***0***	***0***

Delta County Municipal Utility District

Delta County MUD supplies water in Fannin County in Region C and Delta County in Region D. The majority of the population resides in Region D. The MUD currently gets all necessary supplies from the City of Cooper (Region D) sources and there are no water management strategies. **Table 5E.164** shows the projected population and demand, the current supplies, and the water management strategies for Delta County MUD.

TABLE 5E.164 SUMMARY OF WATER USER GROUP – DELTA COUNTY MUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,973**	**2,011**	**2,043**	**2,075**	**2,108**	**2,142**
Projected Water Demand						
Municipal Demand	198	202	205	209	211	215
Total Projected Region C Demand	***198***	***202***	***205***	***209***	***211***	***215***
Currently Available Water Supplies						
City of Cooper Sources (Chapman)	198	202	205	209	211	215
Total Current Supplies	***198***	***202***	***205***	***209***	***211***	***215***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None	0	0	0	0	0	0
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Delta County MUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Desert WSC

Desert WSC serves parts of Fannin, Collin, and Grayson Counties, with the majority of the population located in Fannin County. The WSC gets its water supply from the Woodbine aquifer. Water management strategies for Desert WSC include conservation. **Table 5E.165** shows the projected population and demand, the current supplies, and the water management strategies for Desert WSC.

TABLE 5E.165 SUMMARY OF WATER USER GROUP – DESERT WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,864**	**2,071**	**2,215**	**2,350**	**2,498**	**2,663**
Projected Water Demand						
Municipal Demand	300	331	354	376	399	425
Total Projected Water Demand	***300***	***331***	***354***	***376***	***399***	***425***
Currently Available Water Supplies						
Woodbine Aquifer	300	331	354	376	399	425
Total Current Supplies	***300***	***331***	***354***	***376***	***399***	***425***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	12	30	41	45	49	54
Total Water Management Strategies	***12***	***30***	***41***	***45***	***49***	***54***
Desert WSC Reserve (Shortage)	***12***	***30***	***41***	***45***	***49***	***54***

Fannin County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. The current supplies for Fannin County Irrigation are diversions from the Red River and groundwater from the Trinity aquifer, Woodbine aquifer, and Other aquifer (the alluvium of the Red River). It should be noted that run-of-river supplies are available only along the Red River. Historical groundwater use for Fannin County Irrigation is higher than can be shown as available in the *Region C Regional Water Plan* due to the MAG limitations. The limited availability of groundwater within the county as quantified by the modeled available groundwater causes unmet needs for this WUG. Water management strategies for Fannin County Irrigation include conservation and new groundwater wells in the Trinity aquifer. **Table 5E.166** shows the projected demand, the current supplies, and the water management strategies for Fannin County Irrigation.

TABLE 5E.166 SUMMARY OF WATER USER GROUP – FANNIN COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***11,186***	***11,186***	***11,186***	***11,186***	***11,186***	***11,186***
Currently Available Water Supplies						
Red Run-of-River	2,295	2,295	2,295	2,295	2,295	2,295
Trinity Aquifer	1,000	1,000	1,000	1,000	1,000	1,000
Other Aquifer	2,909	2,909	2,909	2,909	2,909	2,909
Woodbine Aquifer	195	195	195	195	195	195
Total Current Supplies	***6,399***	***6,399***	***6,399***	***6,399***	***6,399***	***6,399***
Need (Demand - Current Supply)	***4,787***	***4,787***	***4,787***	***4,787***	***4,787***	***4,787***
Water Management Strategies						
Water Conservation	1	20	39	49	59	68
New Well(s) in Trinity Aquifer	350	350	350	350	350	350
Total Water Management Strategies	***351***	***370***	***389***	***399***	***409***	***418***
Irrigation, Fannin Reserve (Shortage)	***(4,436)***	***(4,417)***	***(4,398)***	***(4,388)***	***(4,378)***	***(4,369)***

Fannin County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. **Table 5E.167** shows the projected demand, current supplies, and water management strategies for Fannin County Livestock. The current supplies for Fannin County Livestock are local surface water supplies and groundwater (Trinity, Woodbine, and Other aquifers). These sources are sufficient to meet future demands, and there are no water management strategies for this water user group.

TABLE 5E.167 SUMMARY OF WATER USER GROUP – FANNIN COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,375***	***1,375***	***1,375***	***1,375***	***1,375***	***1,375***
Currently Available Water Supplies						
Red Livestock Local Supply	99	99	99	99	99	99
Trinity Livestock Local Supply	8	8	8	8	8	8
Sulphur Livestock Local Supply	34	34	34	34	34	34
Other Aquifer	10	10	10	10	10	10
Trinity Aquifer	424	424	424	424	424	424
Woodbine Aquifer	800	800	800	800	800	800
Total Current Supplies	***1,375***	***1,375***	***1,375***	***1,375***	***1,375***	***1,375***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Fannin Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Fannin County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. The current supply is water from Lake Bonham through the City of Bonham. These sources are sufficient to meet future demands, and there are no water management strategies for this water user group. **Table 5E.168** shows the projected demand, the current supplies, and the water management strategies for Fannin County Manufacturing. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG.

TABLE 5E.168 SUMMARY OF WATER USER GROUP – FANNIN COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***5***	***5***	***5***	***5***	***5***	***5***
Currently Available Water Supplies						
Bonham	5	5	5	5	5	5
Total Current Supplies	***5***	***5***	***5***	***5***	***5***	***5***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Manufacturing, Fannin Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Fannin County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Fannin County Mining is supplied from local supplies and run-of-the river diversions. The only water management strategy for this WUG is conservation. **Table 5E.169** shows the projected demand, the current supplies, and the water management strategies for Fannin County Mining.

TABLE 5E.169 SUMMARY OF WATER USER GROUP – FANNIN COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,747***	***2,070***	***2,561***	***3,376***	***4,258***	***5,130***
Currently Available Water Supplies						
Red Other Local Supply	1,800	2,100	2,373	2,373	2,373	2,373
Red Run-Of-River	75	75	75	75	75	75
Total Current Supplies	***1,875***	***2,175***	***2,448***	***2,448***	***2,448***	***2,448***
Need (Demand - Current Supply)	***0***	***0***	***113***	***928***	***1,810***	***2,682***
Water Management Strategies						
Water Conservation	0	0	113	928	1,810	2,682
Total Water Management Strategies	***0***	***0***	***113***	***928***	***1,810***	***2,682***
Mining, Fannin Reserve (Shortage)	***128***	***105***	***0***	***0***	***0***	***0***

Fannin County Other

Fannin County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups. The entities included under Fannin County Other receive their water supply from run-of-the-river diversions from the Sulphur River, Honey Grove, and groundwater (Trinity and Woodbine aquifers). Water management strategies for these entities include conservation and participation in the Fannin County Water Supply Project. The Fannin County Water Supply Project would be developed by Fannin County WUGs and NTMWD to provide a treated water supply system for Fannin County. Supplies would be treated at the Leonard WTP and then conveyed through a pipeline to participating entities. **Table 5E.170** shows the projected population and demand, the current supplies, and the water management strategies for Fannin County Other.

TABLE 5E.170 SUMMARY OF WATER USER GROUP – FANNIN COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,800**	**3,838**	**4,069**	**4,333**	**4,760**	**5,000**
Projected Water Demand						
Municipal Demand	404	406	430	458	503	529
Total Projected Water Demand	***404***	***406***	***430***	***458***	***503***	***529***
Currently Available Water Supplies						
Sulphur Run-of-River	45	45	45	45	45	45
Honey Grove	50	50	50	50	50	50
Trinity Aquifer	184	166	147	129	110	92
Woodbine Aquifer	300	270	240	210	180	150
Total Current Supplies	***579***	***531***	***482***	***434***	***385***	***337***
Need (Demand - Current Supply)	***0***	***0***	***0***	***24***	***118***	***192***
Water Management Strategies						
Water Conservation	3	5	6	8	11	14
Fannin County Water Supply Project	0	0	0	73	164	236
Total Water Management Strategies	***3***	***5***	***6***	***81***	***175***	***250***
County-Other, Fannin Reserve (Shortage)	***178***	***130***	***58***	***57***	***57***	***58***

Fannin County Steam Electric Power

Steam electric power demands generally represent the cooling water needs during power generation. These demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. Luminant has a water right out of Lake Texoma, but the existing power plant in Fannin County is not operational at this time. There is no projected demand for steam electric power in Fannin County.

Hickory Creek Special Utility District

Hickory Creek SUD serves eastern Collin County, southern Fannin County, and northwestern Hunt County. The SUD is primarily located in Hunt County in the North East Texas Region (Region D), and the supply for Region C is groundwater from the Woodbine aquifer in Hunt County in the North East Texas Region. The SUD intends to develop additional groundwater to meet its projected water needs. However, there is insufficient available groundwater under the MAG to show this strategy as recommended. As a result, Hickory Creek SUD is shown to have a small unmet need in 2080. Since Hunt County does not have a groundwater district to enforce MAG limits, the SUD intends to further develop groundwater under State law. **Table 5E.171** shows the projected population and demand, the current supplies, and the water management strategies for Hickory Creek SUD in Region C.

TABLE 5E.171 SUMMARY OF WATER USER GROUP – HICKORY CREEK SUD (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population in Region C	**99**	**128**	**161**	**194**	**230**	**271**
Projected Water Demand in Region C						
Municipal Demand	16	21	26	31	37	44
Total Projected Region C Demand	**16**	**21**	**26**	**31**	**37**	**44**
Currently Available Water Supplies						
Woodbine Aquifer	26	23	21	19	17	16
Total Current Supplies	***26***	***23***	***21***	***19***	***17***	***16***
Need (Demand - Current Supply)	***0***	***0***	***5***	***12***	***20***	***28***
Water Management Strategies						
Conservation	19	20	21	21	23	24
Total Water Management Strategies	***19***	***20***	***21***	***21***	***23***	***24***
Hickory Creek SUD (Region C Only) Reserve (Shortage)	***29***	***22***	***16***	***9***	***3***	***(4)***

Honey Grove

Honey Grove is located in eastern Fannin County. The city currently gets its water supplies from the Woodbine aquifer. Water management strategies for Honey Grove include water conservation and participation in the Fannin County Water Supply Project. The Fannin County Water Supply Project would be developed by Fannin County WUGs and NTMWD in order to provide a treated water supply system for Fannin County. Supplies would be treated at the Leonard WTP and then conveyed through a pipeline to participating entities. **Table 5E.172** shows the projected population and demand, the current supplies, and the water management strategies for Honey Grove. The reserve is equal to the projected decrease in groundwater use.

TABLE 5E.172 SUMMARY OF WATER USER GROUP – CITY OF HONEY GROVE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,782**	**1,828**	**1,828**	**1,828**	**1,828**	**1,828**
Projected Water Demand						
Municipal Demand	278	284	284	284	284	284
County-Other, Fannin	*50*	*50*	*50*	*50*	*50*	*50*
Total Projected Demand	***278***	***284***	***284***	***284***	***284***	***284***
Currently Available Water Supplies						
Woodbine Aquifer	284	256	228	198	170	142
County-Other, Fannin	50	50	50	50	50	50
Total Current Supplies	***284***	***256***	***228***	***198***	***170***	***142***
Need (Demand - Current Supply)	***0***	***28***	***56***	***86***	***114***	***142***
Water Management Strategies						
Water Conservation	26	72	94	95	96	97
Fannin County Water Supply Project	0	21	37	57	75	93
Total Water Management Strategies	***26***	***93***	***131***	***152***	***171***	***190***
Honey Grove Reserve (Shortage)	***32***	***65***	***75***	***66***	***57***	***48***

Ladonia

Ladonia is located in southeastern Fannin County. The city gets its water from the Trinity aquifer, and water management strategies include conservation and purchasing raw water from Upper Trinity Regional Water District and treating it. **Table 5E.173** shows the projected population and demand, the current supplies, and the water management strategies for Ladonia.

TABLE 5E.173 SUMMARY OF WATER USER GROUP – CITY OF LADONIA

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**774**	**953**	**1,373**	**2,026**	**2,500**	**2,500**
Projected Water Demand						
Municipal Demand	117	144	207	305	377	377
Total Projected Demand	***117***	***144***	***207***	***305***	***377***	***377***
Currently Available Water Supplies						
Trinity Aquifer	120	120	120	120	120	120
Total Current Supplies	***120***	***120***	***120***	***120***	***120***	***120***
Need (Demand - Current Supply)	***0***	***24***	***87***	***185***	***257***	***257***
Water Management Strategies						
Water Conservation	11	36	68	102	127	129
New Well(s) in Trinity Aquifer	0	0	40	40	40	40
Upper Trinity Regional Water District (Lake Ralph Hall); Connect; 1 MGD WTP	0	10	42	102	150	149
Total Water Management Strategies	***11***	***46***	***150***	***244***	***317***	***318***
Ladonia Reserve (Shortage)	***14***	***22***	***63***	***59***	***60***	***61***

Leonard

Leonard is located in southwestern Fannin County. The city gets its water from the Woodbine aquifer. Water management strategies for Leonard include conservation, participating in the Fannin County Water Supply Project, and water system improvements needed in order to receive supplies from the Fannin County Water Supply Project (such as an elevated storage tank).

The Fannin County Water Supply Project would be developed by Fannin County WUGs and NTMWD in order to provide a treated water supply system for Fannin County. Supplies would be treated at the Leonard WTP and then conveyed through a pipeline to participating entities. **Table 5E.174** shows the projected population and demand, the current supplies, and the water management strategies for Leonard. The reserve is equal to the projected decrease in groundwater use.

TABLE 5E.174 SUMMARY OF WATER USER GROUP – CITY OF LEONARD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,799**	**3,019**	**3,580**	**4,187**	**5,000**	**6,000**
Projected Water Demand						
Municipal Demand	383	412	488	571	682	819
Total Projected Demand	***383***	***412***	***488***	***571***	***682***	***819***
Currently Available Water Supplies						
Woodbine Aquifer	383	345	306	268	230	192
Total Current Supplies	***383***	***345***	***306***	***268***	***230***	***192***
Need (Demand - Current Supply)	***0***	***67***	***182***	***303***	***452***	***627***
Water Management Strategies						
Water Conservation	12	26	38	46	57	71
Fannin County Water Supply Project	0	63	168	279	414	573
Water System Improvement needed to take delivery of water from Fannin Co WSP	*0*	*63*	*168*	*279*	*414*	*573*
Total Water Management Strategies	***12***	***89***	***206***	***325***	***471***	***644***
Leonard Reserve (Shortage)	**12**	**22**	**24**	**22**	**19**	**17**

North Hunt Special Utility District

North Hunt SUD serves southern Fannin County in Region C and Delta and Hunt Counties in the North East Texas Region (Region D). The WSC is primarily located in the North East Texas Region (Region D). North Hunt SUD's supply is from groundwater from the Woodbine aquifer and the City of Commerce. **Table 5E.175** shows the projected population and demand, the current supplies, and the water management strategy. The water management strategies for North Hunt SUD include conservation and new groundwater wells, which are discussed in North East Texas Region Plan.

TABLE 5E.175 SUMMARY OF WATER USER GROUP – NORTH HUNT SPECIAL UTILITY DISTRICT

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	2,630	2,591	2,560	2,496	2,431	2,369
Projected Water Demand						
Municipal Demand	388	382	377	368	358	349
Total Projected Demand	***388***	***382***	***377***	***368***	***358***	***349***
Currently Available Water Supplies						
Commerce	147	147	147	147	147	147
Woodbine Aquifer	55	55	55	55	55	55
Total Current Supplies	***202***	***202***	***202***	***202***	***202***	***202***
Need (Demand - Current Supply)	***186***	***180***	***175***	***166***	***156***	***147***
Water Management Strategies						
Water Conservation	77	76	75	73	71	70
Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine)	192	192	192	192	192	192
Total Water Management Strategies	***269***	***268***	***267***	***265***	***263***	***262***
North Hunt SUD Reserve (Shortage)	***83***	***88***	***92***	***99***	***107***	***115***

Southwest Fannin County Special Utility District

Southwest Fannin County SUD serves western Fannin County and eastern Grayson County. The SUD's existing water supply comes from the Woodbine aquifer. Water management strategies for Southwest Fannin County SUD include water conservation and participation in the Fannin County Water Supply Project. The Fannin County Water Supply Project would be developed by Fannin County WUGs and NTMWD in order to provide a treated water supply system for Fannin County. Supplies would be treated at the Leonard WTP and then conveyed through a pipeline to participating entities. **Table 5E.176** shows the projected population and demand, the current supplies, and the water management strategies for Southwest Fannin County SUD.

TABLE 5E.176 SUMMARY OF WATER USER GROUP – SOUTHWEST FANNIN COUNTY SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**8,413**	**9,279**	**9,755**	**10,180**	**10,646**	**11,157**
Projected Water Demand						
Municipal Demand	818	897	943	984	1,029	1,077
Total Projected Demand	***818***	***897***	***943***	***984***	***1,029***	***1,077***
Currently Available Water Supplies						
Woodbine Aquifer	818	768	718	668	618	568
Total Current Supplies	***818***	***768***	***718***	***668***	***618***	***568***
Need (Demand - Current Supply)	***0***	***129***	***225***	***316***	***411***	***509***
Water Management Strategies						
Water Conservation	19	29	34	40	47	53
Fannin County Water Supply Project	0	125	217	303	392	484
Total Water Management Strategies	***19***	***154***	***251***	***343***	***439***	***537***
Southwest Fannin County SUD Reserve (Shortage)	***19***	***25***	***26***	***27***	***28***	***28***

Trenton

Trenton is located in southwestern Fannin County. The city gets its water from the Woodbine aquifer. Water management strategies for Trenton include conservation and a new well in the Woodbine Aquifer. An alternative water management strategy is participation in the Fannin County Water Supply Project. The Fannin County Water Supply Project would be developed by Fannin County WUGs and NTMWD in order to provide a treated water supply system for Fannin County. Supplies would be treated at the Leonard WTP and then conveyed through a pipeline to participating entities. **Table 5E.177** shows the projected population and demand, the current supplies, and the water management strategies for Trenton.

TABLE 5E.177 SUMMARY OF WATER USER GROUP – CITY OF TRENTON

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**798**	**857**	**889**	**913**	**940**	**970**
Projected Water Demand						
Municipal Demand	144	154	160	164	169	174
Total Projected Demand	***144***	***154***	***160***	***164***	***169***	***174***
Currently Available Water Supplies						
Woodbine Aquifer	144	154	160	164	169	174
Total Current Supplies	***144***	***154***	***160***	***164***	***169***	***174***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	3	5	6	6	7	7
New Well(s) in Woodbine Aquifer	50	50	50	50	50	50
Total Water Management Strategies	***53***	***55***	***56***	***56***	***57***	***57***
Trenton Reserve (Shortage)	***53***	***55***	***56***	***56***	***57***	***57***
Alternative Water Management Strategy						
Fannin County Water Supply Project (NTMWD)	0	50	50	50	50	50

West Leonard Water Supply Corporation

West Leonard Water Supply Corporation is located in Collin and Fannin Counties in Region C and Hunt County in Region D. The WSC receives its water supply from the Woodbine aquifer, and the only water management strategy is conservation. **Table 5E.178** shows the projected population and demand, the current supplies, and the water management strategies for Trenton.

TABLE 5E.178 SUMMARY OF WATER USER GROUP – WEST LEONARD WSC(REGION C AND D)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,287**	**2,764**	**3,042**	**3,327**	**3,638**	**3,979**
Projected Water Demand						
Municipal Demand	297	357	393	430	470	514
Total Projected Water Demand	***297***	***357***	***393***	***430***	***470***	***514***
Currently Available Water Supplies						
Woodbine Aquifer	297	357	393	430	470	514
Total Current Supplies	***297***	***357***	***393***	***430***	***470***	***514***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	7	11	14	16	20	23
Total Water Management Strategies	***7***	***11***	***14***	***16***	***20***	***23***
West Leonard WSC Reserve (Shortage)	***7***	***11***	***14***	***16***	***20***	***23***

White Shed Water Supply Corporation

White Shed WSC supplies water to north-central Fannin County. The WSC gets its water supply from the Woodbine aquifer and the only water management strategy is conservation. **Table 5E.179** shows the projected population and demand, the current supplies, and the water management strategies for White Shed WSC.

TABLE 5E.179 SUMMARY OF WATER USER GROUP – WHITE SHED WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,344**	**2,460**	**2,528**	**2,571**	**2,618**	**2,670**
Projected Water Demand						
Municipal Demand	245	256	263	267	272	277
Total Projected Water Demand	***245***	***256***	***263***	***267***	***272***	***277***
Currently Available Water Supplies						
Woodbine Aquifer	245	256	263	267	272	277
Total Current Supplies	***245***	***256***	***263***	***267***	***272***	***277***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	6	8	9	10	11	13
Total Water Management Strategies	***6***	***8***	***9***	***10***	***11***	***13***
White Shed WSC Reserve (Shortage)	***6***	***8***	***9***	***10***	***11***	***13***

Whitewright

Whitewright is located in eastern Grayson County with a small area in Fannin County. The city's water supply plans are discussed under Grayson County in **Section 5E.8**.

Wolfe City

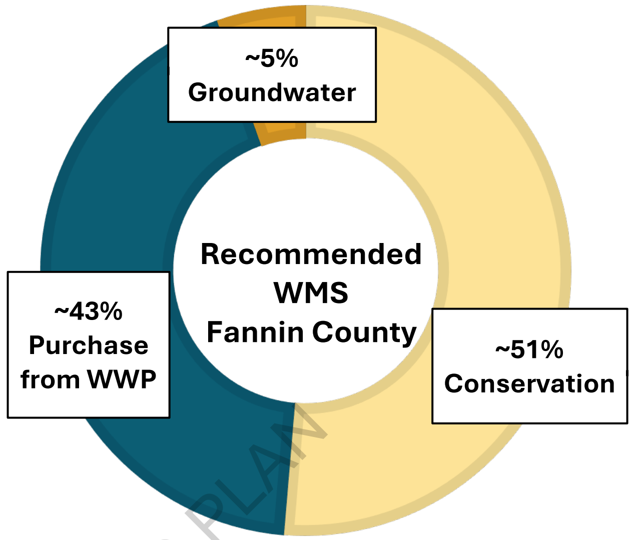
Wolfe City is located in Fannin County and Hunt County in Region D. The city gets its water supply from Turkey Creek Lake and the Woodbine aquifer. **Table 5E.180** shows the projected population and demand, the current supplies, and the water management strategies for Wolfe City. The only water management strategy for Wolfe City is conservation, which is discussed in the Region D Plan.

TABLE 5E.180 SUMMARY OF WATER USER GROUP – WOLFE CITY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	1,638	1,657	1,677	1,681	1,685	1,692
Projected Water Demand						
Municipal Demand	168	169	171	171	172	173
Total Projected Demand in Region C	***168***	***169***	***171***	***171***	***172***	***173***
Currently Available Water Supplies						
Turkey Creek Lake	190	190	190	190	190	190
Woodbine Aquifer	73	74	73	74	73	73
Total Current Supplies	***263***	***264***	***263***	***264***	***263***	***263***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Conservation	39	39	40	39	40	40
Total Water Management Strategies	***39***	***39***	***40***	***39***	***40***	***40***
Wolfe City Reserve (Shortage)	***134***	***134***	***132***	***132***	***131***	***130***

5E.6.2 Summary of Costs for Fannin County

Table 5E.181 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Fannin County. Total quantities from **Table 5E.181** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Fannin County are projected to come through conservation. Other strategies include purchases from WWPs and groundwater.

Table 5E.182 summarizes the recommended water management strategies within Fannin County individually. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.181 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR FANNIN COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	4,648	$158,560
Purchase from WWP	3,916	$0
Additional Infrastructure	*930*	*$71,662,000*
Groundwater	490	$19,013,000
Total	***9,054***	***$90,833,560***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.182 COSTS FOR WATER MANAGEMENT STRATEGIES FOR FANNIN COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
There are no wholesale water providers in Fannin County.						
WUGs						
Arledge Ridge WSC	Conservation	2030	13	$0	$28.75	$1.60
	New Well(s) in Woodbine Aquifer	2030	50	$4,298,000	$20.93	$2.39
Bois D Arc MUD	Conservation	2030	18	$0	$6.77	$2.33
	NTMWD	2040	207	$0	$4.00	$4.00
	Connect to NTMWD	*2040*	*207*	*$10,944,000*	*$3.37*	*$0.44*
Bonham	Conservation	2030	1,402	$158,560	$2.56	$1.21
	Fannin County Water Supply Project	2060	2,323	See NTMWD in **Chapter 5D**.		
Delta County MUD	Conservation	See 2026 Region D Plan				
Desert WSC	Conservation	2030	54	$0	$3.35	$1.18
Hickory Creek SUD[a] (Region C portion only)	Conservation	See 2026 Region D Plan				
	Additional Groundwater					
Honey Grove	Conservation	2030	97	$0	$1.86	$1.44
	Fannin County Water Supply Project	2040	93	See NTMWD in **Chapter 5D**.		
Ladonia	Conservation	2030	129	$0	$1.71	$1.21
	New Well(s) in Trinity Aquifer	2050	40	$4,876,000	$29.53	$3.22
	Infrastructure and treatment for water from Ralph Hall	*2040*	*150*	*$39,513,000*	*$42.40*	*$20.05*
Leonard	Conservation	2030	71	$0	$10.49	$1.37
	Fannin County Water Supply Project	2040	573	See NTMWD in **Chapter 5D**.		
	Water System Improvements	*2040*	*573*	*$21,205,000*	*$7.20*	*$1.03*

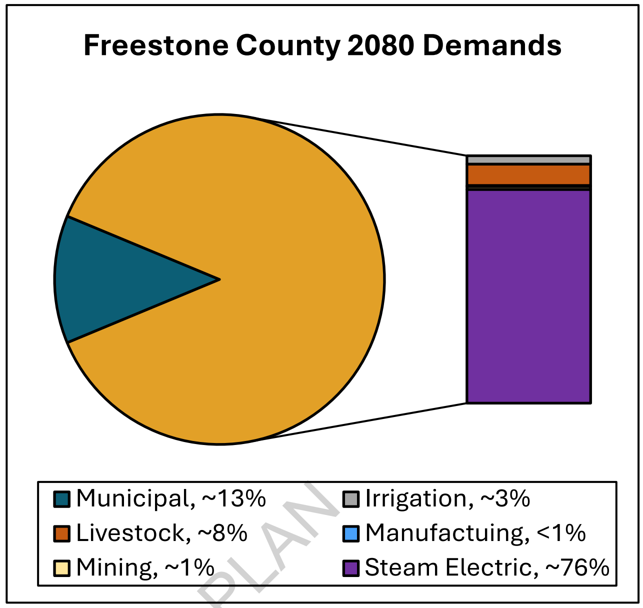
WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
North Hunt WSC[a]	Conservation	See 2026 Region D Plan.				
Savoy	Conservation	2030	4	0	5.67	2
Southwest Fannin Co SUD[a]	Conservation	2030	53	$0	$20.02	$2.88
	Fannin County Water Supply Project	2040	484	See NTMWD in **Chapter 5D**.		
Trenton	Conservation	2030	7	$0	$3.88	$1.54
	New Well(s) in Woodbine Aquifer	2030	50	$4,561,000	$22.22	$2.52
	ALTERNATIVE Fannin County Water Supply Project	2040	50	See NTMWD in **Chapter 5D**.		
West Leonard WSC	Conservation	2030	23	$0	$4.28	$1.98
White Shed WSC	Conservation	2030	13	$0	$10.73	$2.49
Whitewright[a]	Conservation	See Grayson County.				
	Connect to Sherman					
Wolfe City	Conservation	See 2026 Region D Plan.				
County Other and Non-Municipal						
County Other, Fannin	Conservation	2030	14	$0	$4.73	$0.32
	Fannin County Water Supply Project	2060	236	See NTMWD in **Chapter 5D**.		
Irrigation, Fannin	Conservation	2030	68	$0	$0.94	$0.94
	New Well(s) in Trinity Aquifer	2030	350	$5,278,000	$3.69	$0.44
Livestock, Fannin	None	None				
Manufacturing, Fannin	None	None				
Mining, Fannin	Conservation	2050	2,682	$0	$0.61	$0.61
Steam Electric Power, Fannin	None	None				

[a]Water user groups extend into more than one county.

[b]Quantities listed are for the WUG only. They do not include the WUG's customers.

[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.7 Freestone County



Freestone County is located in the southeast portion of Region C. **Figure 5E.14** shows water service areas in Freestone County.

Freestone County's population is projected to stay consistent over the planning period, declining by over 2,000 people between 2030 and 2080.

The largest demand in the county is steam electric power. However, the largest power plant in the county, Luminant's Big Brown Plant, has been shut down and is not currently operating. The demands are still included in the projections in case the plant becomes operational again over the planning horizon. The second and third largest demand categories are municipal and livestock. Mining, irrigation and manufacturing demands account for less than 5% of the county's total demands each.

Tarrant Regional Water District (TRWD) is a major water provider that provides supplies to Freestone County. An overall summary of the County's projections are shown in **Table 5E.183**, and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Freestone County Quick Facts

2020 Population: 19,435

Projected 2080 Population: 16,234

Projected 2080 Demand: 17 MGD

County Seat: Fairfield

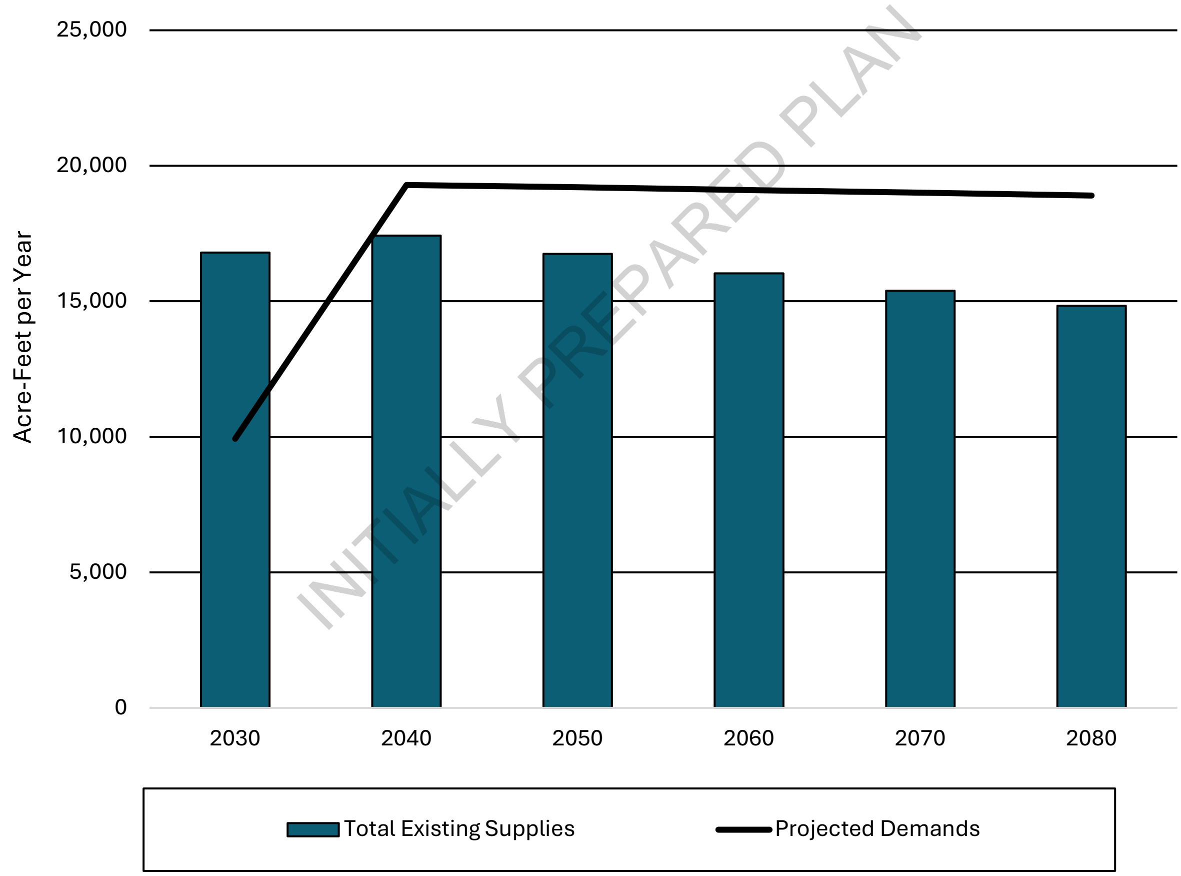
Economy: Natural gas, mining, electricity generating plants, agriculture

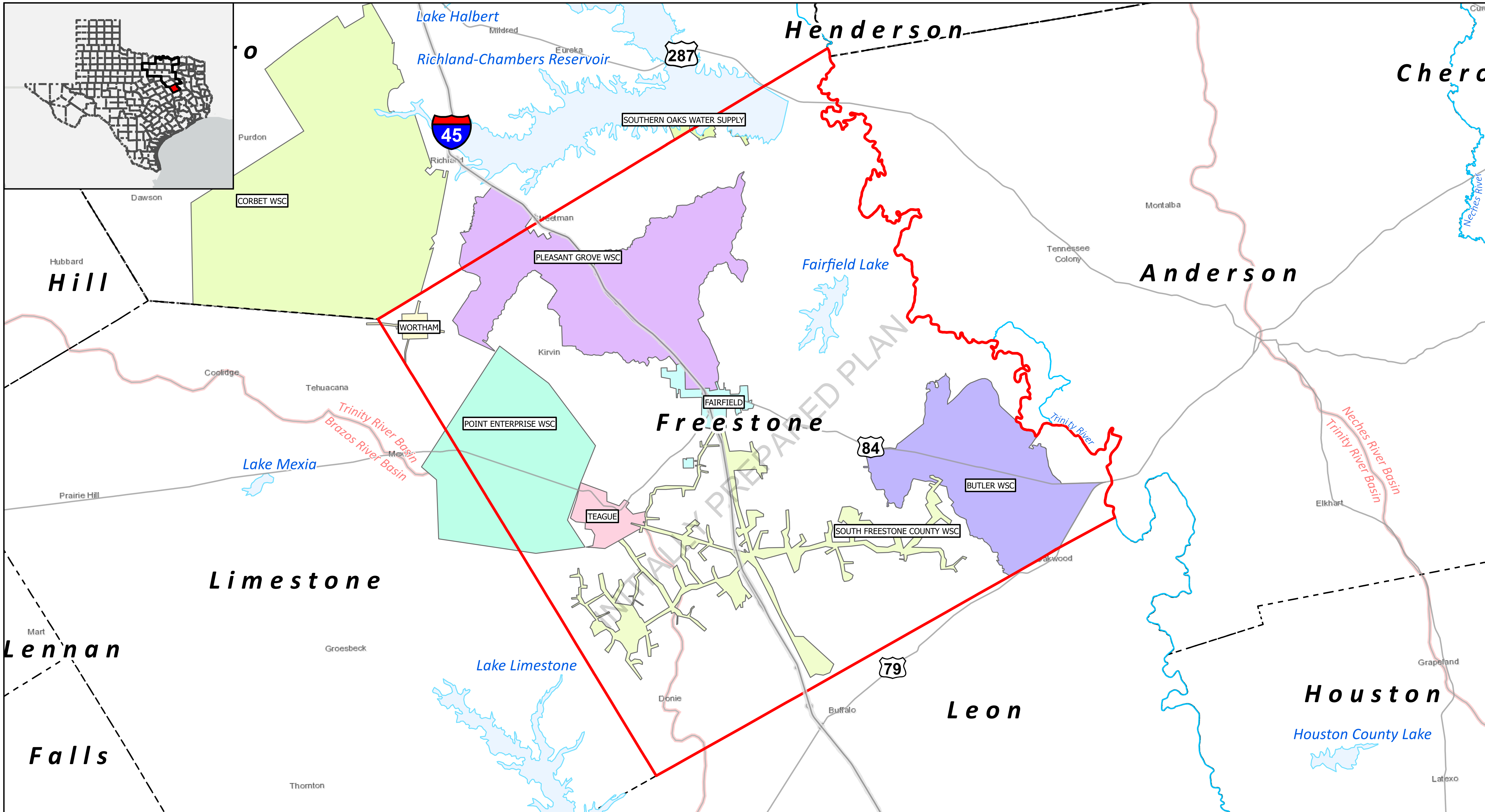
River Basins: Trinity (89%), Brazos (11%)

TABLE 5E.183 SUMMARY OF FREESTONE COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**19,057**	**18,648**	**18,067**	**17,514**	**16,905**	**16,234**
Projected Demands	**9,928**	**19,291**	**19,205**	**19,108**	**19,005**	**18,898**
Municipal	2,847	2,770	2,682	2,583	2,478	2,369
Irrigation	565	565	565	565	565	565
Livestock	1,430	1,430	1,430	1,430	1,430	1,430
Manufacturing	55	57	59	61	63	65
Mining	200	200	200	200	200	200
Steam Electric	4,831	14,269	14,269	14,269	14,269	14,269
Total Existing Supplies	***16,795***	***17,428***	***16,751***	***16,026***	***15,399***	***14,843***
Need (Demand - Supply)	***0***	***1,863***	***2,454***	***3,082***	***3,606***	***4,055***

FIGURE 5E.13 SUMMARY OF FREESTONE COUNTY





REGION C
Water Planning for North Texas

Freestone County, Texas
Figure 5E.14

N
0 5 10 Mi

Data Source(s): ESRI, TWDB, TxDOT

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.7.1 Wholesale Water Providers and Water User Groups

There are no wholesale water providers in Freestone County. Water management strategies for Freestone County water user groups are discussed below (in alphabetical order). The costs for Freestone County water user groups and a summary for Freestone County are presented in **Section 5E.7.2**

Butler Water Supply Corporation

Butler WSC provides water to Freestone County. The WSC gets its water supply from the Carrizo-Wilcox aquifer, and the only water management strategy is conservation. **Table 5E.184** shows the projected population and demand, the current supplies, and the water management strategies for Butler WSC.

TABLE 5E.184 SUMMARY OF WATER USER GROUP – BUTLER WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**838**	**830**	**818**	**794**	**767**	**737**
Projected Water Demand						
Municipal Demand	180	177	175	170	164	158
Total Projected Water Demand	***180***	***177***	***175***	***170***	***164***	***158***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	180	177	175	170	164	158
Total Current Supplies	***180***	***177***	***175***	***170***	***164***	***158***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	5	6	7	6	7	7
Total Water Management Strategies	***5***	***6***	***7***	***6***	***7***	***7***
Butler WSC Reserve (Shortage)	***5***	***6***	***7***	***6***	***7***	***7***

Fairfield

Fairfield is located in central Freestone County. The city's water supply is groundwater from the Carrizo-Wilcox aquifer. Water management strategies for Fairfield include conservation and purchasing raw water from TRWD and building a new treatment plant to reduce dependence on groundwater. **Table 5E.185** shows the projected population and demand, the current supplies, and the water management strategies for Fairfield.

TABLE 5E.185 SUMMARY OF WATER USER GROUP – CITY OF FAIRFIELD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,932**	**4,782**	**4,639**	**4,338**	**4,039**	**3,742**
Projected Water Demand						
Municipal Demand	1,007	973	944	883	822	762
Total Projected Demand	***1,007***	***973***	***944***	***883***	***822***	***762***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	1,007	973	944	883	822	762
Total Current Supplies	***1,007***	***973***	***944***	***883***	***822***	***762***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	23	30	33	34	34	34
Purchase Water from TRWD with new WTP	984	943	911	849	788	728
Total Water Management Strategies	***1,007***	***973***	***944***	***883***	***822***	***762***
Fairfield Reserve (Shortage)	***1,007***	***973***	***944***	***883***	***822***	***762***

Flo Community Water Supply Corporation

Flo Community WSC serves southern Freestone County and part of Leon County in Region H. The current water supply for this WSC in Region C is the Carrizo-Wilcox aquifer. These sources are sufficient to meet future demands, and there are no water management strategies for this water user group **Table 5E.186** shows the projected population and demand, the current supplies, and the water management strategies for Flo Community WSC in Region C.

TABLE 5E.186 SUMMARY OF WATER USER GROUP – FLO COMMUNITY WSC (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Region C Population	**150**	**150**	**150**	**150**	**150**	**150**
Projected Water Demand						
Municipal Demand	18	18	18	18	18	18
Total Projected Region C Demand	***18***	***18***	***18***	***18***	***18***	***18***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	18	18	18	18	18	18
Total Current Supplies	***18***	***18***	***18***	***18***	***18***	***18***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Flo Community WSC (Region C Only) Reserve (Shortage)	**0**	**0**	**0**	**0**	**0**	**0**

Freestone County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. The water supplies for Freestone County irrigation are surface supplies from Trinity Run-of-River and groundwater from the Carrizo-Wilcox aquifer. These existing supplies are sufficient to meet the projected demand and the only water management strategy is conservation. **Table 5E.187** shows the projected demand, the current supplies, and the water management strategies for Freestone County Irrigation.

TABLE 5E.187 SUMMARY OF WATER USER GROUP – FREESTONE COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***565***	***565***	***565***	***565***	***565***	***565***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	565	565	565	565	565	565
Trinity Run-of-River	91	91	91	91	91	91
Total Current Supplies	***565***	***565***	***565***	***565***	***565***	***565***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	0	2	4	5	6	7
Total Water Management Strategies	***0***	***2***	***4***	***5***	***6***	***7***
Irrigation, Freestone Reserve (Shortage)	***0***	***2***	***4***	***5***	***6***	***7***

Freestone County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. The water supplies for Freestone County Livestock are local surface water supplies and groundwater (Carrizo-Wilcox aquifer). These supplies are sufficient to meet projected demands, and there are no water management strategies. **Table 5E.188** shows the projected demand, current supplies, and water management strategy for Freestone County Livestock.

TABLE 5E.188 SUMMARY OF WATER USER GROUP – FREESTONE COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,430***	***1,430***	***1,430***	***1,430***	***1,430***	***1,430***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	387	387	387	387	387	387
Brazos Livestock Local Supply	106	106	106	106	106	106
Trinity Livestock Local Supply	1,229	1,229	1,229	1,229	1,229	1,229
Total Current Supplies	***1,722***	***1,722***	***1,722***	***1,722***	***1,722***	***1,722***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Freestone Reserve (Shortage)	***292***	***292***	***292***	***292***	***292***	***292***

Freestone County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. The water supply for Freestone County Manufacturing is groundwater from the Carrizo-Wilcox aquifer through the City of Teague. The existing supplies are sufficient to meet the projected demand, and there are no water management strategies for Freestone County Manufacturing. **Table 5E.189** shows the projected demand, the current supplies, and the water management strategies for Freestone County Manufacturing.

TABLE 5E.189 SUMMARY OF WATER USER GROUPS – FREESTONE COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***55***	***57***	***59***	***61***	***63***	***65***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	55	57	59	61	63	65
Total Current Supplies	***55***	***57***	***59***	***61***	***63***	***65***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Manufacturing, Freestone Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Freestone County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. The water supplies for Freestone County Mining are local supplies and groundwater from the Carrizo-Wilcox aquifer. These sources are sufficient to meet future demands, and there are no water management strategies for this water user group. **Table 5E.190** shows the projected demand, the current supplies, and the water management strategies for Freestone County Mining.

TABLE 5E.190 SUMMARY OF WATER USER GROUPS – FREESTONE COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***200***	***200***	***200***	***200***	***200***	***200***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	168	168	168	168	168	168
Trinity Other Local Supply	32	32	32	32	32	32
Total Current Supplies	***200***	***200***	***200***	***200***	***200***	***200***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Mining, Freestone Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Freestone County Other

Freestone County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups. The water supplies for these entities are run-of-the-river local supply and groundwater from the Carrizo-Wilcox aquifer. Water management strategies for these entities include conservation. **Table 5E.191** shows the projected population and demand, the current supplies, and the water management strategies for Freestone County Other.

TABLE 5E.191 SUMMARY OF WATER USER GROUP – FREESTONE COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,337**	**3,063**	**2,622**	**2,661**	**2,675**	**2,657**
Projected Water Demand						
Municipal Demand	326	297	254	258	259	257
Total Projected Water Demand	***326***	***297***	***254***	***258***	***259***	***257***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	940	940	940	940	940	940
Trinity Run-of-River	41	41	41	41	41	41
Total Current Supplies	***981***	***981***	***981***	***981***	***981***	***981***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	3	3	4	4	5	6
Total Water Management Strategies	***3***	***3***	***4***	***4***	***5***	***6***
County-Other, Freestone Reserve (Shortage)	***658***	***687***	***731***	***727***	***727***	***730***

Freestone County Steam Electric Power

Steam electric power demands generally represent the cooling water needs during power generation. These demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. The current water supplies for Freestone County Steam Electric Power are groundwater (Carrizo-Wilcox aquifer), supplies from Lake Fairfield, and TRWD water through TRA. Water management strategies for Freestone County Steam Electric Power are purchasing additional water from TRWD.

Table 5E.192 shows the projected demand, the current supplies, and the water management strategies for Freestone County Steam Electric Power. Conservation was considered for this water user group, but it is not recommended because the steam electric demand projections themselves considered items such as future efficiency programs. It is projected that future needs will be met through groundwater. However, due to MAG limitations, there is no more groundwater supply available within the county. It was determined to leave some steam electric demand as an unmet need in the *2026 Region C Regional Water Plan*.

TABLE 5E.192 SUMMARY OF WATER USER GROUP – FREESTONE COUNTY STEAM ELECTRIC POWER

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***4,831***	***14,269***	***14,269***	***14,269***	***14,269***	***14,269***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	70	70	70	70	70	70
Fairfield Lake/Reservoir	6,395	6,163	5,930	5,725	5,520	5,315
Tarrant Regional WD	4,107	5,054	4,694	4,278	3,964	3,722
Total Current Supplies	***10,572***	***11,287***	***10,694***	***10,073***	***9,554***	***9,107***
Need (Demand - Current Supply)	***0***	***2,982***	***3,575***	***4,196***	***4,715***	***5,162***
Water Management Strategies						
Additional Supplies from TRWD	654	1,598	1,958	2,374	2,688	2,930
Total Water Management Strategies	***654***	***1,598***	***1,958***	***2,374***	***2,688***	***2,930***
Steam-Electric Power, Freestone Reserve (Shortage)	***6,395***	***(1,384)***	***(1,617)***	***(1,822)***	***(2,027)***	***(2,232)***

Pleasant Grove WSC

Pleasant Grove WSC provides water in Freestone and Navarro Counties. The WSC gets its water supply from the Carrizo Wilcox aquifer. The only water management strategy is conservation. **Table 5E.193** shows the projected population and demand, the current supplies, and the water management strategies for Pleasant Grove WSC.

TABLE 5E.193 SUMMARY OF WATER USER GROUP – PLEASANT GROVE WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,445**	**1,560**	**1,711**	**1,674**	**1,633**	**1,588**
Projected Water Demand						
Municipal Demand	138	148	162	159	155	151
Total Projected Water Demand	***138***	***148***	***162***	***159***	***155***	***151***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	138	148	162	159	155	151
Total Current Supplies	***138***	***148***	***162***	***159***	***155***	***151***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	3	5	6	6	7	7
Total Water Management Strategies	***3***	***5***	***6***	***6***	***7***	***7***
Pleasant Grove WSC Reserve (Shortage)	***3***	***5***	***6***	***6***	***7***	***7***

Point Enterprise Water Supply Corporation

Point Enterprise WSC supplies water in Freestone County in Region C and Limestone County in Region G. The WSC gets its water supply from the Carrizo-Wilcox Aquifer, and the only water management strategy is conservation. **Table 5E.194** shows the projected population and demand, the current supplies, and the water management strategies for Point Enterprise WSC.

TABLE 5E.194 SUMMARY OF WATER USER GROUP – POINT ENTERPRISE WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,311**	**1,289**	**1,258**	**1,241**	**1,223**	**1,203**
Projected Water Demand						
Municipal Demand	181	178	173	171	168	165
Total Projected Water Demand	***181***	***178***	***173***	***171***	***168***	***165***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	181	178	173	171	168	165
Total Current Supplies	***181***	***178***	***173***	***171***	***168***	***165***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	4	6	5	7	7	7
Total Water Management Strategies	***4***	***6***	***5***	***7***	***7***	***7***
Point Enterprise WSC Reserve (Shortage)	***4***	***6***	***5***	***7***	***7***	***7***

South Freestone County Water Supply Corporation

South Freestone County WSC supplies Freestone County. The WSC gets its water supply from the Carrizo-Wilcox Aquifer. The only water management strategy is conservation. **Table 5E.195** shows the projected population and demand, the current supplies, and the water management strategies for South Freestone County WSC.

TABLE 5E.195 SUMMARY OF WATER USER GROUP – SOUTH FREESTONE COUNTY WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,598**	**2,720**	**2,880**	**2,799**	**2,708**	**2,608**
Projected Water Demand						
Municipal Demand	250	260	275	267	258	249
Total Projected Water Demand	***250***	***260***	***275***	***267***	***258***	***249***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	250	260	275	267	258	249
Total Current Supplies	***250***	***260***	***275***	***267***	***258***	***249***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	6	8	10	10	10	11
Total Water Management Strategies	***6***	***8***	***10***	***10***	***10***	***11***
South Freestone County WSC Reserve (Shortage)	***6***	***8***	***10***	***10***	***10***	***11***

Southern Oaks Water Supply

Southern Oaks Water Supply is located supplies Freestone County. The WSC gets its water supply from the Carrizo-Wilcox Aquifer. The only water management strategy for the WSC is conservation. **Table 5E.196** shows the projected population and demand, the current supplies, and the water management strategies for South Freestone County WSC.

TABLE 5E.196 SUMMARY OF WATER USER GROUP – SOUTHERN OAKS WATER SUPPLY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**838**	**1,077**	**1,368**	**1,393**	**1,418**	**1,444**
Projected Water Demand						
Municipal Demand	150	194	245	249	254	259
Total Projected Demand	***150***	***194***	***245***	***249***	***254***	***259***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	259	259	259	259	259	259
Total Current Supplies	***259***	***259***	***259***	***259***	***259***	***259***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	5	7	11	12	13	14
Total Water Management Strategies	***5***	***7***	***11***	***12***	***13***	***14***
Southern Oaks Water Supply Reserve (Shortage)	***114***	***72***	***25***	***22***	***18***	***14***

Teague

Teague is located in western Freestone County. The city's water supply is groundwater from the Carrizo-Wilcox aquifer. The only water management strategy for Teague is conservation. **Table 5E.197** shows the projected population and demand, the current supplies, and the water management strategies for Teague.

TABLE 5E.197 SUMMARY OF WATER USER GROUP – CITY OF TEAGUE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,437**	**3,142**	**2,738**	**2,646**	**2,545**	**2,435**
Projected Water Demand						
Municipal Demand	575	524	457	441	424	406
Total Projected Demand	***575***	***524***	***457***	***441***	***424***	***406***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	575	524	457	441	424	406
Total Current Supplies	***575***	***524***	***457***	***441***	***424***	***406***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	54	131	151	147	142	138
Total Water Management Strategies	***54***	***131***	***151***	***147***	***142***	***138***
Teague Reserve (Shortage)	***54***	***131***	***151***	***147***	***142***	***138***

Wortham

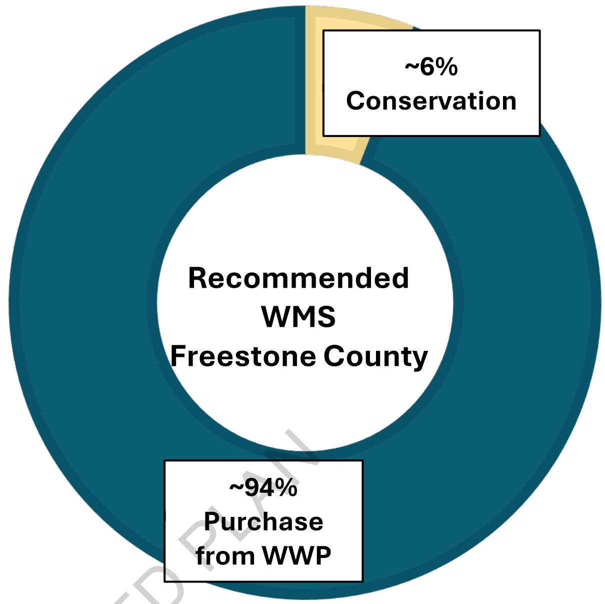
Wortham is a city located in western Freestone County. The city's water supply is purchased water from Mexia (which is located in the Brazos G Region). Water management strategies for Wortham include conservation. **Table 5E.198** shows the projected population and demand, the current supplies, and the water management strategies for Wortham.

TABLE 5E.198 SUMMARY OF WATER USER GROUP – CITY OF WORTHAM

(Values in Ac-Ft/Yr)	Projected Population and Demand					
	2030	2040	2050	2060	2070	2080
Projected Population	**925**	**841**	**724**	**700**	**673**	**644**
Projected Water Demand						
Municipal Demand	128	116	100	96	92	89
Total Projected Demand	***128***	***116***	***100***	***96***	***92***	***89***
Currently Available Water Supplies						
Mexia	128	116	100	96	92	89
Total Current Supplies	***128***	***116***	***100***	***96***	***92***	***89***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	3	4	4	3	4	4
Total Water Management Strategies	***3***	***4***	***4***	***3***	***4***	***4***
Wortham Reserve (Shortage)	***3***	***4***	***4***	***3***	***4***	***4***

5E.7.2 Summary of Costs for Freestone County

Table 5E.199 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Freestone County. Total quantities from **Table 5E.199** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Freestone County are projected to come through purchases from wholesale water providers. The only other strategy in Freestone County is conservation.

Table 5E.200 summarizes the recommended water management strategies within Freestone County individually. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.199 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR FREESTONE COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	248	$8,560
Purchase from WWP	3,914	$0
Additional Infrastructure	*984*	*$84,722,000*
Groundwater	0	$0
Total	***4,162***	***$84,730,560***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

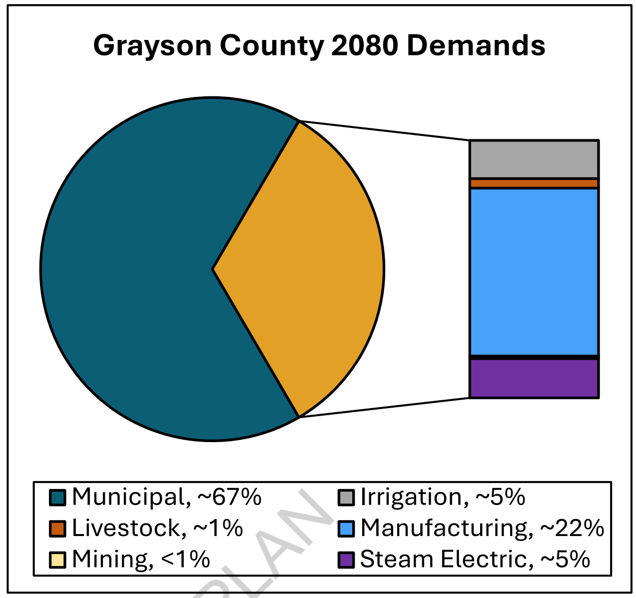
TABLE 5E.200 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR FREESTONE COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
There are no wholesale water providers in Freestone County.						
WUGs						
Butler WSC	Conservation	2030	7	$0	$2.42	$1.21
Fairfield	Conservation	2030	34	$0	$2.91	$1.34
	TRWD	2050	984	$0	$1.50	$1.50
	New WTP and transmission	*2050*	*984*	*$84,722,000*	*$22.55*	*$8.19*
Flo Community WSC[a] (Region C only)	Conservation	See 2026 Region H Plan.				
	New Wells					
Pleasant Grove WSC	Conservation	2030	7	$0	$5.72	$2.74
Point Enterprise WSC	Conservation	2030	7	$0	$3.97	$2.27
South Freestone County WSC	Conservation	2030	11	$0	$11.58	$2.52
Southern Oaks Water Supply	Conservation	2030	14	$8,560	$2.93	$1.46
Teague	Conservation	2030	151	$0	$1.71	$1.37
Wortham	Conservation	2030	4	$0	$5.74	$2.04
	Mexia	See 2026 Region G Plan.				
County Other and Non-Municipal						
County Other, Freestone	Conservation	2030	6	$0	$4.19	$0.27
Irrigation, Freestone	Conservation	2040	7	$0	$0.94	$0.94
Livestock, Freestone	None	None				
Manufacturing, Freestone	None	None				
Mining, Freestone	None	None				
Steam Electric Power, Freestone	TRWD	2030	2,930	$0	$4.00	$4.00

[a]Water user groups extend into more than one county
[b]Quantities listed are for the WUG only. They do not include the WUG's customers.
[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.8 Grayson County

Grayson County is located in the northern portion of Region C. **Figure 5E.16** shows water service areas in Grayson County.



Grayson County is growing rapidly, and the county's population is projected to increase by over 147,000 between 2030 and 2080.

The 2080 projected demands for the county are predominately municipal. The second largest demands are manufacturing. Irrigation, livestock, mining, and steam electric power demands account for less than 12% of the county's total demands.

Greater Texoma Utility Authority (GTUA) is a regional water provider that provides supplies to Grayson County. Several of the entities in this area hold water rights in Lake Texoma but currently do not have access to this resource. The GTUA Regional Water System strategy would make additional supplies available by treating Lake Texoma water and delivering to these entities.

An overall summary of the county's projections is shown in **Table 5E.201** and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Grayson County Quick Facts

2020 Population: 135,543

Projected 2080 Population: 317,713

Projected 2080 Demand: 81 MGD

County Seat: Sherman

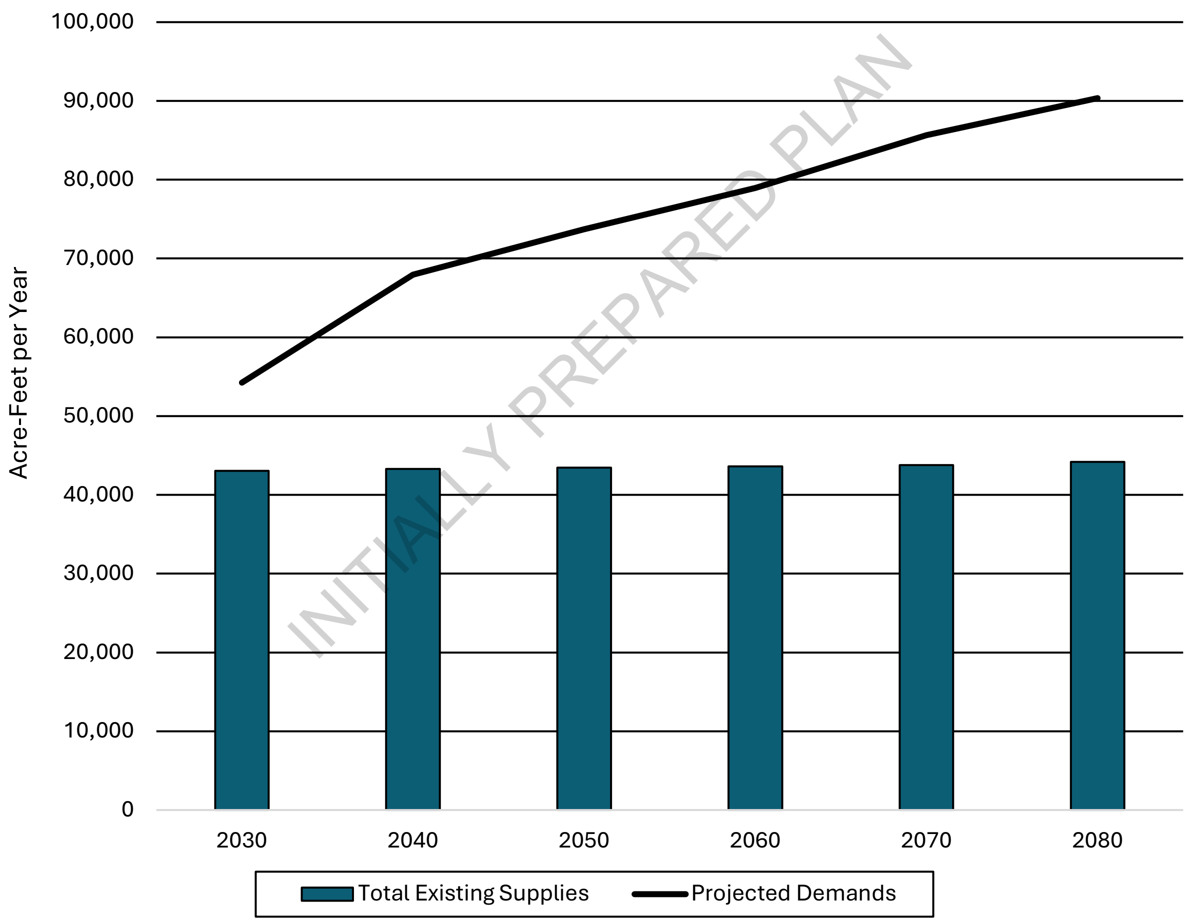
Economy: Manufacturing, distribution and trade; tourism; mineral production

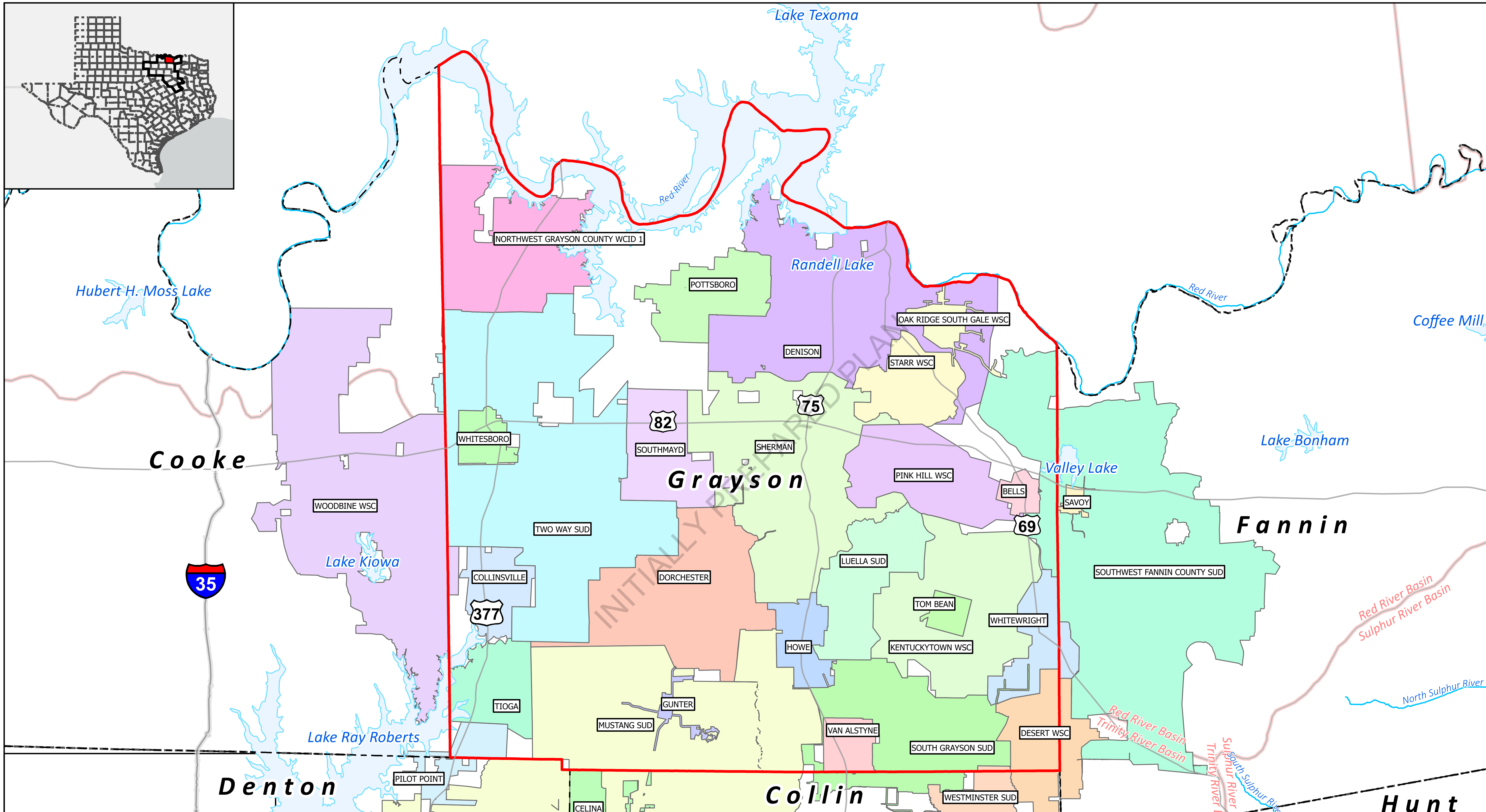
River Basins: Trinity (36%), Red (64%)

TABLE 5E.201 SUMMARY OF GRAYSON COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**169,780**	**200,021**	**231,274**	**257,654**	**292,518**	**317,713**
Projected Demands	**54,245**	**67,933**	**73,732**	**78,945**	**85,660**	**90,355**
Municipal	32,673	38,417	44,111	49,215	55,817	60,395
Irrigation	4,450	4,450	4,450	4,450	4,450	4,450
Livestock	1,106	1,106	1,106	1,106	1,106	1,106
Manufacturing	11,148	19,092	19,197	19,306	19,419	19,536
Mining	295	295	295	295	295	295
Steam Electric	4,573	4,573	4,573	4,573	4,573	4,573
Total Existing Supplies	***43,056***	***43,305***	***43,440***	***43,621***	***43,786***	***44,171***
Need (Demand - Supply)	***11,189***	***24,628***	***30,292***	***35,324***	***41,874***	***46,184***

FIGURE 5E.15 SUMMARY OF GRAYSON COUNTY





REGION C
Water Planning for North Texas

Grayson County, Texas
Figure 5E.16

Data Source(s): ESRI, TWDB, TxDOT

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.8.1 Wholesale Water Provider and Water User Groups

Water management strategies for Grayson County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs for recommended and alternative water management strategies are presented in **Section 5E.8.2. Appendix H** has more detailed cost estimates.

Bells

Bells is located in eastern Grayson County. The city gets its water supply from groundwater (Woodbine and Trinity aquifers). Water management strategies for Bells include implementing conservation measures, constructing new well(s) in the Woodbine Aquifer, and connecting to and purchasing water from Sherman. **Table 5E.202** shows the projected population and demand, the current supplies, and the water management strategies for Bells.

TABLE 5E.202 SUMMARY OF WATER USER GROUP – CITY OF BELLS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,743**	**1,900**	**2,031**	**2,147**	**2,275**	**2,416**
Projected Water Demand						
Municipal Demand	179	194	207	219	232	246
Total Projected Demand	***179***	***194***	***207***	***219***	***232***	***246***
Currently Available Water Supplies						
Woodbine Aquifer	107	107	107	107	107	107
Total Current Supplies	***107***	***107***	***107***	***107***	***107***	***107***
Need (Demand - Current Supply)	***72***	***87***	***100***	***112***	***125***	***139***
Water Management Strategies						
Water Conservation	5	6	7	8	10	11
Connect to Sherman	70	84	97	108	120	133
New Well(s) in Woodbine Aquifer	45	45	45	45	45	45
Total Water Management Strategies	***120***	***135***	***149***	***161***	***175***	***189***
Bells Reserve (Shortage)	***48***	***48***	***49***	***49***	***50***	***50***

Collinsville

Collinsville is located in western Grayson County. The city gets its water supply from the Trinity aquifer. Water management strategies for Collinsville include conservation, new groundwater wells in the Trinity Aquifer, and supplies from a new GTUA Regional Water System. For more information on the new GTUA Regional Water System see **Chapter 5C** and **Appendix G**. **Table 5E.203** shows the projected population and demand, the current supplies, and the water management strategies for Collinsville.

TABLE 5E.203 SUMMARY OF WATER USER GROUP – CITY OF COLLINSVILLE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,641**	**2,907**	**3,129**	**3,331**	**3,552**	**3,794**
Projected Water Demand						
Municipal Demand	280	306	329	351	374	399
Total Projected Water Demand	***280***	***306***	***329***	***351***	***374***	***399***
Currently Available Water Supplies						
Trinity Aquifer	242	242	242	242	242	242
Total Current Supplies	***242***	***242***	***242***	***242***	***242***	***242***
Need (Demand - Current Supply)	***38***	***64***	***87***	***109***	***132***	***157***
Water Management Strategies						
Water Conservation	6	10	12	14	15	18
New Well(s) in Trinity Aquifer	40	40	40	40	40	40
Supplies from New GTUA Regional Water System	0	500	500	500	500	500
Total Water Management Strategies	***46***	***550***	***552***	***554***	***555***	***558***
Collinsville Reserve (Shortage)	***8***	***486***	***465***	***445***	***423***	***401***

Denison

Denison is one of the two largest cities in Grayson County and is located in the northern part of the county. Denison is a wholesale water provider (WWP) that currently provides treated water to residents of Denison, Pottsboro, Oak Ridge South Gale WSC, and rural areas of Grayson County. Denison also provides water to Grayson County manufacturing users.

Denison's current sources of water supply are groundwater, Lake Randell, and Lake Texoma. Denison's water right in Lake Randell is 5,280 acre-feet per year, but the firm yield for Lake Randell as calculated by the approved TCEQ Water Availability Model (modeled without backup supplies from Lake Texoma) is 1,600 acre-feet per year. Denison holds a water right from Lake Texoma for 24,400 acre-feet per year, and Denison also has an agreement to purchase an additional 12,204 acre-feet per year of Lake Texoma water from GTUA. One of Denison's customers, Pottsboro, also has an agreement to purchase 5,650 acre-feet per year of Lake Texoma water from GTUA. Denison has an existing intake structure and pipeline that currently delivers water from Lake Texoma to Lake Randell. A conventional treatment plant with a peak capacity of 13 MGD is located near Lake Randell and treats the blended water from Lake Randell and Lake Texoma. Using a peaking factor of 2, Denison can treat up to 7,200 acre-feet per year for municipal supplies.

The proposed future strategies for Denison are to implement water conservation measures and develop additional Lake Texoma supplies with infrastructure improvements. Denison will need to add water treatment plant capacity and expand the raw water delivery infrastructure from Lake Texoma to access these additional supplies.

The amount of water currently available to Denison is partially limited by the capacity of its water treatment plant. Denison will need to develop a total treatment capacity of 46 MGD to meet its projected 2080 demands. Due to the high TDS of Lake Texoma, planning level treatment costs are based on advanced desalination treatment. The city currently blends the two sources to resolve quality issues. However, due to the limitations placed on supplies from Lake Randell, any additional Texoma water will need advanced treatment. Along with the water treatment expansions, Denison will also need to expand its current delivery infrastructure from Lake Texoma. **Table 5E.204** shows the projected demand, the current supplies, and the water management strategies for Denison.

TABLE 5E.204 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – DENISON

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Denison	11,860	15,077	17,969	20,896	24,712	26,830
County-Other, Grayson	400	400	400	400	400	400
Manufacturing, Grayson	500	500	500	500	500	500
Oak Ridge South Gale WSC	236	239	244	245	247	249
Pottsboro	484	535	580	620	663	711
Total Projected Demands	***13,480***	***16,751***	***19,693***	***22,661***	***26,522***	***28,690***
Currently Available Water Supplies						
Lake Randell	1,600	1,600	1,600	1,600	1,600	1,600
Lake Texoma (Water Right)	24,400	24,400	24,400	24,400	24,400	24,400
Lake Texoma (Contracted with GTUA for Denison and Pottsboro)	17,854	17,854	17,854	17,854	17,854	17,854
Woodbine Aquifer	84	84	84	84	84	84
Total Current Supplies	***43,938***	***43,938***	***43,938***	***43,938***	***43,938***	***43,938***
Total Supplies Limited by WTP Capacity (13 MGD Denison)	***7,871***	***7,871***	***7,871***	***7,871***	***7,871***	***7,871***
Need (Demand less Supply)	***5,609***	***8,880***	***11,822***	***14,790***	***18,651***	***20,819***
Water Management Strategies						
Conservation (retail)	682	1,269	1,616	1,951	2,412	2,614
Conservation (customers)	21	30	35	42	48	53
Additional Lake Texoma with Infrastructure as follows:	4,906	7,581	10,171	12,797	16,191	18,152
12 MGD Desalination WTP Expansion	*4,906*	*6,726*	*6,726*	*6,726*	*6,726*	*6,726*
21 MGD Desalination WTP Expansion	*0*	*855*	*3,445*	*6,071*	*9,465*	*11,426*
Expand Raw Water delivery from Lake Texoma	*4,906*	*7,581*	*10,171*	*12,797*	*16,191*	*18,152*
Total Supplies from Strategies	***5,609***	***8,880***	***11,822***	***14,790***	***18,651***	***20,819***
Total Supplies	***13,480***	***16,751***	***19,693***	***22,661***	***26,522***	***28,690***
Reserve or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

Desert WSC

Desert WSC is located in Fannin, Collin, and Grayson Counties. Water management strategies for Desert WSC are discussed under Fannin County in **Section 5E.5**.

Dorchester

Dorchester is located in Grayson County. The city gets its water supply from the Woodbine aquifer and the Trinity aquifer through Sherman. The only water management strategy is conservation. **Table 5E.205** shows the projected population and demand, the current supplies, and the water management strategies for Dorchester.

TABLE 5E.205 SUMMARY OF WATER USER GROUP – DORCHESTER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,287**	**1,322**	**1,350**	**1,361**	**1,376**	**1,394**
Projected Water Demand						
Municipal Demand	222	228	232	234	237	240
Total Projected Water Demand	***222***	***228***	***232***	***234***	***237***	***240***
Currently Available Water Supplies						
Sherman (Trinity Aquifer)	62	68	72	74	77	80
Woodbine Aquifer	160	160	160	160	160	160
Total Current Supplies	***222***	***228***	***232***	***234***	***237***	***240***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	19	52	69	70	72	74
Total Water Management Strategies	***19***	***52***	***69***	***70***	***72***	***74***
Dorchester Reserve (Shortage)	***19***	***52***	***69***	***70***	***72***	***74***

Grayson County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. Grayson County Irrigation gets its water supply from local supplies and groundwater (Trinity and Woodbine aquifers). The only water management strategy is conservation. **Table 5E.206** shows the projected demand, the current supplies, and the water management strategies for Grayson County Irrigation.

TABLE 5E.206 SUMMARY OF WATER USER GROUP – GRAYSON COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***4,450***	***4,450***	***4,450***	***4,450***	***4,450***	***4,450***
Currently Available Water Supplies						
Red Run-of-River	768	768	768	768	768	768
Trinity Aquifer	1,692	1,692	1,692	1,692	1,692	1,692
Woodbine Aquifer	1,990	1,990	1,990	1,990	1,990	1,990
Total Current Supplies	***4,450***	***4,450***	***4,450***	***4,450***	***4,450***	***4,450***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	2	32	62	77	92	106
Total Water Management Strategies	***2***	***32***	***62***	***77***	***92***	***106***
Irrigation, Grayson Reserve (Shortage)	***2***	***32***	***62***	***77***	***92***	***106***

Grayson County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. The current supplies are local surface water supplies and groundwater from the Woodbine aquifer. These sources are sufficient to meet future demands, and there are no water management strategies for this water user group. **Table 5E.207** shows the projected demand, current supplies, and water management strategies for Grayson County Livestock.

TABLE 5E.207 SUMMARY OF WATER USER GROUP – GRAYSON COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,106***	***1,106***	***1,106***	***1,106***	***1,106***	***1,106***
Currently Available Water Supplies						
Woodbine Aquifer	173	173	173	173	173	173
Red Livestock Local Supply	566	566	566	566	566	566
Trinity Livestock Local Supply	367	367	367	367	367	367
Total Current Supplies	***1,106***	***1,106***	***1,106***	***1,106***	***1,106***	***1,106***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Grayson Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Grayson County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. Current supplies include Sherman (from Lake Texoma), Denison, Howe (from GTUA and NTMWD), groundwater (Woodbine aquifer), and run-of-river. Water management strategies for this group include additional supplies from NTMWD (through GTUA through Howe) and additional supplies from Sherman. An alternative strategy would be direct reuse from Sherman. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG. **Table 5E.208** shows the projected demand, the current supplies, and the water management strategies for Grayson County Manufacturing.

TABLE 5E.208 SUMMARY OF WATER USER GROUP – GRAYSON COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***11,148***	***19,092***	***19,197***	***19,306***	***19,419***	***19,536***
Currently Available Water Supplies						
Sherman	6,968	8,089	7,836	7,631	7,403	7,173
Denison	500	500	500	500	500	500
Howe	30	30	30	29	27	30
Woodbine Aquifer	500	500	500	500	500	694
Red Run-of-River	3	3	3	3	3	3
Total Current Supplies	***8,001***	***9,122***	***8,869***	***8,663***	***8,433***	***8,400***
Need (Demand - Current Supply)	***3,147***	***9,970***	***10,328***	***10,643***	***10,986***	***11,136***
Water Management Strategies						
Additional Supplies from NTMWD through GTUA through Howe (CGMA)	20	20	20	21	23	70
Additional Supplies from Sherman	3,147	9,970	10,328	10,643	10,986	11,136
Total Water Management Strategies	***3,167***	***9,990***	***10,348***	***10,664***	***11,009***	***11,206***
Manufacturing, Grayson Reserve (Shortage)	***20***	***20***	***20***	***21***	***23***	***70***
Alternative Water Management Strategy						
Direct Reuse from Sherman	0	561	561	561	561	561

Grayson County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Grayson County Mining is supplied from groundwater (Trinity aquifer). This source is sufficient to meet future demands, and there are no water management strategies for this water user group. **Table 5E.209** shows the projected demand, the current supplies, and the water management strategies for Grayson County Mining. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple companies, industries, facilities, and types of processes that make up this WUG.

TABLE 5E.209 SUMMARY OF WATER USER GROUP – GRAYSON COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***295***	***295***	***295***	***295***	***295***	***295***
Currently Available Water Supplies						
Trinity Aquifer	295	295	295	295	295	295
Total Current Supplies	***295***	***295***	***295***	***295***	***295***	***295***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Mining, Grayson Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Grayson County Other

Grayson County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups. The entities receive their water supply from Denison (Lake Texoma and Lake Randell), the Red River Authority (Lake Texoma), Sherman (GTUA), Northwest Grayson County WCID 1 (Trinity Aquifer), and the Woodbine aquifer. Water management strategies for these entities include conservation and additional supplies through Denison and Sherman. **Table 5E.210** shows the projected population and demand, the current supplies, and the water management strategies for Grayson County Other.

TABLE 5E.210 SUMMARY OF WATER USER GROUP – GRAYSON COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**11,157**	**10,489**	**11,085**	**11,680**	**12,800**	**13,000**
Projected Water Demand						
Municipal Demand	1,372	1,282	1,355	1,428	1,565	1,589
Total Projected Water Demand	***1,372***	***1,282***	***1,355***	***1,428***	***1,565***	***1,589***
Currently Available Water Supplies						
Denison	240	191	162	141	120	111
Red River Authority	254	304	347	390	436	486
Sherman	288	125	133	141	173	158
Northwest Grayson County WCID 1	200	200	200	200	200	200
Woodbine Aquifer	100	100	100	100	100	100
Total Current Supplies	***1,082***	***920***	***942***	***972***	***1,029***	***1,055***
Need (Demand - Current Supply)	***290***	***362***	***413***	***456***	***536***	***534***
Water Management Strategies						
Water Conservation	13	16	22	27	35	41
Additional Supplies through Denison	156	204	232	251	271	279
Additional Supplies through Sherman	126	150	170	191	246	235
Total Water Management Strategies	***295***	***370***	***424***	***469***	***552***	***555***
County-Other, Grayson Reserve (Shortage)	***5***	***8***	***11***	***13***	***16***	***21***

Grayson County Steam Electric Power

Steam electric power demands generally represent the cooling water needs during power generation. These demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. The current supply for this water user group is treated water from Lake Texoma from GTUA through Sherman. This source is sufficient to meet future demands, and there are no water management strategies for this water user group. **Table 5E.211** shows the projected demand, the current supplies, and the water management strategies for Grayson County Steam Electric Power.

TABLE 5E.211 SUMMARY OF WATER USER GROUP – GRAYSON COUNTY SEP

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***4,573***	***4,573***	***4,573***	***4,573***	***4,573***	***4,573***
Currently Available Water Supplies						
Sherman	4,573	4,573	4,573	4,573	4,573	4,573
Total Current Supplies	***4,573***	***4,573***	***4,573***	***4,573***	***4,573***	***4,573***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None	0	0	0	0	0	0
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Steam-Electric Power, Grayson Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Gunter

Gunter is located in southern Grayson County. The city gets water supplies from the Trinity aquifer and Mustang SUD. Water management strategies for Gunter include conservation and additional supplies from Mustang SUD. **Table 5E.212** shows the projected population and demand, the current supplies, and the water management strategies for Gunter.

TABLE 5E.212 SUMMARY OF WATER USER GROUP – CITY OF GUNTER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,940**	**2,258**	**2,523**	**2,782**	**3,064**	**3,371**
Projected Water Demand						
Municipal Demand	305	354	395	436	480	528
Total Projected Demand	***305***	***354***	***395***	***436***	***480***	***528***
Currently Available Water Supplies						
Trinity Aquifer	175	175	175	175	175	175
Mustang SUD	130	129	120	128	135	142
Total Current Supplies	***305***	***304***	***295***	***303***	***310***	***317***
Need (Demand - Current Supply)	***0***	***50***	***100***	***133***	***170***	***211***
Water Management Strategies						
Water Conservation	8	11	14	17	20	25
Additional Supplies from Mustang SUD	0	44	92	123	157	194
Total Water Management Strategies	***8***	***55***	***106***	***140***	***177***	***219***
Gunter Reserve (Shortage)	***8***	***5***	***6***	***7***	***7***	***8***

Howe

Howe is located in southern Grayson County, on the border between the Red and Trinity River basins. The city provides water to a portion of Grayson County Manufacturing. The city gets its current supplies from the Woodbine aquifer and the North Texas Municipal Water District (NTMWD) via GTUA and the Collin-Grayson Municipal Alliance Project (CGMA). Water management strategies for Howe include conservation and additional water from the CGMA through NTMWD. **Table 5E.213** shows the projected population and demand, the current supplies, and the water management strategies for Howe.

TABLE 5E.213 SUMMARY OF WATER USER GROUP – CITY OF HOWE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,785**	**5,735**	**6,531**	**7,320**	**8,178**	**9,111**
Projected Water Demand						
Municipal Demand	438	522	595	667	745	830
Manufacturing, Grayson	*50*	*50*	*50*	*50*	*50*	*100*
Total Projected Demand	***488***	***572***	***645***	***717***	***795***	***930***
Currently Available Water Supplies						
Woodbine Aquifer	282	282	282	282	282	282
Greater Texoma Utility Authority	94	94	94	94	94	94
Manufacturing, Grayson	*30*	*30*	*30*	*29*	*27*	*30*
Total Current Supplies	***406***	***406***	***406***	***405***	***403***	***406***
Need (Demand - Current Supply)	***82***	***166***	***239***	***312***	***392***	***524***
Water Management Strategies						
Water Conservation	41	130	197	222	251	283
Expand Collin-Grayson Municipal Alliance, Additional Supplies from NTMWD through GTUA	47	86	115	163	213	267
Manufacturing, Grayson	*20*	*21*	*20*	*21*	*23*	*70*
Total Water Management Strategies	***108***	***237***	***332***	***406***	***487***	***620***
Howe Reserve (Shortage)	***26***	***71***	***93***	***94***	***95***	***96***

Kentucky Town Water Supply Corporation

The Kentucky Town WSC is located in southeastern Grayson County. The WSC gets its current water supply from the Woodbine aquifer, and the only water management strategy is conservation. **Table 5E.214** shows the projected population and demand, the current supplies, and the water management strategies for Kentucky Town WSC.

TABLE 5E.214 SUMMARY OF WATER USER GROUP – KENTUCKY TOWN WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,863**	**3,139**	**3,368**	**3,574**	**3,801**	**4,050**
Projected Water Demand						
Municipal Demand	345	376	404	428	456	485
Total Projected Demand	***345***	***376***	***404***	***428***	***456***	***485***
Currently Available Water Supplies						
Woodbine Aquifer	345	376	404	428	456	485
Total Current Supplies	***345***	***376***	***404***	***428***	***456***	***485***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	8	13	14	17	19	22
Total Water Management Strategies	***8***	***13***	***14***	***17***	***19***	***22***
Kentucky Town WSC Reserve (Shortage)	***8***	***13***	***14***	***17***	***19***	***22***

Luella Special Utility District

The Luella SUD is located in central Grayson County. The SUD gets its current water supply from the Woodbine aquifer, and the only water management strategy for Luella SUD is conservation. **Table 5E.215** shows the projected population and demand, the current supplies, and the water management strategies for Luella SUD.

TABLE 5E.215 SUMMARY OF WATER USER GROUP – LUELLA SPECIAL UTILITY DISTRICT

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,717**	**2,717**	**2,717**	**2,717**	**2,717**	**2,717**
Projected Water Demand						
Municipal Demand	275	274	274	274	274	274
Total Projected Demand	***275***	***274***	***274***	***274***	***274***	***274***
Currently Available Water Supplies						
Woodbine Aquifer	275	274	274	274	274	274
Total Current Supplies	***275***	***274***	***274***	***274***	***274***	***274***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	6	8	9	10	11	11
Total Water Management Strategies	***6***	***8***	***9***	***10***	***11***	***11***
Luella SUD Reserve (Shortage)	***6***	***8***	***9***	***10***	***11***	***11***

Mustang Special Utility District

Mustang SUD is located in northeastern Denton County and Grayson County. The SUD is a wholesale water provider, and the discussion of its water supply plans is under Denton County in **Section 5E.4.**

Northwest Grayson County WCID 1

Northwest Grayson County WCID 1 supplies water to northwest Grayson County and gets its water supply from the Trinity aquifer. The water management strategies include conservation, supplies from the new GTUA Regional Water System, and new groundwater wells in the Trinity aquifer. For more information on the new GTUA Regional Water System see **Chapter 5C** and **Appendix G**. **Table 5E.216** shows the projected population and demand, the current supplies, and the water management strategies for Northwest Grayson County WCID 1.

TABLE 5E.216 SUMMARY OF WATER USER GROUP – NORTHWEST GRAYSON COUNTY WCID 1

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,032**	**2,265**	**2,459**	**2,640**	**2,838**	**3,054**
Projected Water Demand						
Municipal Demand	199	221	240	257	277	298
County-Other, Grayson	*200*	*200*	*200*	*200*	*200*	*200*
Total Projected Water Demand	***399***	***421***	***440***	***457***	***477***	***498***
Currently Available Water Supplies						
Trinity Aquifer	163	163	163	163	163	163
County-Other, Grayson	*200*	*200*	*200*	*200*	*200*	*200*
Total Current Supplies	***363***	***363***	***363***	***363***	***363***	***363***
Need (Demand - Current Supply)	***36***	***58***	***77***	***94***	***114***	***135***
Water Management Strategies						
Water Conservation	5	6	8	9	12	13
Supplies from New GTUA Regional Water System	0	500	500	500	500	500
New Well(s) in Trinity Aquifer	40	40	40	40	40	40
Total Water Management Strategies	***45***	***546***	***548***	***549***	***552***	***553***
Northwest Grayson County WCID 1 Reserve (Shortage)	***9***	***488***	***471***	***455***	***438***	***418***

Oak Ridge South Gale Water Supply Corporation

Oak Ridge South Gale WSC supplies water in northeast Grayson County. The WSC gets its water supply from Denison. The water management strategies include conservation and additional supplies from Denison. **Table 5E.217** shows the projected population and demand, the current supplies, and the water management strategies for Oak Ridge South Gale WSC.

TABLE 5E.217 SUMMARY OF WATER USER GROUP – OAK RIDGE SOUTH GALE WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,811**	**2,875**	**2,927**	**2,942**	**2,962**	**2,988**
Projected Water Demand						
Municipal Demand	236	239	244	245	247	249
Total Projected Water Demand	***236***	***239***	***244***	***245***	***247***	***249***
Currently Available Water Supplies						
Denison	141	115	99	86	74	69
Total Current Supplies	***141***	***115***	***99***	***86***	***74***	***69***
Need (Demand - Current Supply)	***95***	***124***	***145***	***159***	***173***	***180***
Water Management Strategies						
Water Conservation	6	8	8	9	10	11
Additional Supplies from Denison	89	116	137	150	163	169
Total Water Management Strategies	***95***	***124***	***145***	***159***	***173***	***180***
Oak Ridge South Gale WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Pink Hill Water Supply Corporation

Pink Hill WSC supplies water in east central Grayson County. The WSC gets its water supply from the Trinity and Woodbine aquifers. The only water management strategy for the WSC is conservation. **Table 5E.218** shows the projected population and demand, the current supplies, and the water management strategies for Pink Hill WSC.

TABLE 5E.218 SUMMARY OF WATER USER GROUP – PINK HILL WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,210**	**2,449**	**2,648**	**2,832**	**3,033**	**3,253**
Projected Water Demand						
Municipal Demand	246	272	294	314	336	361
Total Projected Water Demand	***246***	***272***	***294***	***314***	***336***	***361***
Currently Available Water Supplies						
Trinity Aquifer	128	128	128	128	128	128
Woodbine Aquifer	118	144	166	186	208	233
Total Current Supplies	***246***	***272***	***294***	***314***	***336***	***361***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	6	8	10	12	15	16
Total Water Management Strategies	***6***	***8***	***10***	***12***	***15***	***16***
Pink Hill WSC Reserve (Shortage)	***6***	***8***	***10***	***12***	***15***	***16***

Pottsboro

Pottsboro is located in northern Grayson County, near Lake Texoma. The city gets its current supplies from the Woodbine aquifer and treated water purchased from Denison. Water management strategies for Pottsboro include conservation and additional water from Denison. **Table 5E.219** shows the projected population and demand, the current supplies, and the water management strategies for Pottsboro.

TABLE 5E.219 SUMMARY OF WATER USER GROUP – CITY OF POTTSBORO

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,613**	**3,938**	**4,210**	**4,450**	**4,715**	**5,007**
Projected Water Demand						
Municipal Demand	596	647	692	732	775	823
Total Projected Demand	***596***	***647***	***692***	***732***	***775***	***823***
Currently Available Water Supplies						
Woodbine Aquifer	112	112	112	112	112	112
Denison	291	257	235	218	199	196
Total Current Supplies	***403***	***369***	***347***	***330***	***311***	***308***
Need (Demand - Current Supply)	***193***	***278***	***345***	***402***	***464***	***515***
Water Management Strategies						
Water Conservation	14	21	25	30	34	37
Additional Supplies from Denison	182	261	324	377	435	483
Total Water Management Strategies	***196***	***282***	***349***	***407***	***469***	***520***
Pottsboro Reserve (Shortage)	***3***	***4***	***4***	***5***	***5***	***5***

Red River Authority of Texas

The Red River Authority of Texas supplies water in Grayson County in Region C and multiple other Counties in Regions A, B, G, and O. This source is sufficient to meet future demands, and there are no water management strategies for this water user group. **Table 5E.220** shows the projected population and demand, the current supplies, and the water management strategies for the Red River Authority of Texas in Region C.

TABLE 5E.220 SUMMARY OF WATER USER GROUP – RED RIVER AUTHORITY OF TEXAS (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,052**	**1,265**	**1,443**	**1,621**	**1,814**	**2,024**
Projected Water Demand						
Municipal Demand	254	304	347	390	436	486
Total Projected Water Demand	***254***	***304***	***347***	***390***	***436***	***486***
Currently Available Water Supplies						
Red River Authority of Texas	254	304	347	390	436	486
Total Current Supplies	***254***	***304***	***347***	***390***	***436***	***486***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Red River Authority of Texas Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Savoy

The City of Savoy is located in east Grayson County and west Fannin County. The city gets its current supplies from the Woodbine aquifer and the only water management strategy for the city is conservation. **Table 5E-221** shows the projected population and demand, the current supplies, and the water management strategies for the City of Savoy.

TABLE 5E-221. SUMMARY OF WATER USER GROUP – SAVOY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**711**	**704**	**706**	**698**	**689**	**678**
Projected Water Demand						
Municipal Demand	94	93	93	92	91	89
Total Projected Demand	***94***	***93***	***93***	***92***	***91***	***89***
Currently Available Water Supplies						
Woodbine Aquifer	94	93	93	92	91	89
Total Current Supplies	***94***	***93***	***93***	***92***	***91***	***89***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	1	3	3	3	4	4
Total Water Management Strategies	***1***	***3***	***3***	***3***	***4***	***4***
Savoy Reserve (Shortage)	***1***	***3***	***3***	***3***	***4***	***4***

Sherman

Sherman is the largest city in Grayson County and is located in the center of the county. Sherman is a wholesale water provider (WWP) that provides water to Grayson County Steam Electric Power, Grayson County Manufacturing, Grayson County Other, Dorchester, and Mustang SUD. In the future, Sherman is assumed to treat water for other water suppliers in Grayson County from its Lake Texoma supplies.

Sherman uses groundwater from the Trinity and Woodbine aquifers and water from Lake Texoma purchased from the Greater Texoma Utility Authority. Sherman's existing water treatment plant has a peak capacity of 20 MGD and is capable of treating the high TDS levels from Lake Texoma without blending with other sources. There are sufficient supplies in Lake Texoma to meet needs for Sherman and its customers over the planning period. In addition to its current contract for Lake Texoma supplies through GTUA, Sherman plans to purchase an unused USACE storage contract from Luminant and either purchase the associated Texas water right or seek a new water right to divert the water. Additional information on Lake Texoma Supplies is provided in **Appendix G**.

Recommended water management strategies for Sherman include acquiring an additional water right in Lake Texoma, expanding the existing treatment plant, and expanding raw water delivery infrastructure. Planned WTP expansions will be located at the existing site. Expansions of the WTP and delivery infrastructure would facilitate use of both the existing and new Lake Texoma water rights.

Table 5E.222 shows the projected demand, the current supplies, and the water management strategies for Sherman.

TABLE 5E.222 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – SHERMAN

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Sherman	11,274	12,225	13,046	13,766	14,560	15,434
County Other, Grayson	418	278	308	338	429	403
Dorchester	62	68	72	74	77	80
Manufacturing, Grayson	10,115	18,059	18,164	18,274	18,389	18,309
Mustang SUD	200	200	200	200	200	200
Steam Electric Power, Grayson	4,573	4,573	4,573	4,573	4,573	4,573
Potential Future Customers						
Bells	72	87	100	112	125	139
South Grayson SUD	124	222	322	418	524	641
Tioga	71	114	151	188	227	270
Whitewright	0	38	69	98	129	163
Total Projected Demand	***26,909***	***35,864***	***37,005***	***38,041***	***39,233***	***40,212***
Treated Water Demand	*22,336*	*31,291*	*32,432*	*33,468*	*34,660*	*35,639*
Raw Water Demand (for SEP)	*4,573*	*4,573*	*4,573*	*4,573*	*4,573*	*4,573*
Currently Available Supplies						
Trinity Aquifer	4,800	4,806	4,810	4,812	4,815	4,818
Woodbine Aquifer	996	996	996	996	996	996
GTUA (Lake Texoma, Raw for SEP)	4,573	4,573	4,573	4,573	4,573	4,573
GTUA (Lake Texoma, Treated, Limited by WTP)	11,210	11,210	11,210	11,210	11,210	11,210
Total Currently Available Supplies (Treated Supplies)	***17,006***	***17,012***	***17,016***	***17,018***	***17,021***	***17,024***
Total Currently Available Supplies (Raw Supplies)	***4,573***	***4,573***	***4,573***	***4,573***	***4,573***	***4,573***
Treated Need (Demand – Supply)	***5,330***	***14,279***	***15,416***	***16,450***	***17,639***	***18,615***
Raw Water Need (Demand – Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Conservation (retail)	924	2,060	2,707	2,903	3,121	3,364
Conservation (wholesale)	55	107	136	152	173	193
Additional Texoma Supply (Existing Water Right)	5,900	8,850	8,850	8,850	8,850	8,850
Acquire Water Rights in Valley Lake (Luminant)	0	8,850	8,850	8,850	8,850	8,850
Infrastructure for Additional Texoma Supplies						
Expand Raw Water Delivery from Lake Texoma Phase I	*11,385*	*11,385*	*11,385*	*11,385*	*11,385*	*11,385*
Expand Raw Water Delivery from Lake Texoma Phase II	*0*	*6,352*	*6,352*	*6,352*	*6,352*	*6,352*
10 MGD WTP Expansion (desal)	*5,900*	*5,900*	*5,900*	*5,900*	*5,900*	*5,900*
20 MGD WTP Expansion (desal)	*0*	*11,800*	*11,800*	*11,800*	*11,800*	*11,800*
Total Supplies from Strategies	***6,879***	***19,867***	***20,543***	***20,755***	***20,994***	***21,257***
Surplus or (Shortage)	***1,549***	***5,588***	***5,127***	***4,305***	***3,355***	***2,642***
Management Supply Factor	***1.06***	***1.16***	***1.14***	***1.11***	***1.09***	***1.07***
Alternative Water Management Strategy						
Indirect Reuse	0	0	0	4,907	5,204	5,530

South Grayson Special Utility District

South Grayson SUD is located in southern Grayson County and northern Collin County. The WSC gets its current supplies from the Trinity and Woodbine aquifers. Water management strategies for South Grayson SUD include implementing water conservation measures and connecting to and purchasing supplies from Sherman**. Table 5E.223** shows the projected population and demand, the current supplies, and the water management strategies for South Grayson SUD.

TABLE 5E.223 SUMMARY OF WATER USER GROUP – SOUTH GRAYSON SPECIAL UTILITY DISTRICT

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,303**	**6,167**	**7,010**	**7,826**	**8,723**	**9,710**
Projected Water Demand						
Municipal Demand	630	728	828	924	1,030	1,147
Total Projected Demand	***630***	***728***	***828***	***924***	***1,030***	***1,147***
Currently Available Water Supplies						
Trinity Aquifer	400	400	400	400	400	400
Woodbine Aquifer	106	106	106	106	106	106
Total Current Supplies	***506***	***506***	***506***	***506***	***506***	***506***
Need (Demand - Current Supply)	***124***	***222***	***322***	***418***	***524***	***641***
Water Management Strategies						
Water Conservation	15	25	30	36	44	53
Connect to Sherman	109	197	292	382	480	588
Total Water Management Strategies	***124***	***222***	***322***	***418***	***524***	***641***
South Grayson SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Southmayd

Southmayd is located in central Grayson County. The city gets its current supplies from the Woodbine aquifer and the only water management strategy for Southmayd is conservation. **Table 5E.224** shows the projected population and demand, the current supplies, and the water management strategies for Southmayd.

TABLE 5E.224 SUMMARY OF WATER USER GROUP – CITY OF SOUTHMAYD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**964**	**992**	**1,015**	**1,026**	**1,039**	**1,055**
Projected Water Demand						
Municipal Demand	103	106	108	109	111	112
Total Projected Demand	***103***	***106***	***108***	***109***	***111***	***112***
Currently Available Water Supplies						
Woodbine Aquifer	103	106	108	109	111	112
Total Current Supplies	***103***	***106***	***108***	***109***	***111***	***112***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	4	11	13	13	15	15
Total Water Management Strategies	***4***	***11***	***13***	***13***	***15***	***15***
Southmayd Reserve (Shortage)	***4***	***11***	***13***	***13***	***15***	***15***

Southwest Fannin County Special Utility District

Southwest Fannin County SUD serves western Fannin County and eastern Grayson County. The water supply plan for Southwest Fannin County SUD is discussed under Fannin County in **Section 5E.5.**

Starr Water Supply Corporation

Starr WSC supplies water to Grayson County. The WSC gets its water from the Trinity aquifer and the only water management strategy is conservation. **Table 5E.225** shows the projected population and demand, the current supplies, and the water management strategies for Starr WSC.

TABLE 5E.225 SUMMARY OF WATER USER GROUP – STARR WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,325**	**2,533**	**2,708**	**2,862**	**3,032**	**3,219**
Projected Water Demand						
Municipal Demand	230	249	266	281	298	316
Total Projected Water Demand	***230***	***249***	***266***	***281***	***298***	***316***
Currently Available Water Supplies						
Trinity Aquifer	230	249	266	281	298	316
Total Current Supplies	***230***	***249***	***266***	***281***	***298***	***316***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	5	8	9	11	12	14
Total Water Management Strategies	***5***	***8***	***9***	***11***	***12***	***14***
Starr WSC Reserve (Shortage)	***5***	***8***	***9***	***11***	***12***	***14***

Tioga

Tioga is located in southwestern Grayson County. The city gets its water supply from the Trinity aquifer. Water management strategies for Tioga include conservation and connecting to Sherman. **Table 5E.226** shows the projected population and demand, the current supplies, and the water management strategies for Tioga.

TABLE 5E.226 SUMMARY OF WATER USER GROUP – CITY OF TIOGA

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,773**	**2,106**	**2,386**	**2,662**	**2,961**	**3,288**
Projected Water Demand						
Municipal Demand	236	279	316	353	392	435
Total Projected Demand	***236***	***279***	***316***	***353***	***392***	***435***
Currently Available Water Supplies						
Trinity Aquifer	165	165	165	165	165	165
Total Current Supplies	***165***	***165***	***165***	***165***	***165***	***165***
Need (Demand - Current Supply)	***71***	***114***	***151***	***188***	***227***	***270***
Water Management Strategies						
Water Conservation	6	10	12	16	19	23
Connect to Sherman	65	104	139	172	208	247
Total Water Management Strategies	***71***	***114***	***151***	***188***	***227***	***270***
Tioga Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Tom Bean

Tom Bean is located in southeastern Grayson County. The city gets its water supply from the Woodbine aquifer and the only water management strategy for Tom Bean is conservation. **Table 5E.227** shows the projected population and demand, the current supplies, and the water management strategies for Tom Bean.

TABLE 5E.227 SUMMARY OF WATER USER GROUP – CITY OF TOM BEAN

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,113**	**1,113**	**1,113**	**1,113**	**1,113**	**1,113**
Projected Water Demand						
Municipal Demand	205	204	204	204	204	204
Total Projected Demand	***205***	***204***	***204***	***204***	***204***	***204***
Currently Available Water Supplies						
Woodbine Aquifer	205	204	204	204	204	204
Total Current Supplies	***205***	***204***	***204***	***204***	***204***	***204***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	8	18	24	25	25	26
Total Water Management Strategies	***8***	***18***	***24***	***25***	***25***	***26***
Tom Bean Reserve (Shortage)	***8***	***18***	***24***	***25***	***25***	***26***

Two Way Special Utility District

Two Way SUD serves eastern Cooke County and western Grayson County. The SUD currently gets its water supplies from the Trinity aquifer. Water management strategies for Two Way SUD include conservation, new groundwater wells in the Trinity aquifer, and participation in the GTUA Regional Water System. For more information on the new GTUA Regional Water System see Chapter 5C and Appendix G. **Table 5E.228** shows the projected population and demand, the current supplies, and the water management strategies for Two Way SUD.

TABLE 5E.228 SUMMARY OF WATER USER GROUP – TWO WAY SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,047**	**6,400**	**7,619**	**8,326**	**9,241**	**9,811**
Projected Water Demand						
Municipal Demand	789	831	989	1,081	1,200	1,274
Total Projected Demand	***789***	***831***	***989***	***1,081***	***1,200***	***1,274***
Currently Available Water Supplies						
Trinity Aquifer	688	688	688	688	688	688
Total Current Supplies	***688***	***688***	***688***	***688***	***688***	***688***
Need (Demand - Current Supply)	***101***	***143***	***301***	***393***	***512***	***586***
Water Management Strategies						
Water Conservation	19	28	36	42	51	57
New Well(s) in Trinity Aquifer	90	90	90	90	90	90
Supplies from New GTUA Regional Water System	0	1,500	1,500	1,500	1,500	1,500
Total Water Management Strategies	***109***	***1,618***	***1,626***	***1,632***	***1,641***	***1,647***
Two Way SUD Reserve (Shortage)	***8***	***1,475***	***1,325***	***1,239***	***1,129***	***1,061***

Van Alstyne

Van Alstyne is located in southern Grayson County on the border with Collin County. The city gets its current supplies from the Trinity and Woodbine aquifers and the North Texas Municipal Water District (NTMWD) via GTUA and the Collin-Grayson Municipal Alliance pipeline. Water management strategies for Van Alstyne include conservation, additional water through the CGMA from NTMWD, and water system improvements needed to take delivery of additional water from GTUA. **Table 5E.229** shows the projected population and demand, the current supplies, and the water management strategies for Van Alstyne.

TABLE 5E.229 SUMMARY OF WATER USER GROUP – CITY OF VAN ALSTYNE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**8,398**	**16,284**	**25,925**	**31,829**	**41,706**	**49,029**
Projected Water Demand						
Municipal Demand	946	1,825	2,905	3,567	4,674	5,494
Total Projected Demand	***946***	***1,825***	***2,905***	***3,567***	***4,674***	***5,494***
Currently Available Water Supplies						
Trinity Aquifer	300	300	300	300	300	300
Woodbine Aquifer	208	208	208	208	208	208
North Texas MWD (though GTUA CGMA)	391	391	391	391	391	391
Total Current Supplies	***899***	***899***	***899***	***899***	***899***	***899***
Need (Demand - Current Supply)	***47***	***926***	***2,006***	***2,668***	***3,775***	***4,595***
Water Management Strategies						
Water Conservation	22	61	152	226	309	359
Expand Collin-Grayson Municipal Alliance, Additional Supplies from NTMWD through GTUA	240	1,083	2,078	2,669	3,694	4,464
Water System Improvements to take delivery of water from GTUA	*240*	*1,083*	*2,078*	*2,669*	*3,694*	*4,464*
Total Water Management Strategies	***262***	***1,144***	***2,230***	***2,895***	***4,003***	***4,823***
Van Alstyne Reserve (Shortage)	***215***	***218***	***224***	***227***	***228***	***228***

Westminster SUD

Westminster SUD serves parts of Collin County and Grayson Counties. Water management strategies for Westminster SUD are discussed under Collin County in **Section 5E.1.**

Whitesboro

Whitesboro is located in western Grayson County. The city gets its water supply from the Trinity aquifer. Water management strategies for Whitesboro include conservation, new groundwater wells in the Trinity aquifer, and participation in the new GTUA Regional Water System. For more information on the new GTUA Regional Water System see **Chapter 5C** and **Appendix G**. **Table 5E.230** shows the projected population and demand, the current supplies, and the water management strategies for Whitesboro.

TABLE 5E.230 SUMMARY OF WATER USER GROUP – CITY OF WHITESBORO

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,847**	**5,280**	**5,642**	**5,960**	**6,311**	**6,699**
Projected Water Demand						
Municipal Demand	571	619	661	699	740	785
Total Projected Demand	***571***	***619***	***661***	***699***	***740***	***785***
Currently Available Water Supplies						
Trinity Aquifer	547	547	547	547	547	547
Total Current Supplies	***547***	***547***	***547***	***547***	***547***	***547***
Need (Demand - Current Supply)	***24***	***72***	***114***	***152***	***193***	***238***
Water Management Strategies						
Water Conservation	14	19	23	26	31	36
New Well(s) in Trinity Aquifer	20	20	20	20	20	20
Supplies from New GTUA Regional Water System	0	1,500	1,500	1,500	1,500	1,500
Total Water Management Strategies	***34***	***1,539***	***1,543***	***1,546***	***1,551***	***1,556***
Whitesboro Reserve (Shortage)	***10***	***1,467***	***1,429***	***1,394***	***1,358***	***1,318***

Whitewright

Whitewright is located in eastern Grayson County with a small area in Fannin County. The city gets its current water supply from the Woodbine aquifer, and water management strategies include conservation and connecting to Sherman. **Table 5E.231** shows the projected population and demand, the current supplies, and the water management strategies for Whitewright.

TABLE 5E.231 SUMMARY OF WATER USER GROUP – CITY OF WHITEWRIGHT

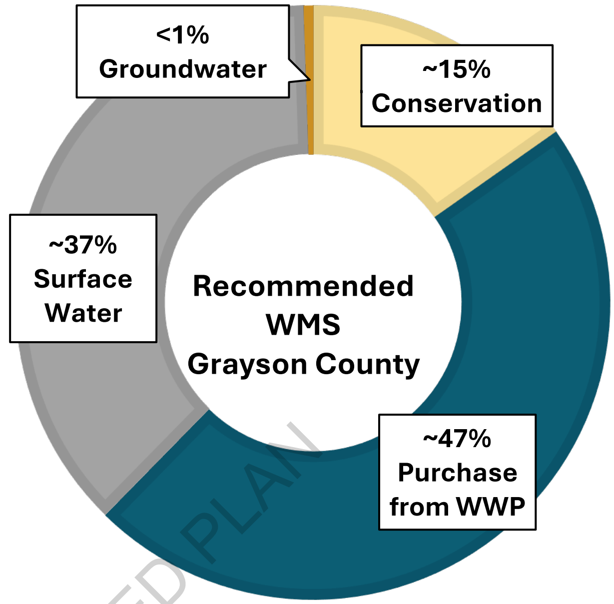
(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,298**	**2,519**	**2,695**	**2,854**	**3,026**	**3,218**
Projected Water Demand						
Municipal Demand	413	451	482	511	542	576
Total Projected Demand	***413***	***451***	***482***	***511***	***542***	***576***
Currently Available Water Supplies						
Woodbine Aquifer	413	413	413	413	413	413
Total Current Supplies	***413***	***413***	***413***	***413***	***413***	***413***
Need (Demand - Current Supply)	***0***	***38***	***69***	***98***	***129***	***163***
Water Management Strategies						
Water Conservation	9	14	17	20	23	27
Connect to Sherman	0	24	52	78	106	136
Total Water Management Strategies	***9***	***38***	***69***	***98***	***129***	***163***
Whitewright Reserve (Shortage)	***9***	***0***	***0***	***0***	***0***	***0***

Woodbine Water Supply Corporation

Woodbine WSC serves eastern Cooke County and western Grayson County. The water supply plan for Woodbine WSC is discussed under Cooke County in **Section 5E.2**.

5E.8.2 Summary of Costs for Grayson County

Table 5E.232 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Grayson County. Total quantities from **Table 5E.232** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Collin County are projected to come through purchases from wholesale water providers. Other strategies include surface water, conservation, and groundwater.

Table 5E.233 summarizes the recommended water management strategies within Grayson County individually. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.232 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR GRAYSON COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	7,256	$332,739
Purchase from WWP	22,412	$0
Additional Infrastructure	*94,357*	*$1,044,463,000*
Groundwater	235	$31,097,000
Total	***47,603***	***$1,075,892,739***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.233 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR GRAYSON COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Denison	Conservation (retail)	2030	2,614	$165,619	$0.80	$0.43
	Conservation (wholesale)	2030	Included with WUGs.			
	Additional Lake Texoma with Infrastructure as follows:	*2030*	*18,152*	*$0*	*$0.00*	*$0.00*
	12 MGD Desalination WTP Expansion	*2030*	*6,726*	*$192,477,000*	*$11.84*	*$7.07*
	21 MGD Desalination WTP Expansion	*2040*	*11,426*	*$282,557,000*	*$9.97*	*$5.97*
	Expand Raw Water delivery from Lake Texoma	*2030*	*18,152*	*$72,303,000*	*$0.87*	*$0.20*
Sherman	Conservation (retail)	2030	3,364	$150,000	$1.17	$1.10
	Conservation (wholesale)	2030	Included with WUGs.			
	Additional Texoma (Existing Water Right)	2030	8,850	$0	$0.00	$0.00
	Acquire Water Rights in Valley Lake (Luminant)	2040	8,850	$0	$0.00	$0.00
	Expand Raw Water Delivery from Lake Texoma Phase I	*2030*	*11,385*	*$84,352,000*	*$1.55*	*$0.35*
	Expand Raw Water Delivery from Lake Texoma Phase II	*2040*	*6,352*	*$1,461,000*	*$0.18*	*$0.14*
	10 MGD WTP Expansion (desal)	*2030*	*5,900*	*$181,496,000*	*$13.31*	*$6.66*
	20 MGD WTP Expansion (desal)	*2040*	*11,800*	*$220,555,000*	*$8.52*	*$4.49*
	ALTERNATIVE Indirect Reuse	*2060*	*5,530*	*$52,011,000*	*$2.42*	*$0.39*
WUGs						
Bells	Conservation	2030	11	$0	$4.02	$2.67
	Connect to Sherman	2030	133	$0	$4.00	$4.00
	New Well(s) in Woodbine Aquifer	2030	45	$3,371,000	$15.01	$1.79

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
Collinsville	Conservation	2030	18	$0	$4.70	$2.45
	New Well(s) in Trinity Aquifer	2030	40	$4,057,000	$24.70	$2.76
	GTUA Regional Water System	2040	500	$0	$12.45	$6.65
Desert WSC	Conservation	See Fannin County.				
Dorchester	Conservation	2030	74	$0	$1.98	$1.37
Gunter	Conservation	2030	25	$0	$3.62	$1.70
	Mustang SUD	2040	194	$0	$4.00	$4.00
Howe	Conservation	2030	283	$0	$2.19	$1.53
	NTMWD through GTUA (CGMA)	2030	267	$0	$1.50	$1.50
	CGMA Supplies	*2030*	*See GTUA in **Chapter 5D**.*			
Kentuckytown WSC	Conservation	2030	22	$0	$4.18	$2.20
Luella SUD	Conservation	2030	11	$0	$5.50	$2.65
Mustang SUD[a]	Conservation	See Denton County.				
	Other WMSs					
Northwest Grayson County WCID 1	Conservation	2030	13	$0	$4.36	$2.74
	GTUA Regional Water System	2040	500	$0	$12.45	$6.65
	New Well(s) in Trinity Aquifer	2030	40	$4,303,000	$19.14	$2.23
Oak Ridge South Gale WSC	Conservation	2030	11	$0	$4.38	$3.22
	Denison	2030	169	$0	$4.00	$4.00
Pink Hill WSC	Conservation	2030	16	$0	$5.69	$2.32
Pottsboro	Conservation	2030	37	$0	$2.71	$1.72
	Denison	2030	483	$0	$4.00	$4.00
Red River Authority of Texas	Conservation	See 2026 Region B Plan				
South Grayson SUD[a]	Conservation	2030	53	$8,560	$4.43	$2.35
	Connect to Sherman	2030	588	$0	$4.00	$4.00
Southmayd	Conservation	2030	15	$0	$3.29	$1.41
Southwest Fannin County SUD[a]	Conservation	See Fannin County.				
	Fannin County WSP					
Starr WSC	Conservation	2030	14	$0	$5.76	$2.65
Tioga	Conservation	2030	23	$0	$5.47	$1.93

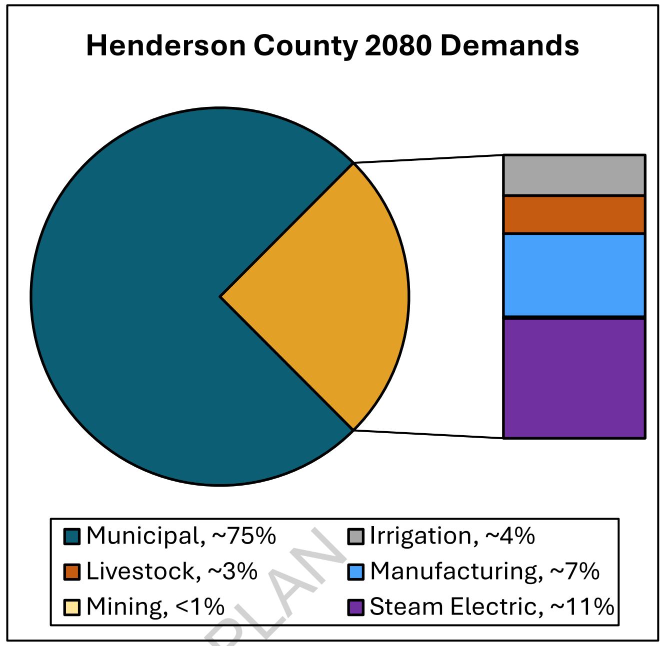
WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	Connect to Sherman	2030	247	$0	$4.00	$4.00
Tom Bean	Conservation	2030	26	$0	$3.00	$1.15
Two Way SUD[a]	Conservation	2030	57	$0	$3.74	$2.15
	New Well(s) in Trinity Aquifer	2030	90	$9,683,000	$0.35	$0.15
	GTUA Regional Water System	2040	1,500	$0	$12.45	$6.65
Van Alstyne	Conservation	2030	359	$0	$4.35	$1.61
	NTMWD through GTUA (CGMA)	2030	4,464	$0	$1.50	$1.50
	CGMA Supplies	*2030*	*See GTUA in **Chapter 5D**.*			
	Water System Improvements	*2030*	*4,464*	*$9,262,000*	*$0.50*	*$0.15*
Westminster SUD[a]	Conservation	See Collin County.				
Whitesboro	Conservation	2030	36	$0	$3.53	$2.19
	New Well(s) in Trinity Aquifer	2030	20	$9,683,000	$0.35	$0.15
	GTUA Regional Water System	2040	1,500	$0	$12.45	$6.65
Whitewright[a]	Conservation	2030	27	$0	$2.80	$1.47
	Connect to Sherman	2040	136	$0	$4.00	$4.00
Woodbine WSC[a]	Conservation	See Cooke County.				
	GTUA Regional Water System					
County Other and Non-Municipal						
County Other, Grayson	Conservation	2030	41	$8,560	$5.32	$0.83
	Denison	2030	279	$0	$4.00	$4.00
	Sherman	2030	246	$0	$4.00	$4.00
Irrigation, Grayson	Conservation	2030	106	$0	$0.94	$0.94
Livestock, Grayson	None	None				
Manufacturing, Grayson	Sherman	2030	11,136	$0	$4.00	$4.00
	NTMWD through GTUA (CGMA)	2030	70	$0	$1.50	$1.50
	CGMA Supplies	*2030*	*See GTUA in **Chapter 5D**.*			

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	ALTERNATIVE Direct Reuse from Sherman	*2040*	*561*	*$24,215,000*	*$10.11*	*$2.91*
Mining, Grayson	None	None				
Steam Electric Power, Grayson	None	None				

[a]Water User Groups extend into more than one county
[b]Quantities listed are for the WUG only. They do not include the WUG's customers.
[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.9 Henderson County

Henderson County is located in the southeast portion of Region C. **Figure 5E.18** shows the service areas for water providers in the county. Henderson County is the only county in Region C that is split with another regional planning group. The western half of the county is located in Region C while the eastern half of the county is located in the East Texas Region (Region I). There are several reservoirs in the county, including Cedar Creek Reservoir, Forest Grove Reservoir, Lake Athens and Lake Palestine.



Although Henderson County is not the most populous county in Region C, the county's population is expected to increase by over 31,000 between 2030 and 2080.

Demands for the county are predominantly municipal and the largest non-municipal demand in the county is for Steam Electric Power.

An overall summary of the county's projections is shown in **Table 5E.234**Error! Reference source not found. and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Henderson County Quick Facts

2020 Population: 82,150

Projected 2080 Population: 97,538

Projected 2080 Demand: 18 MGD

County Seat: Athens

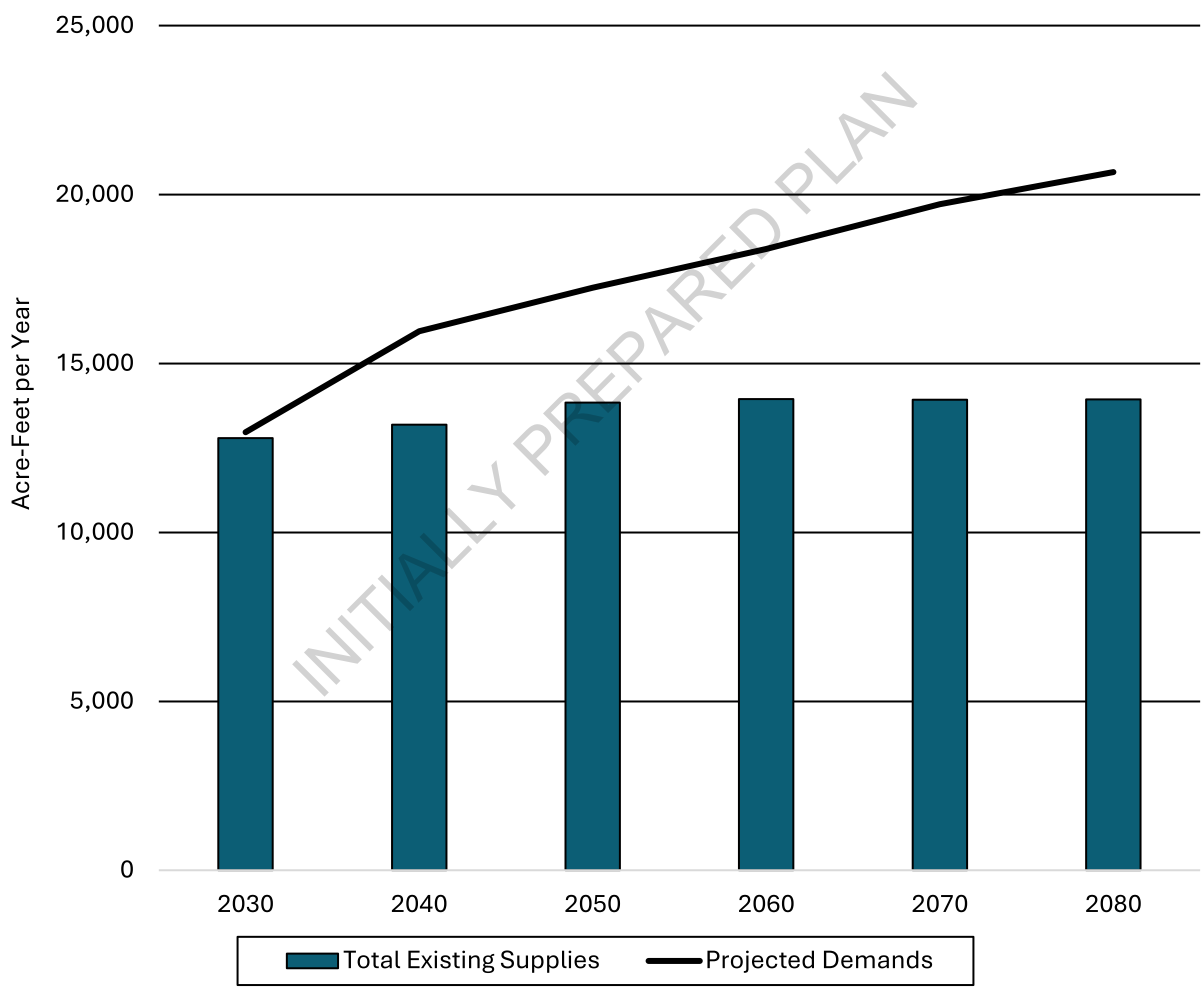
Economy: Agribusiness; manufacturing; minerals; tourism

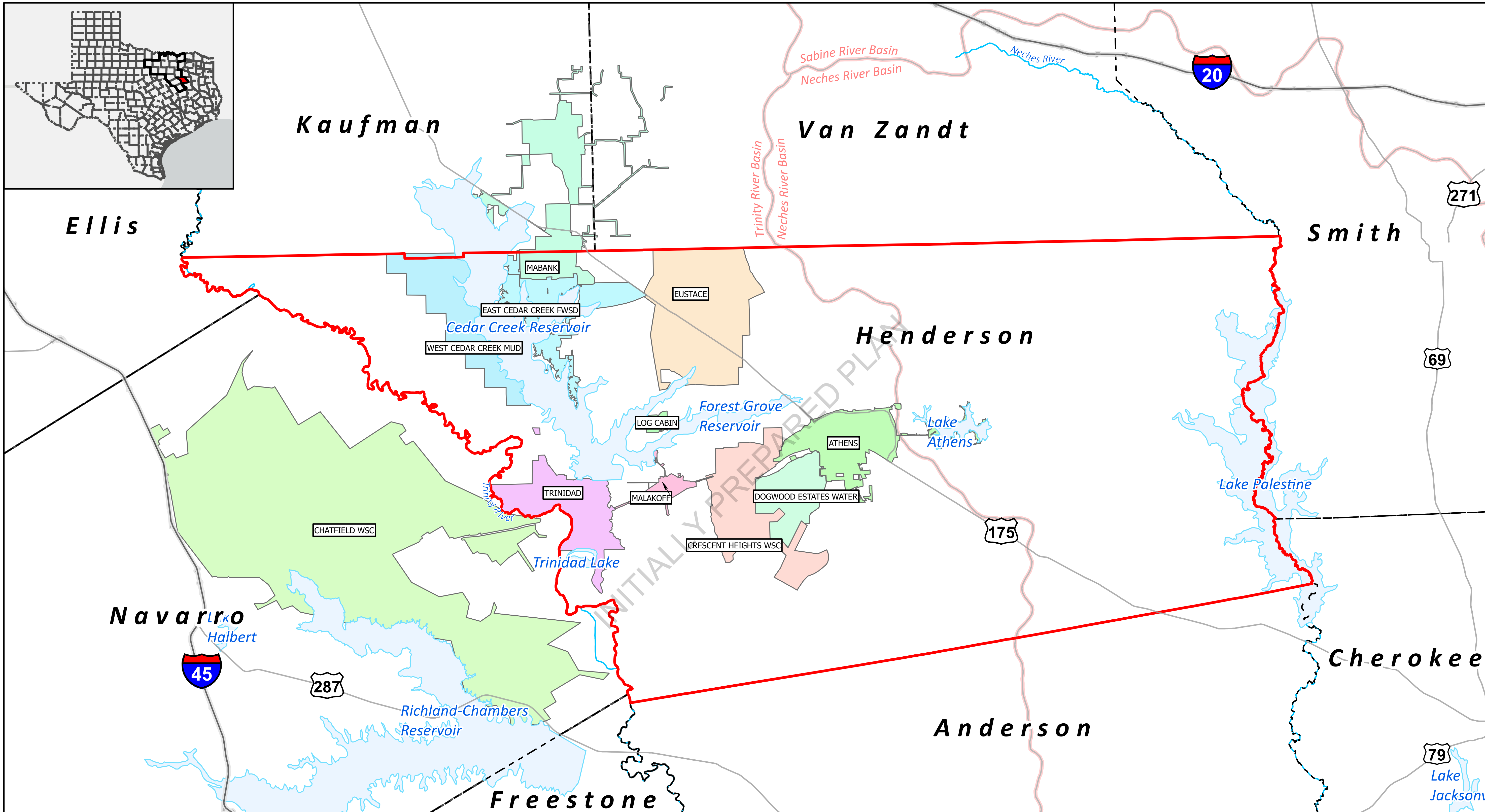
River Basins: Trinity (61%), Sabine (39%)

TABLE 5E.234 SUMMARY OF HENDERSON COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**65,669**	**71,460**	**78,514**	**84,827**	**92,129**	**97,538**
Projected Demands	**12,965**	**15,951**	**17,245**	**18,385**	**19,713**	**20,664**
Municipal	10,112	10,990	12,234	13,321	14,594	15,487
Irrigation	743	743	743	743	743	743
Livestock	694	694	694	694	694	694
Manufacturing	1,269	1,316	1,365	1,416	1,468	1,522
Mining	15	16	17	19	22	26
Steam Electric	132	2,192	2,192	2,192	2,192	2,192
Total Existing Supplies	***12,786***	***13,185***	***13,845***	***13,950***	***13,930***	***13,936***
Need (Demand - Supply)	***179***	***2,766***	***3,400***	***4,435***	***5,783***	***6,728***

FIGURE 5E.17 SUMMARY OF HENDERSON COUNTY





Henderson County, Texas

Figure 5E.18

Data Source(s): ESRI, TWDB, TxDOT

N

0 5 10 Mi

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.9.1 Wholesale Water Providers and Water User Groups

Water management strategies for Henderson County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs and summary for Henderson County are presented in **Section 5E.9.2.**

Athens Municipal Water Authority

Athens Municipal Water Authority (MWA) is a wholesale water provider and supplies water to the City of Athens. Athens MWA also supplies local demand for lawn irrigation around Lake Athens and is contracted to supply 3,023 acre-feet per year for the Athens Fish Hatchery, located at Lake Athens (and in Region I, the East Texas Region).

Athens MWA has a right to divert 8,500 acre-feet per year from Lake Athens, but the reliable supply is limited by the firm yield of the lake. Athens MWA also owns a groundwater well on its water treatment plant property. The fish hatchery returns approximately 95 percent of the water it diverts to Lake Athens, which serves to increase the supply from the lake, but the hatchery is under no contractual obligation to continue this practice.

Recognizing the limitations of its existing supplies, Athens MWA has obtained a reuse permit that allows the City of Athens to discharge its treated wastewater effluent to Lake Athens for reuse. The reuse permit is for 2,677 acre-feet per year, but a recent study shows that this strategy is less economically feasible than other alternatives. At this time, Athens MWA and the City of Athens are not pursuing reuse of City of Athens wastewater through Lake Athens.

The recommended water management strategies for Athens MWA include implementing water conservation measures, fish hatchery reuse, and infrastructure improvements at the WTP. The infrastructure improvements include expanding the existing high service pump station to meet projected treated water demands of the City of Athens. Additionally, Athens MWA has an alternative strategy to develop new groundwater wells in the Carrizo-Wilxoc Aquifer in Henderson County. This groundwater strategy is included as an alternative due to modeled available groundwater (MAG) limitations. The alternative strategy could potentially be changed to a recommended strategy if the MAG volumes increase in the future. For more information on Athens MWA's water management strategies see the *2026 Region I Plan*. **Table 5E.235** shows the recommended plan for Athens MWA.

TABLE 5E.235 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – ATHENS MWA (REGIONS C & I)

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Athens	2,142	2,670	3,659	4,507	5,532	6,158
Manufacturing, Henderson	20	20	20	20	20	20
Irrigation, Henderson (Region I)	85	90	95	100	105	110
Livestock, Henderson (TPWD Fish Hatchery)	3,023	3,023	3,023	3,023	3,023	3,023
Total Projected Demands	***5,270***	***5,803***	***6,797***	***7,650***	***8,680***	***9,311***
Treated Water Demand[a]	*2,162*	*2,690*	*3,679*	*4,527*	*5,552*	*6,178*
Raw Water Demand	*3,108*	*3,113*	*3,118*	*3,123*	*3,128*	*3,133*
Currently Available Water Supplies						
Lake Athens	4,540	4,480	4,420	4,360	4,300	4,240
Lake Athens Supply Constrained by AMWA WTP HSPS Capacity[b]	4,540	4,480	4,420	4,191	3,851	3,679
Existing Wells in Carrizo-Wilcox (Athens MWA)	1,487	1,487	1,487	1,487	1,487	1,487
Total Current Supplies	***6,027***	***5,967***	***5,907***	***5,678***	***5,338***	***5,166***
Need (Demand less Supply)	***0***	***0***	***890***	***1,972***	***3,342***	***4,145***
Water Management Strategies						
Conservation[c]	122	325	687	904	1,112	1,226
Fish Hatchery Reuse	2,872	2,872	2,872	2,872	2,872	2,872
Additional Treated Water Supply Accessible with WTP Pump Station Expansion	0	0	0	169	449	561
WTP Pump Station Expansion	0	0	*4,592*	*4,592*	*4,592*	*4,592*
Total Supplies from Strategies	***2,994***	***3,197***	***3,559***	***3,945***	***4,433***	***4,659***
Total Supplies	***9,021***	***9,164***	***9,466***	***9,623***	***9,771***	***9,825***
Reserve or (Shortage)	***3,751***	***3,361***	***2,669***	***1,973***	***1,091***	***514***
Management Supply Factor	***1.71***	***1.58***	***1.39***	***1.26***	***1.13***	***1.06***
Alternative Water Management Strategies						
New Well(s) in Carrizo-Wilcox	0	0	0	0	720	720

[a]Treated demands are demands for Athens and part of Henderson County manufacturing less Athens groundwater supplies. Demands for raw water are for the fish hatchery and lawn irrigation around Lake Athens.

[b]This volume reflects the treated water supply that can be delivered from Lake Athens considering AMWA's existing WTP HSPS capacity. This volume assumes that supply from AMWA's groundwater well that is blended and treated with Lake Athens supply at the AMWA WTP is not constrained.

[c]Includes the municipal conservation savings across both Region C and Region I.

Athens

The City of Athens is located in central Henderson County, and its population is divided between the Trinity River Basin (Region C) and the Neches River Basin (the East Texas Region). Athens purchases treated water from the Athens Municipal Water Authority (a wholesale water provider that treats water from Lake Athens) and uses groundwater from the Carrizo-Wilcox aquifer. Water management strategies for Athens include conservation and additional water from Athens MWA. Plans for Athens MWA, which provides most of Athens' water supply, are discussed under Athens MWA. **Table 5E.236** shows the projected population and demand, the current supplies, and the water management strategies for Athens.

TABLE 5E.236 SUMMARY OF WATER USER GROUP – ATHENS (REGIONS C & I)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**13,208**	**15,913**	**20,884**	**25,156**	**30,311**	**33,463**
Projected Water Demand						
Municipal Demand	2,633	3,161	4,150	4,998	6,023	6,649
Manufacturing, Henderson	*20*	*20*	*20*	*20*	*20*	*20*
Total Projected Water Demand	***2,653***	***3,181***	***4,170***	***5,018***	***6,043***	***6,669***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	491	491	491	491	491	491
Athens Municipal Water Authority	2,142	2,670	3,295	3,454	3,456	3,457
Manufacturing, Henderson	20	20	17	14	12	11
Total Current Supplies	***2,653***	***3,181***	***3,803***	***3,959***	***3,959***	***3,959***
Need (Demand - Current Supply)	***0***	***0***	***367***	***1,059***	***2,084***	***2,710***
Water Management Strategies						
Water Conservation	122	325	687	904	1,112	1,226
Additional Supplies from Athens MWA System	0	0	0	149	964	1,475
Manufacturing, Henderson	*0*	*0*	*3*	*6*	*8*	*9*
Total Water Management Strategies	***122***	***325***	***690***	***1,059***	***2,084***	***2,710***
Athens Reserve (Shortage)	***122***	***325***	***323***	***0***	***0***	***0***

B B S Water Supply Corporation

B B S WSC supplies water to Henderson County in Region C and Anderson County in Region I. The WSC gets its water supply from the Carrizo-Wilcox aquifer. These sources are sufficient to meet future demands, and there are no water management strategies. **Table 5E.237** shows the projected population and demand, the current supplies, and the water management strategies for B B S WSC. Strategies in the East Texas Region (Region I) are discussed in that region's water plan.

TABLE 5E.237 SUMMARY OF WATER USER GROUP – B B S WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,081**	**1,078**	**1,065**	**1,052**	**1,038**	**1,025**
Projected Water Demand						
Municipal Demand	140	139	137	135	134	132
Total Projected Water Demand	***140***	***139***	***137***	***135***	***134***	***132***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	140	139	137	135	134	132
Total Current Supplies	***140***	***139***	***137***	***135***	***134***	***132***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies[a]						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
B B S WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

[a]Water Management Strategies for B B S WSC are covered in Region I Plan.

Bethel Ash Water Supply Corporation

Bethel Ash WSC provides water for Henderson County (Region C and I) and Van Zandt County in Region D. **Table 5E.238** shows the projected population and demand, the current supplies, and the water management strategies for the portion of Bethel Ash WSC located in Region C. The Region I and Region D plan include strategies for the portion of Bethel Ash WSC in those regions. The current supply for the WSC in Region C is the Carrizo-Wilcox aquifer, and there are no water management strategies for Bethel Ash WSC in Region C.

TABLE 5E.238 SUMMARY OF WATER USER GROUP – BETHEL ASH WSC (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Region C Population	**3,053**	**3,205**	**3,238**	**3,316**	**3,403**	**3,499**
Projected Water Demand						
Municipal Demand	299	312	315	323	331	340
Total Projected Region C Demand	***299***	***312***	***315***	***323***	***331***	***340***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	299	312	315	323	331	340
Total Current Supplies	***299***	***312***	***315***	***323***	***331***	***340***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Bethel Ash WSC (Region C Only) Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Crescent Heights Water Supply Corporation

Crescent Heights WSC provides water to Henderson County. The WSC gets its water supply from the Carrizo-Wilcox aquifer and the only water management strategy is conservation. **Table 5E.239** shows the projected population and demand, the current supplies, and the water management strategies for Crescent Heights WSC.

TABLE 5E.239 SUMMARY OF WATER USER GROUP – CRESCENT HEIGHTS WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,801**	**1,857**	**2,064**	**2,099**	**2,137**	**2,178**
Projected Water Demand						
Municipal Demand	150	154	171	174	177	180
Total Projected Water Demand	***150***	***154***	***171***	***174***	***177***	***180***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	150	154	171	174	177	180
Total Current Supplies	***150***	***154***	***171***	***174***	***177***	***180***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	4	5	6	6	8	9
Total Water Management Strategies	***4***	***5***	***6***	***6***	***8***	***9***
Crescent Heights WSC Reserve (Shortage)	***4***	***5***	***6***	***6***	***8***	***9***

Dogwood Estates Water

Dogwood Estates Water gets its water supply from the Carrizo-Wilcox aquifer. The only water management strategy is conservation. **Table 5E.240** shows the projected population and demand, the current supplies, and the water management strategies for Dogwood Estates Water.

TABLE 5E.240 SUMMARY OF WATER USER GROUP – DOGWOOD ESTATES WATER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,179**	**1,154**	**1,226**	**1,239**	**1,253**	**1,267**
Projected Water Demand						
Municipal Demand	175	170	181	183	185	187
Total Projected Water Demand	***175***	***170***	***181***	***183***	***185***	***187***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	175	170	181	183	185	187
Total Current Supplies	***175***	***170***	***181***	***183***	***185***	***187***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	5	5	7	7	8	9
Total Water Management Strategies	***5***	***5***	***7***	***7***	***8***	***9***
Dogwood Estates Water Reserve (Shortage)	***5***	***5***	***7***	***7***	***8***	***9***

East Cedar Creek Fresh Water Supply District

East Cedar Creek FWSD supplies water to retail customers on the east side of Cedar Creek Reservoir in Henderson County. The FWSD gets its water supply from Tarrant Regional Water District (TRWD), and the water management strategies are conservation and additional supplies from TRWD. **Table 5E.241** shows the projected population and demand, the current supplies, and the water management strategies for East Cedar Creek FWSD.

TABLE 5E.241 SUMMARY OF WATER USER GROUP – EAST CEDAR CREEK FWSD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**23,746**	**25,120**	**25,323**	**25,882**	**26,501**	**27,183**
Projected Water Demand						
Municipal Demand	3,591	3,799	3,829	3,914	4,007	4,111
Total Projected Water Demand	***3,591***	***3,799***	***3,829***	***3,914***	***4,007***	***4,111***
Currently Available Water Supplies						
Tarrant Regional WD	1,155	1,155	1,155	1,155	1,155	1,155
Total Current Supplies	***1,155***	***1,155***	***1,155***	***1,155***	***1,155***	***1,155***
Need (Demand - Current Supply)	***2,436***	***2,644***	***2,674***	***2,759***	***2,852***	***2,956***
Water Management Strategies						
Water Conservation	194	320	367	387	411	435
Additional Supplies from TRWD	2,242	2,324	2,307	2,372	2,441	2,521
Total Water Management Strategies	***2,436***	***2,644***	***2,674***	***2,759***	***2,852***	***2,956***
East Cedar Creek FWSD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Eustace

Eustace is located in northern Henderson County. The city's current supply is groundwater from the Carrizo-Wilcox aquifer. Conservation is the only recommended water management strategy. **Table 5E.242** shows the projected population and demand, the current supplies, and the water management strategies for Eustace.

TABLE 5E.242 SUMMARY OF WATER USER GROUP – CITY OF EUSTACE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,105**	**3,399**	**3,333**	**3,441**	**3,562**	**3,696**
Projected Water Demand						
Municipal Demand	322	351	344	356	368	382
Total Projected Demand	***322***	***351***	***344***	***356***	***368***	***382***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	322	351	344	356	368	382
Total Current Supplies	***322***	***351***	***344***	***356***	***368***	***382***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	8	11	12	14	15	18
Total Water Management Strategies	***8***	***11***	***12***	***14***	***15***	***18***
Eustace Reserve (Shortage)	***8***	***11***	***12***	***14***	***15***	***18***

Henderson County Irrigation (Region C Only)

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. **Table 5E.243** shows the projected demand, the current supplies, and the water management strategies for Henderson County Irrigation in Region C (the portion in the Trinity River Basin). The current supplies are direct reuse through Pinnacle and local supplies (Trinity run-of-river). The only recommended water management strategy is conservation.

TABLE 5E.243 SUMMARY OF WATER USER GROUP – HENDERSON COUNTY IRRIGATION (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand in Region C	***743***	***743***	***743***	***743***	***743***	***743***
Currently Available Water Supplies						
Direct Reuse from Pinnacle Club	32	32	32	32	32	32
Trinity Run-of-River	1,246	1,246	1,246	1,246	1,246	1,246
Total Current Supplies	***1,278***	***1,278***	***1,278***	***1,278***	***1,278***	***1,278***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	0	2	4	6	7	8
Total Water Management Strategies	***0***	***2***	***4***	***6***	***7***	***8***
Irrigation, Henderson (Region C Only) Reserve (Shortage)	***535***	***537***	***539***	***541***	***542***	***543***

Henderson County Livestock (Region C Only)

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. **Table 5E.244** shows the projected demand, current supplies, and water management strategies for Henderson County Livestock in Region C (the portion in the Trinity River Basin). The current supplies are local surface water supplies (Trinity and Neches livestock local supply) and groundwater (Carrizo-Wilcox and Queen City aquifers). The supply is sufficient to meet future demands, and there are no water management strategies for this water user group.

TABLE 5E.244 SUMMARY OF WATER USER GROUP – HENDERSON COUNTY LIVESTOCK (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand in Region C	***694***	***694***	***694***	***694***	***694***	***694***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	111	111	111	111	111	111
Queen City Aquifer	100	100	100	100	100	100
Trinity Livestock Local Supply	430	430	430	430	430	430
Neches Livestock Local Supply	138	138	138	138	138	138
Total Current Supplies	***779***	***779***	***779***	***779***	***779***	***779***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Henderson (Region C Only) Reserve (Shortage)	***85***	***85***	***85***	***85***	***85***	***85***

Henderson County Manufacturing (Region C Only)

Manufacturing water use is defined as water used to produce manufactured goods. **Table 5E.245** shows the projected demand, the current supplies, and the water management strategies for Henderson County Manufacturing in Region C (the portion in the Trinity River Basin). Current supplies include groundwater (Carrizo-Wilcox aquifer, directly and through Malakoff) and water from Athens. Additional supply from Athens (through Athens MWA) is the only recommended water management strategy for this water user group. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG. Henderson County manufacturing has an unmet need due to limited modeled available groundwater (MAG). There may be some additional supply available in later decades from the City of Athens, however Athens has not committed to providing additional water to manufacturing. For more information on the impact of not meeting needs, see **Chapter 6**.

TABLE 5E.245 SUMMARY OF WATER USER GROUP – HENDERSON COUNTY MANUFACTURING (REGION C)

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand in Region C	***1,269***	***1,316***	***1,365***	***1,416***	***1,468***	***1,522***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	390	390	390	390	390	390
Malakoff	10	10	10	10	10	10
Athens	20	20	17	14	12	11
Total Current Supplies	***420***	***420***	***417***	***414***	***412***	***411***
Need (Demand - Current Supply)	***849***	***896***	***948***	***1,002***	***1,056***	***1,111***
Water Management Strategies						
Additional Supplies from Athens through Athens MWA	20	20	17	14	12	11
Total Water Management Strategies	***20***	***20***	***17***	***14***	***12***	***11***
Manufacturing, Henderson (Region C Only) Reserve (Shortage)	***(829)***	***(876)***	***(931)***	***(988)***	***(1,044)***	***(1,100)***

Henderson County Mining (Region C Only)

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. The current supply is from groundwater (Carrizo-Wilcox aquifer). The supply is sufficient to meet future demands, and there are no water management strategies for this water user group **Table 5E.246** shows the projected demand, the current supplies, and the water management strategies for Henderson County Mining in Region C (the portion in the Trinity River Basin).

TABLE 5E.246 SUMMARY OF WATER USER GROUP – HENDERSON COUNTY MINING (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand in Region C	***15***	***16***	***17***	***19***	***22***	***26***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	15	16	17	19	22	26
Total Current Supplies	***15***	***16***	***17***	***19***	***22***	***26***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Mining, Henderson Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Henderson County Other (Region C Only)

Henderson County Other includes individual domestic supplies and other water suppliers too small to be classified as water user groups. The entities included under Henderson County Other in Region C receive their water supply from Tarrant Regional Water District (TRWD) and groundwater (Carrizo-Wilcox aquifer). Water management strategies for these entities include conservation and additional water from TRWD. **Table 5E.247** shows the projected population and demand, the current supplies, and the water management strategies for Henderson County Other.

TABLE 5E.247 SUMMARY OF WATER USER GROUP – HENDERSON COUNTY OTHER (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population in Region C	**5,000**	**6,000**	**7,000**	**8,000**	**9,000**	**10,000**
Projected Water Demand in Region C						
Municipal Demand	437	521	608	695	782	869
Total Projected Water Demand	***437***	***521***	***608***	***695***	***782***	***869***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	135	135	135	135	135	135
Tarrant Regional WD	260	294	333	361	385	410
Total Current Supplies	***395***	***429***	***468***	***496***	***520***	***545***
Need (Demand - Current Supply)	***42***	***92***	***140***	***199***	***262***	***324***
Water Management Strategies						
Water Conservation	9	14	19	23	26	28
Additional Supplies from TRWD	36	82	125	180	240	300
Total Water Management Strategies	***45***	***96***	***144***	***203***	***266***	***328***
County-Other, Henderson Reserve (Shortage)	***3***	***4***	***4***	***4***	***4***	***4***

Henderson County Steam Electric Power (Region C Only)

Steam electric power demands do not include water that is used in cogeneration facilities (which is in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. Henderson County's Steam Electric Power demand is attributed to the Luminant Generation Company LLC. The current supply for this water user group is Lake Trinidad. The supply is sufficient to meet future demands, and there are no water management strategies for this water user group. Conservation was considered for this water user group, but it is not recommended because the steam electric demand projections themselves considered items such as future efficiency programs. **Table 5E.248** shows the projected demand, the current supplies, and the water management strategies for Henderson County Steam Electric Power in Region C (the portion in the Trinity River Basin).

TABLE 5E.248 SUMMARY OF WATER USER GROUP - HENDERSON COUNTY SEP (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand in Region C	**132**	**2,192**	**2,192**	**2,192**	**2,192**	**2,192**
Currently Available Water Supplies						
Trinidad Lake/Reservoir	2,950	2,950	2,950	2,950	2,950	2,950
Total Current Supplies	***2,950***	***2,950***	***2,950***	***2,950***	***2,950***	***2,950***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Steam-Electric Power, Henderson Reserve (Shortage)	***2,818***	***758***	***758***	***758***	***758***	***758***

Log Cabin

The City of Log Cabin is located in western Henderson County. The city's current supply is groundwater from the Carrizo-Wilcox aquifer. Conservation is the only recommended water management strategy. **Table 5E.249** shows the projected population and demand, the current supplies, and the water management strategies for Log Cabin.

TABLE 5E.249 SUMMARY OF WATER USER GROUP – LOG CABIN

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**671**	**671**	**702**	**712**	**723**	**735**
Projected Water Demand						
Municipal Demand	114	114	119	121	123	125
Total Projected Demand	***114***	***114***	***119***	***121***	***123***	***125***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	114	114	119	121	123	125
Total Current Supplies	***114***	***114***	***119***	***121***	***123***	***125***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	3	4	5	6	6	8
Total Water Management Strategies	***3***	***4***	***5***	***6***	***6***	***8***
Log Cabin Reserve (Shortage)	***3***	***4***	***5***	***6***	***6***	***8***

Mabank

Mabank is located in southeastern Kaufman County and northern Henderson County in Region C and Van Zandt County in Region D. Projected demands and water management strategies for Mabank are discussed under Kaufman County in **Section 0.**

Malakoff

Malakoff is located in western Henderson County. The city provides a small amount of retail water supply to Henderson County Manufacturing. The city gets its water supply from the Carrizo-Wilcox aquifer and from purchasing raw water from the Tarrant Regional Water District (TRWD). The water management strategies for Malakoff include conservation and additional water from TRWD. **Table 5E.250** shows the projected population and demand, the current supplies, and the water management strategies for Malakoff.

TABLE 5E.250 SUMMARY OF WATER USER GROUP – CITY OF MALAKOFF

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,416**	**2,562**	**2,689**	**2,727**	**2,766**	**2,809**
Projected Water Demand						
Municipal Demand	270	285	299	303	308	312
Manufacturing, Henderson	*10*	*10*	*10*	*10*	*10*	*10*
Total Projected Demand	***280***	***295***	***309***	***313***	***318***	***322***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	100	100	100	100	100	100
Manufacturing, Henderson	10	10	10	10	10	10
Tarrant Regional WD	232	216	211	195	184	175
Total Current Supplies	***342***	***326***	***321***	***305***	***294***	***285***
Need (Demand - Current Supply)	***0***	***0***	***0***	***8***	***24***	***37***
Water Management Strategies						
Water Conservation	11	28	37	38	39	41
Additional Supplies from TRWD	27	41	51	70	85	96
Total Water Management Strategies	***38***	***69***	***88***	***108***	***124***	***137***
Malakoff Reserve (Shortage)	***100***	***100***	***100***	***100***	***100***	***100***

Trinidad

Trinidad is located in western Henderson County. The city gets its water supply from TRWD. The water management strategies for Trinidad include conservation and additional supplies from TRWD. **Table 5E.251** shows the projected population and demand, the current supplies, and the water management strategies for the city.

TABLE 5E.251 SUMMARY OF WATER USER GROUP – CITY OF TRINIDAD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,134**	**1,152**	**1,191**	**1,213**	**1,236**	**1,261**
Projected Water Demand						
Municipal Demand	159	161	167	170	173	177
Total Projected Demand	***159***	***161***	***167***	***170***	***173***	***177***
Currently Available Water Supplies						
Tarrant Regional WD	127	114	110	102	96	92
Total Current Supplies	***127***	***114***	***110***	***102***	***96***	***92***
Need (Demand - Current Supply)	***32***	***47***	***57***	***68***	***77***	***85***
Water Management Strategies						
Water Conservation	13	35	48	48	50	53
Additional Water from TRWD	19	12	9	20	27	32
Total Water Management Strategies	***32***	***47***	***57***	***68***	***77***	***85***
Trinidad Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Virginia Hill Water Supply Corporation

Virginia Hill WSC serves southern Henderson County. This water user group is split between Regions C and I. The WSC gets its water supply from the Carrizo-Wilcox aquifer, and the supply is sufficient to meet the projected demand. The only water management strategy for Virginia Hill WSC is conservation. **Table 5E.252** shows the projected population and demand, the current supplies, and the water management strategies for Virginia Hill WSC.

TABLE 5E.252 SUMMARY OF WATER USER GROUP – VIRGINIA HILL WATER SUPPLY CORPORATION

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,547**	**1,594**	**1,633**	**1,667**	**1,704**	**1,744**
Projected Water Demand						
Municipal Demand	184	189	194	198	202	207
Total Projected Demand	***184***	***189***	***194***	***198***	***202***	***207***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	184	189	194	198	202	207
Total Current Supplies	***184***	***189***	***194***	***198***	***202***	***207***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	2	3	3	4	6	7
Total Water Management Strategies	***2***	***3***	***3***	***4***	***6***	***7***
Virginia Hill WSC (Regions C Only) Reserve (Shortage)	***2***	***3***	***3***	***4***	***6***	***7***

West Cedar Creek Municipal Utility District

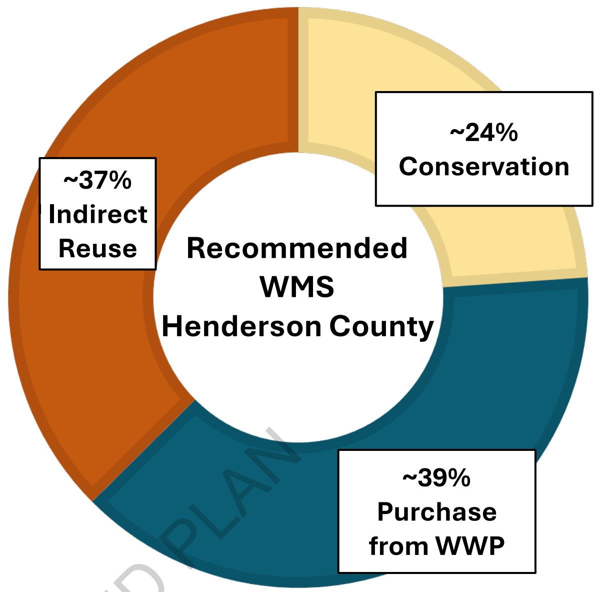
West Cedar Creek MUD supplies water to northwestern Henderson County and southern Kaufman County. The MUD gets its water supply from Tarrant Regional Water District (TRWD), and the recommended water management strategies include conservation and additional supplies from TRWD. **Table 5E.253** shows the projected population and demand, the current supplies, and the water management strategies for West Cedar Creek MUD.

TABLE 5E.253 SUMMARY OF WATER USER GROUP – WEST CEDAR CREEK MUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,074**	**4,777**	**5,308**	**5,383**	**5,461**	**5,543**
Projected Water Demand						
Municipal Demand	1,086	1,022	1,136	1,152	1,168	1,186
Total Projected Water Demand	***1,086***	***1,022***	***1,136***	***1,152***	***1,168***	***1,186***
Currently Available Water Supplies						
Tarrant Regional WD	937	776	802	741	696	663
Total Current Supplies	***937***	***776***	***802***	***741***	***696***	***663***
Need (Demand - Current Supply)	***149***	***246***	***334***	***411***	***472***	***523***
Water Management Strategies						
Water Conservation	26	33	41	45	49	55
Additional Supplies from TRWD	123	213	293	366	423	468
Total Water Management Strategies	***149***	***246***	***334***	***411***	***472***	***523***
West Cedar Creek MUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

5E.9.2 Summary of Costs for Henderson County

Table 5E.254 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Henderson County. Total quantities from **Table 5E.254** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Henderson County are projected to come through purchases from WWP. Other strategies include indirect reuse and conservation.

Table 5E.255 summarizes the recommended and alternative water management strategies for suppliers in Henderson County. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.254 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR HENDERSON COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	1,835	$306,974
Purchase from WWP	2,969	$0
Additional Infrastructure	*4,592*	*$3,116,000*
Indirect Reuse	2,872	$0
Total	***7,676***	***$3,422,974***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.255 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR HENDERSON COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Athens MWA	Conservation	2030	Included under WUGs.			
	Fish Hatchery Reuse	2030	2,872	$0	$0.00	$0.00
	WTP Pump Station Expansion	*2050*	*4,592*	*$3,116,000*	*$0.21*	*$0.06*
	ALTERNATIVE New Well(s) in Carrizo-Wilcox	*2070*	*720*	*$10,270,000*	*$5.48*	*$4.40*
WUGs						
Athens[a]	Conservation	2030	1,226	$156,974	$2.62	$1.08
	Athens	2030	See Athens MWA.			
B B S WSC[a]	Conservation	See 2026 Region I Plan.				
Bethel Ash WSC[a]	Conservation	See 2026 Region I Plan.				
Crescent Heights WSC	Conservation	2030	9	$0	$6.23	$3.23
Dogwood Estates Water	Conservation	2030	9	$0	$2.96	$1.73
East Cedar Creek FWSD	Conservation	2030	435	$150,000	$2.61	$0.93
	TRWD	2030	2,521	$0	$1.50	$1.50
Eustace	Conservation	2030	18	$0	$4.44	$2.58
Log Cabin	Conservation	2030	8	$0	$3.32	$1.69
Mabank[a]	Conservation	See Kaufman County.				
	TRWD					
	Additional Treatment and Delivery					
Malakoff	Conservation	2030	41	$0	$3.48	$1.45
	TRWD	2030	96	$0	$1.50	$1.50
Trinidad	Conservation	2030	53	$0	$2.00	$1.39
	TRWD	2030	32	$0	$1.50	$1.50
Virginia Hill WSC[a] (Region C and I portions)	Conservation	See 2026 Region I Plan				
West Cedar Creek MUD[a]	Conservation	See Kaufman County.				
	TRWD					
County Other and Non-Municipal						

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
County Other, Henderson (Region C only)	Conservation	2030	28	$0	$6.22	$0.31
	TRWD	2030	300	$0	$1.50	$1.50
Irrigation, Henderson (Region C only)	Conservation	2040	8	$0	$0.94	$0.94
Livestock, Henderson (Region C only)	None	None				
Manufacturing, Henderson (Region C only)	Athens	2030	20	$0	$1.50	$1.50
Mining, Henderson (Region C only)	None	None				
Steam Electric Power, Henderson (Region C only)	None	None				

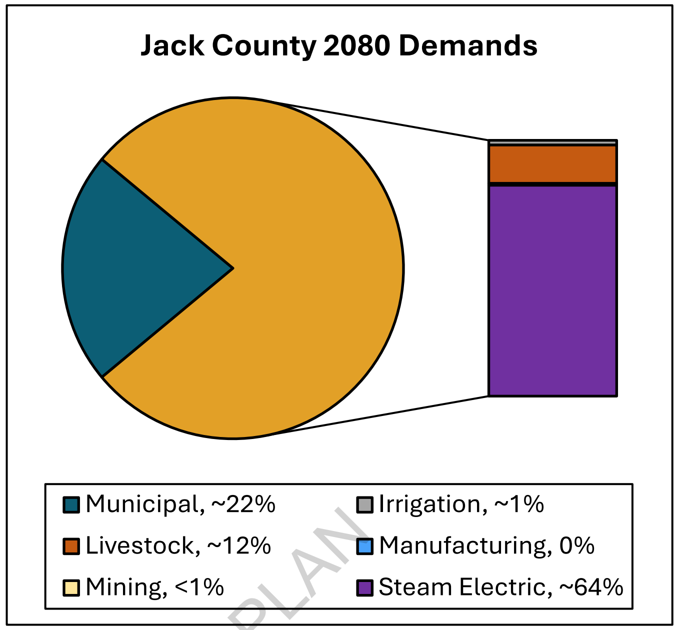
[a]Water User Groups extend into more than one county or into the Region I part of Henderson County.
[b]Quantities listed are for the WUG only. They do not include the WUG's customers.
[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.10 Jack County

Jack County is located in the western portion of Region C. **Figure 5E.20** shows the service area for water suppliers in Jack County.

Jack County's population is projected to stay consistent over the planning period, declining by about 400 people between 2030 and 2080.

Non-municipal water use represents over 78% of the total demand. Steam electric demands are the largest projected demand for Jack County. Municipal and livestock are the second and third largest projected demands for the county.



Tarrant Regional Water District (TRWD) is a major water provider that supplies water to Jack County. An overall summary of the county's projections is shown in **Table 5E.256**, and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Jack County Quick Facts

2020 Population: 8,472

Projected 2080 Population: 7,787

Projected 2080 Demand: 5 MGD

County Seat: Jacksboro

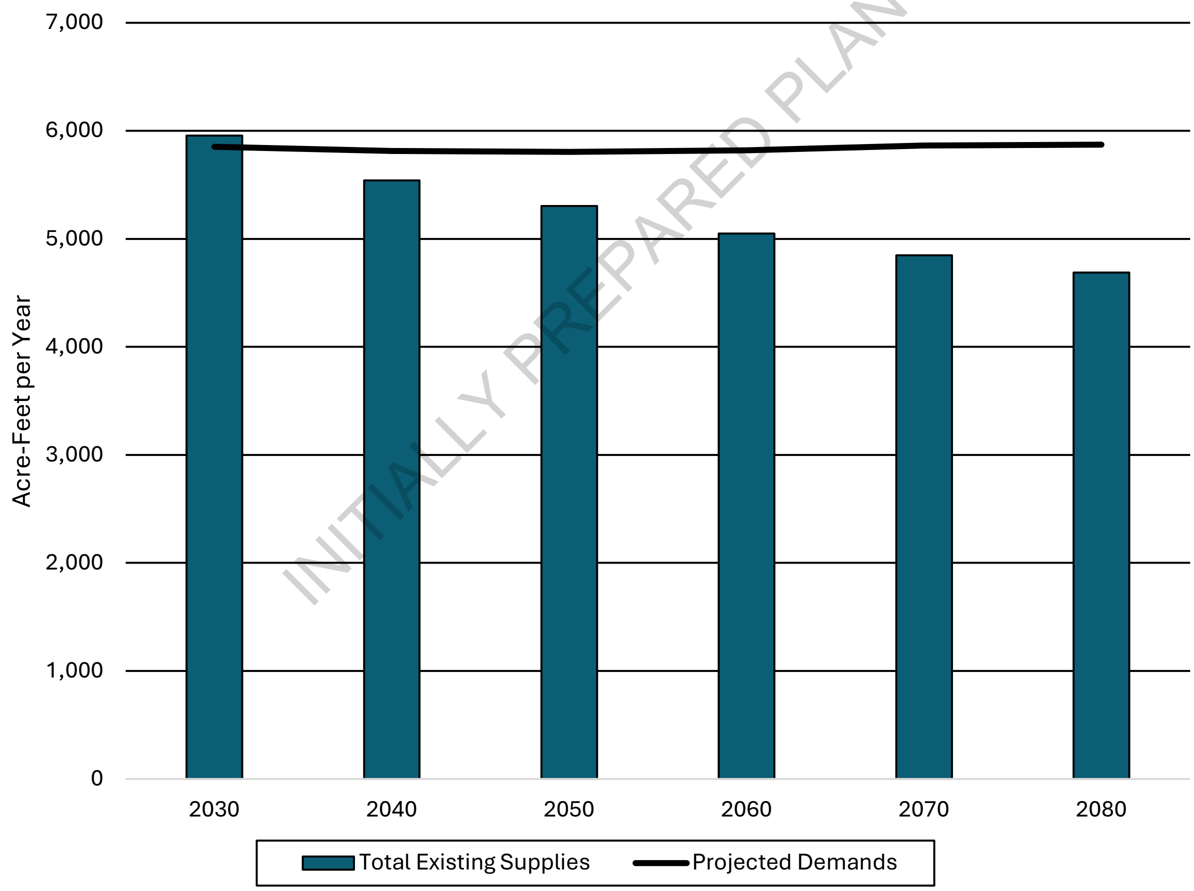
Economy: Petroleum production, oil-field services, livestock, manufacturing tourism

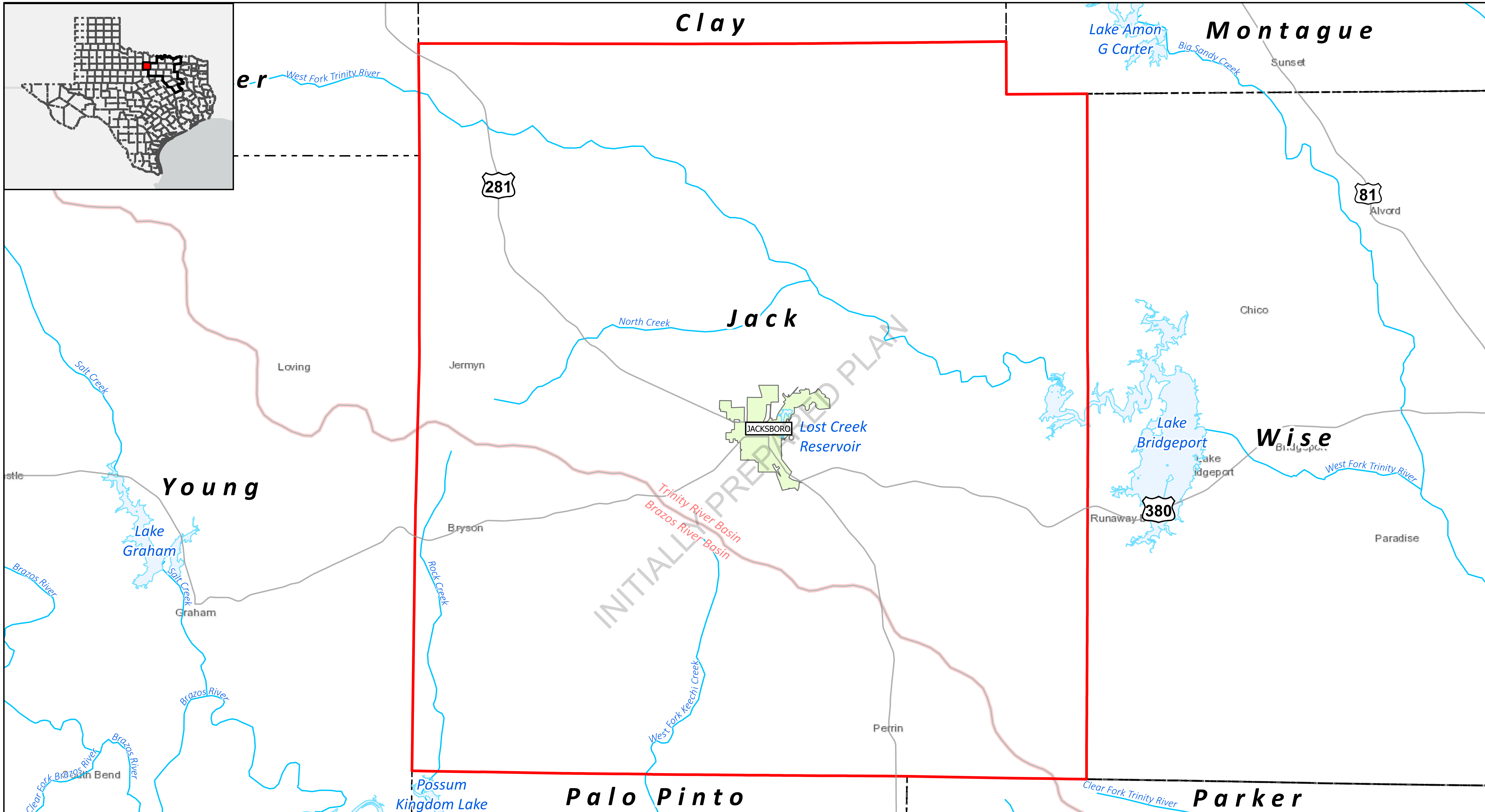
River Basins: Trinity (71%), Brazos (29%)

TABLE 5E.256 SUMMARY OF JACK COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**8,214**	**7,957**	**7,770**	**7,740**	**7,859**	**7,787**
Projected Demands	**5,852**	**5,813**	**5,805**	**5,820**	**5,865**	**5,872**
Municipal	1,276	1,237	1,229	1,244	1,289	1,296
Irrigation	84	84	84	84	84	84
Livestock	685	685	685	685	685	685
Manufacturing	0	0	0	0	0	0
Mining	35	35	35	35	35	35
Steam Electric	3,772	3,772	3,772	3,772	3,772	3,772
Total Existing Supplies	***5,955***	***5,541***	***5,304***	***5,049***	***4,848***	***4,689***
Need (Demand - Supply)	***0***	***272***	***501***	***771***	***1,017***	***1,183***

FIGURE 5E.19 SUMMARY OF JACK COUNTY





REGION C
Water Planning for North Texas

Jack County, Texas
Figure 5E.20

N
0 4.25 8.5 Mi

Data Source(s): ESRI, TWDB, TxDOT

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.10.2 Wholesale Water Providers and Water User Groups

There are no wholesale water providers in Jack County. Water management strategies for Jack County water user groups are discussed below (in alphabetical order). The costs for Jack County water user groups and a summary for Jack County are presented in **Section 5E.10.2.**

Jack County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. The available sources of supply are local supplies (Trinity run-of-river), direct reuse, and groundwater (Cross Timbers aquifer). Current supplies are sufficient to meet future needs, and the only water management strategy is conservation. **Table 5E.257** shows the projected demand, the current supplies, and the water management strategies for Jack County Irrigation.

TABLE 5E.257 SUMMARY OF WATER USER GROUP – JACK COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***84***	***84***	***84***	***84***	***84***	***84***
Currently Available Water Supplies						
Cross Timbers Aquifer	59	59	59	59	59	59
Direct Reuse through Bryson	25	25	25	25	25	25
Trinity Run-of-River	0	0	0	0	0	0
Total Current Supplies	***84***	***84***	***84***	***84***	***84***	***84***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	0	2	4	5	6	7
Total Water Management Strategies	***0***	***2***	***4***	***5***	***6***	***7***
Irrigation, Jack Reserve (Shortage)	***0***	***2***	***4***	***5***	***6***	***7***

Jack County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. The current supplies are local surface water supplies and groundwater (Cross Timbers aquifer). These sources are sufficient to meet future demands, and there are no water management strategies. **Table 5E.258** shows the projected demand, current supplies, and water management strategies for Jack County Livestock.

TABLE 5E.258 SUMMARY OF WATER USER GROUP – JACK COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***685***	***685***	***685***	***685***	***685***	***685***
Currently Available Water Supplies						
Cross Timbers Aquifer	100	100	100	100	100	100
Brazos Livestock Local Supply	173	173	173	173	173	173
Trinity Livestock Local Supply	425	425	425	425	425	425
Total Current Supplies	***698***	***698***	***698***	***698***	***698***	***698***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Jack Reserve (Shortage)	***13***	***13***	***13***	***13***	***13***	***13***

Jack County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. There is no projected manufacturing demand in Jack County.

Jack County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Jack County Mining is supplied by groundwater (Cross Timbers aquifer). The existing supply is sufficient to meet future demands, and there are no water management strategies. **Table 5E.259** shows the projected demand, the current supplies, and the water management strategies for Jack County Mining.

TABLE 5E.259 SUMMARY OF WATER USER GROUP – JACK COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***35***	***35***	***35***	***35***	***35***	***35***
Currently Available Water Supplies						
Cross Timbers Aquifer	35	35	35	35	35	35
Total Current Supplies	***35***	***35***	***35***	***35***	***35***	***35***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Mining, Jack Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Jack County Other

Jack County Other includes individual domestic supplies and other water suppliers too small to be classified as water user groups. The entities included under Jack County Other currently receive their water supply from Lake Graham through Graham and groundwater (Cross Timbers aquifer). Water management strategies for these entities include conservation and water from Walnut Creek SUD. **Table 5E.260** shows the projected population and demand, the current supplies, and the water management strategies for Jack County Other.

TABLE 5E.260 SUMMARY OF WATER USER GROUP – JACK COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,500**	**4,300**	**4,000**	**3,800**	**3,600**	**3,400**
Projected Water Demand in Region C						
Municipal Demand	486	461	429	408	386	365
Total Projected Water Demand	***486***	***461***	***429***	***408***	***386***	***365***
Currently Available Water Supplies						
Graham	43	38	34	30	30	27
Cross Timbers Aquifer	443	423	395	378	356	338
Total Current Supplies	***486***	***461***	***429***	***408***	***386***	***365***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	4	5	6	7	8	9
Connect to Walnut Creek SUD	49	46	43	41	39	37
Total Water Management Strategies	***53***	***51***	***49***	***48***	***47***	***46***
County-Other, Jack Reserve (Shortage)	***53***	***51***	***49***	***48***	***47***	***46***

Jack County Steam Electric Power

Steam electric power demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. Jack County's Steam Electric Power demand is attributed to the Brazos Electric Power Coop Inc. and is currently supplied by Tarrant Regional Water District (TRWD). The water management strategy for Jack County Steam Electric Power is additional water from TRWD. Conservation was considered for this water user group, but it is not recommended because the steam electric demand projections themselves considered items such as future efficiency programs. **Table 5E.261** shows the projected demand, the current supplies, and the water management strategies for Jack County Steam Electric Power.

TABLE 5E.261 SUMMARY OF WATER USER GROUP – JACK COUNTY SEP

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***3,772***	***3,772***	***3,772***	***3,772***	***3,772***	***3,772***
Currently Available Water Supplies						
Tarrant Regional WD	3,255	2,866	2,661	2,427	2,248	2,110
Total Current Supplies	***3,255***	***2,866***	***2,661***	***2,427***	***2,248***	***2,110***
Need (Demand - Current Supply)	***517***	***906***	***1,111***	***1,345***	***1,524***	***1,662***
Water Management Strategies						
Additional Supplies from TRWD	517	906	1,111	1,345	1,524	1,662
Total Water Management Strategies	***517***	***906***	***1,111***	***1,345***	***1,524***	***1,662***
Steam-Electric Power, Jack Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Jacksboro

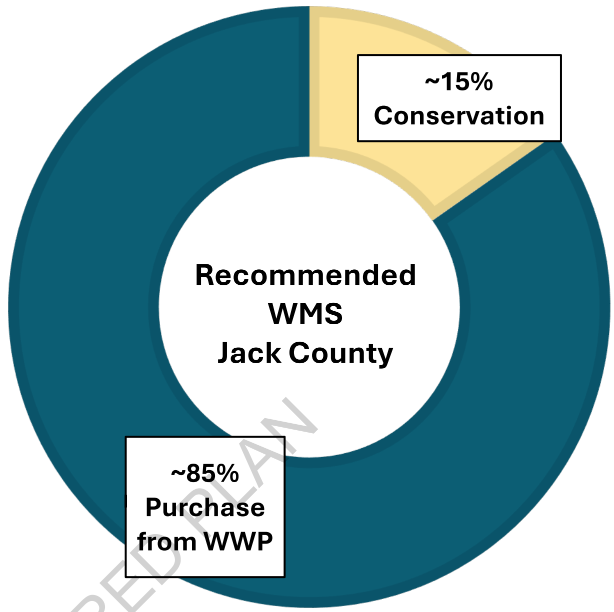
Jacksboro, the county seat of Jack County, is located in the center of the county. The city obtains its water supply from the Lost Creek Reservoir/Lake Jacksboro System, which it owns and operates. The existing supply is sufficient to meet future demands and the only water management strategy for Jacksboro is conservation. **Table 5E.262** shows the projected population and demand, the current supplies, and the water management strategies for Jacksboro.

TABLE 5E.262 SUMMARY OF WATER USER GROUP – CITY OF JACKSBORO

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,714**	**3,657**	**3,770**	**3,940**	**4,259**	**4,387**
Projected Water Demand						
Municipal Demand	790	776	800	836	903	931
Total Projected Demand	***790***	***776***	***800***	***836***	***903***	***931***
Currently Available Water Supplies						
Lost Creek-Jacksboro Lake/Reservoir System	1,397	1,397	1,397	1,397	1,397	1,397
Total Current Supplies	***1,397***	***1,397***	***1,397***	***1,397***	***1,397***	***1,397***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	69	180	242	256	279	292
Total Water Management Strategies	***69***	***180***	***242***	***256***	***279***	***292***
Jacksboro Reserve (Shortage)	***676***	***801***	***839***	***817***	***773***	***758***

5E.10.3 Summary of Costs for Jack County

Table 5E.263 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Jack County. Total quantities from **Table 5E.263** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Jack County are projected to come through purchases from wholesale water providers and the only other strategy is conservation.

Table 5E.264 summarizes the recommended water management strategies within Jack County for individual WUGs and WWPs. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.263 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR JACK COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	308	$0
Purchase from WWP	1,711	$0
Additional Infrastructure	*49*	*$12,927,000*
Total	***2,019***	***$12,927,000***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.264 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR JACK COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
There are no wholesale water providers in Jack County.						
WUGs						
Jacksboro	Conservation	2030	292	$0	$1.70	$1.43
County Other and Non-Municipal						
County Other, Jack	Conservation	2030	9	$0	$3.92	$0.32
	Walnut Creek SUD	2030	49	$0	$4.00	$4.00
	Infrastructure to connect to Walnut Creek SUD	*2030*	*49*	*$12,927,000*	*$50.66*	*$6.64*
Irrigation, Jack	Conservation	2040	7	$0	$0.94	$0.94
Livestock, Jack	None	None				
Manufacturing, Jack	None	None				
Mining, Jack	None	None				
Steam Electric Power, Jack	TRWD	2030	1,662	$0	$1.50	$1.50

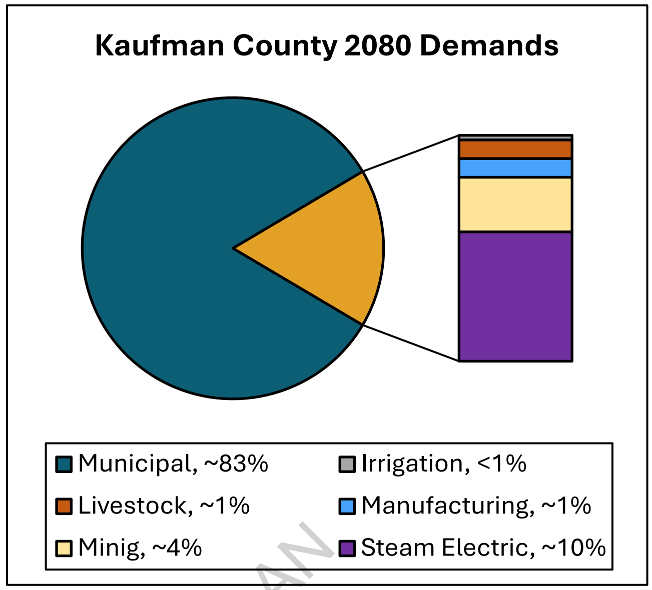
[a]Water User Groups extend into more than one county.
[b]Quantities listed are for the WUG only. They do not include the WUG's customers.
[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.11 Kaufman County

Kaufman County is located in the southeastern portion of Region C. **Figure 5E.22** shows the service areas for water user groups in Kaufman County.

The population of Kaufman County is projected to more than triple between 2030 and 2080.

Municipal demand is the largest projected demand in the county. The second largest projected demand is for steam electric power. Irrigation, livestock, mining and manufacturing demands account for less than 7% of the total county demand.



An overall summary of the county's projections is shown in **Table 5E.265**, and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Kaufman County Quick Facts

2020 Population: 145,310

Projected 2080 Population: 627,644

Projected 2080 Demand: 90 MGD

County Seat: Kaufman

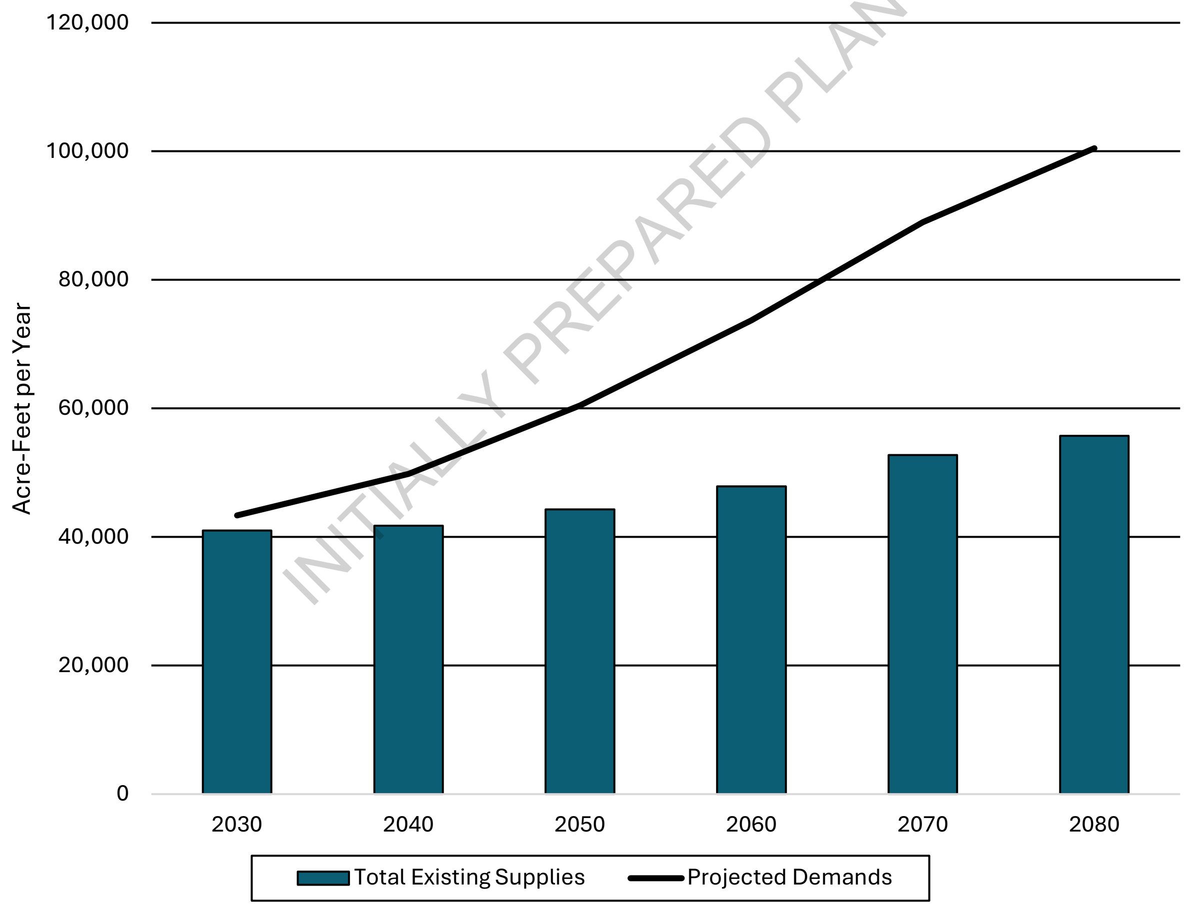
Economy: Manufacturing; government/services

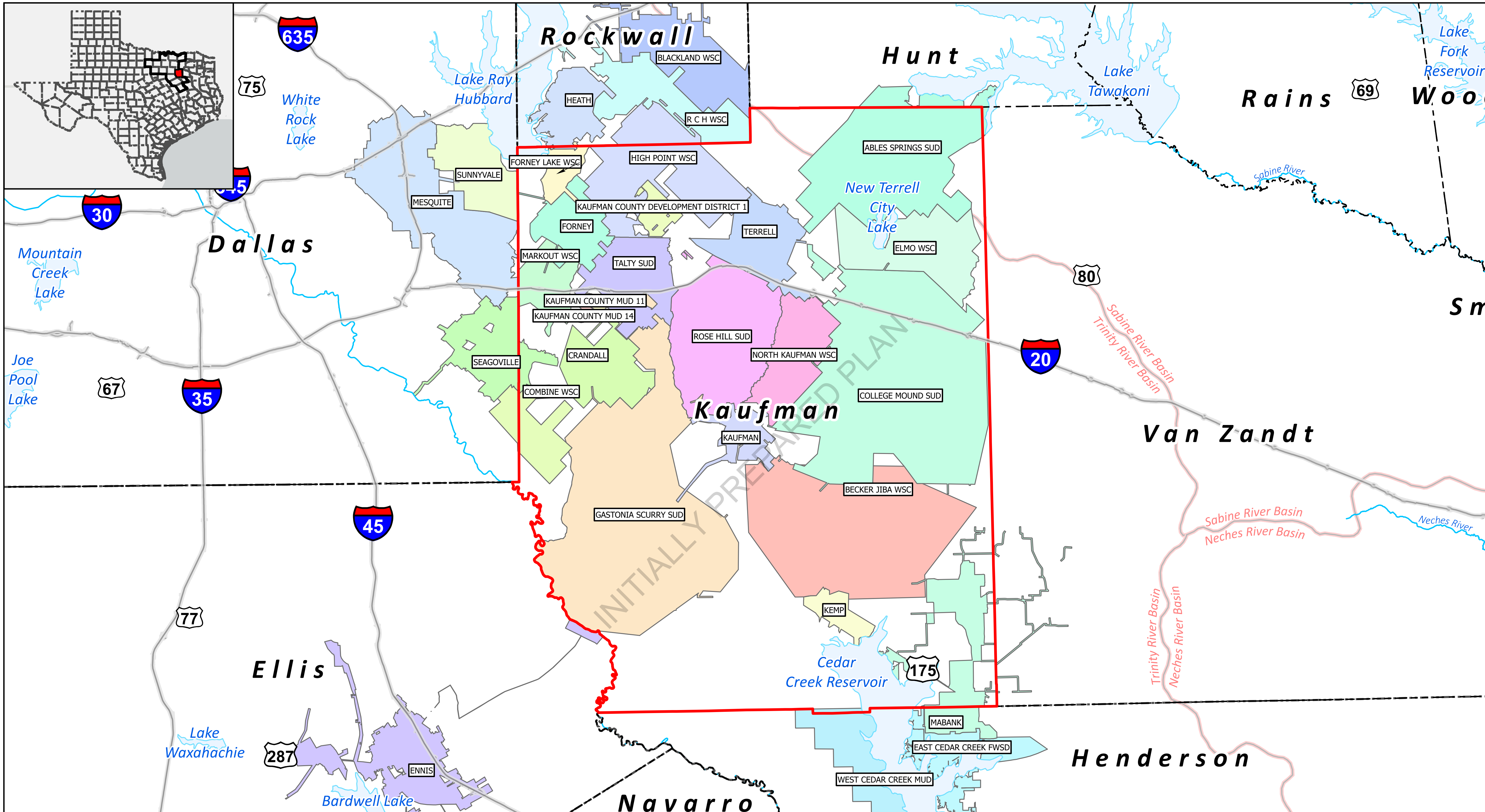
River Basins: Trinity (95%), Sabine (5%)

TABLE 5E.265 SUMMARY OF KAUFMAN COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**209,309**	**257,499**	**335,063**	**431,671**	**542,246**	**627,644**
Projected Demands	**43,359**	**49,805**	**60,450**	**73,713**	**88,988**	**100,484**
Municipal	29,170	35,289	45,524	58,162	72,710	83,379
Irrigation	353	353	353	353	353	353
Livestock	1,413	1,413	1,413	1,413	1,413	1,413
Manufacturing	1,177	1,221	1,266	1,313	1,362	1,412
Mining	1,453	1,736	2,101	2,679	3,357	4,134
Steam Electric	9,793	9,793	9,793	9,793	9,793	9,793
Total Existing Supplies	***41,000***	***41,774***	***44,311***	***47,864***	***52,779***	***55,759***
Need (Demand - Supply)	***2,359***	***8,031***	***16,139***	***25,849***	***36,209***	***44,725***

FIGURE 5E.21 SUMMARY OF KAUFMAN COUNTY





REGION C
Water Planning for North Texas

Kaufman County, Texas

Figure 5E.22

Data Source(s): ESRI, TWDB, TxDOT

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.11.1 Wholesale Water Providers and Water User Groups

Water management strategies for Kaufman County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs and a summary for Kaufman County are presented in **Section 5E.11.2.**

Ables Springs Special Utility District

Ables Springs SUD supplies northeastern Kaufman County in Region C, and part of Hunt and Van Zandt Counties in Region D. The water supply for this SUD is treated water from the North Texas Municipal Water District (NTMWD). Water management strategies for Ables Springs SUD include conservation and purchasing additional water from NTMWD. **Table 5E.266** shows the projected population and demand, the current supplies, and the water management strategies for Ables Springs SUD.

TABLE 5E.266 SUMMARY OF WATER USER GROUP – ABLES SPRINGS SUD (REGIONS C AND D)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,598**	**6,890**	**7,972**	**8,926**	**10,044**	**10,545**
Projected Water Demand						
Municipal Demand	443	463	536	600	675	709
Total Projected Water Demand	***443***	***463***	***536***	***600***	***675***	***709***
Currently Available Water Supplies						
North Texas MWD	405	361	358	355	370	369
Total Current Supplies	***405***	***361***	***358***	***355***	***370***	***369***
Need (Demand - Current Supply)	***38***	***102***	***178***	***245***	***305***	***340***
Water Management Strategies						
Water Conservation	6	8	10	14	18	21
Additional Supplies from NTMWD	32	94	168	231	287	319
Total Water Management Strategies	***38***	***102***	***178***	***245***	***305***	***340***
Ables Springs SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Becker Jiba Water Supply Corporation

Becker Jiba WSC supplies water to Kaufman County. The WSC gets its water supply from North Texas Municipal Water District (NTMWD) through Kaufman. The water management strategies include conservation and additional supplies from NTMWD. **Table 5E.267** shows the projected population and demand, the current supplies, and the water management strategies for Becker Jiba WSC.

TABLE 5E.267 SUMMARY OF WATER USER GROUP – BECKER JIBA WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,425**	**6,986**	**9,459**	**11,174**	**13,077**	**15,179**
Projected Water Demand						
Municipal Demand	390	611	828	978	1,145	1,329
Total Projected Water Demand	***390***	***611***	***828***	***978***	***1,145***	***1,329***
Currently Available Water Supplies						
North Texas MWD (through Kaufman)	357	476	553	579	627	691
Total Current Supplies	***357***	***476***	***553***	***579***	***627***	***691***
Need (Demand - Current Supply)	***33***	***135***	***275***	***399***	***518***	***638***
Water Management Strategies						
Water Conservation	9	19	29	39	51	64
Additional Supplies from NTMWD	24	116	246	360	467	574
Total Water Management Strategies	***33***	***135***	***275***	***399***	***518***	***638***
Becker Jiba WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

College Mound Special Utility District

College Mound SUD supplies eastern Kaufman County. The water supply for this SUD is purchased water from North Texas Municipal Water District (NTMWD), both directly from NTWMD and through Terrell. Water management strategies for College Mound SUD include conservation and purchasing additional water from NTMWD (direct and through Terrell), including additional delivery infrastructure from Terrell. **Table 5E.268** shows the projected population and demand, the current supplies, and the water management strategies for College Mound SUD.

TABLE 5E.268 SUMMARY OF WATER USER GROUP – COLLEGE MOUND SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**12,664**	**14,078**	**19,045**	**29,451**	**40,174**	**50,886**
Projected Water Demand						
Municipal Demand	1,291	1,435	1,941	3,002	4,095	5,187
Total Projected Water Demand	***1,291***	***1,435***	***1,941***	***3,002***	***4,095***	***5,187***
Currently Available Water Supplies						
North Texas MWD	589	559	646	888	1,121	1,348
North Texas MWD (through Terrell)	338	341	343	344	345	346
Total Current Supplies	***927***	***900***	***989***	***1,232***	***1,466***	***1,694***
Need (Demand - Current Supply)	***364***	***535***	***952***	***1,770***	***2,629***	***3,493***
Water Management Strategies						
Water Conservation	17	25	40	190	331	424
Additional Supplies from NTMWD	48	146	304	518	761	1,033
Additional Supplies from NTMWD through Terrell	299	364	608	1,062	1,537	2,036
Increase Delivery Infrastructure from Terrell	*299*	*364*	*608*	*1,062*	*1,537*	*2,036*
Total Water Management Strategies	***364***	***535***	***952***	***1,770***	***2,629***	***3,493***
College Mound WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Combine Water Supply Corporation

Combine WSC provides water in Kaufman and Dallas Counties. The WSC gets its water supply from Dallas Water Utilities (DWU) through Seagoville. Water management strategies for Combine WSC include conservation and additional supplies from DWU. **Table 5E.269** shows the projected population and demand, the current supplies, and the water management strategies for Combine WSC.

TABLE 5E.269 SUMMARY OF WATER USER GROUP – COMBINE WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,604**	**4,094**	**4,678**	**5,309**	**6,009**	**6,784**
Projected Water Demand						
Municipal Demand	330	373	426	483	548	618
Total Projected Water Demand	***330***	***373***	***426***	***483***	***548***	***618***
Currently Available Water Supplies						
DWU (through Seagoville)	305	328	356	388	422	460
Total Current Supplies	***305***	***328***	***356***	***388***	***422***	***460***
Need (Demand - Current Supply)	***25***	***45***	***70***	***95***	***126***	***158***
Water Management Strategies						
Water Conservation	5	6	8	10	15	18
Additional Supplies from DWU through Seagoville	20	39	62	85	111	140
Total Water Management Strategies	***25***	***45***	***70***	***95***	***126***	***158***
Combine WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Crandall

Crandall is located in western Kaufman County. The city's water supply is purchased from North Texas Municipal Water District (NTMWD) through the Kaufman Four One delivery point. Crandall plans to continue using NTMWD water. Water management strategies for Crandall include conservation and purchasing additional water from NTMWD. **Table 5E.270** shows the projected population and demand, the current supplies, and the water management strategies for Crandall.

TABLE 5E.270 SUMMARY OF WATER USER GROUP – CITY OF CRANDALL

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,598**	**12,005**	**20,084**	**29,172**	**41,195**	**49,395**
Projected Water Demand						
Municipal Demand	992	2,121	3,548	5,153	7,277	8,725
Total Projected Demand	***992***	***2,121***	***3,548***	***5,153***	***7,277***	***8,725***
Currently Available Water Supplies						
North Texas MWD	905	1,653	2,366	3,050	3,987	4,536
Total Current Supplies	***905***	***1,653***	***2,366***	***3,050***	***3,987***	***4,536***
Need (Demand - Current Supply)	***87***	***468***	***1,182***	***2,103***	***3,290***	***4,189***
Water Management Strategies						
Water Conservation	23	70	305	563	799	918
Additional Supplies from NTMWD	64	398	877	1,540	2,491	3,271
Total Water Management Strategies	***87***	***468***	***1,182***	***2,103***	***3,290***	***4,189***
Crandall Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Elmo Water Supply Corporation

Elmo WSC supplies water in Kaufman County. The WSC gets its water supply from North Texas Municipal Water District (NTMWD) through Terrell. The water management strategies include conservation and additional water from NTMWD through Terrell. **Table 5E.271** shows the projected population and demand, the current supplies, and the water management strategies for Elmo WSC.

TABLE 5E.271 SUMMARY OF WATER USER GROUP – ELMO WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,332**	**2,733**	**3,243**	**3,810**	**4,440**	**5,137**
Projected Water Demand						
Municipal Demand	190	221	263	309	360	416
Total Projected Water Demand	***190***	***221***	***263***	***309***	***360***	***416***
Currently Available Water Supplies						
North Texas MWD (through Terrell)	173	173	175	183	197	216
Total Current Supplies	***173***	***173***	***175***	***183***	***197***	***216***
Need (Demand - Current Supply)	***17***	***48***	***88***	***126***	***163***	***200***
Water Management Strategies						
Water Conservation	5	6	9	12	15	18
Additional Supplies from NTMWD through Terrell	12	42	79	114	148	182
Total Water Management Strategies	***17***	***48***	***88***	***126***	***163***	***200***
Elmo WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Forney

The City of Forney is located in northwestern Kaufman County. Forney is a wholesale water provider (WWP) that currently purchases treated water from the North Texas Municipal Water District (NTMWD). Forney also purchases reuse water from Garland, which it then sells as a supply for Kaufman County Steam Electric Power. Forney currently provides wholesale supplies to all or portions of High Point WSC, Talty SUD, Kaufman County Development District 1, Markout WSC, Kaufman County Manufacturing (through retail service within the city), and a Kaufman County Steam Electric provider. NTMWD plans to continue providing water to Forney and its retail customers. The recommended water management strategies for Forney include implementing water conservation measures and purchasing additional water from NTMWD, including additional delivery infrastructure from NTMWD. A summary of the recommended water plan for Forney is shown in **Table 5E.272**.

TABLE 5E.272 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – CITY OF FORNEY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Forney	4,304	5,511	6,823	8,056	8,956	8,956
High Point WSC	935	1,431	2,068	2,796	3,596	4,474
Kaufman County Development District 1	905	959	1,484	2,300	3,412	3,945
Manufacturing, Kaufman	1,036	1,075	1,114	1,156	1,198	1,243
Markout WSC	504	597	833	1,200	1,602	2,137
Steam Electric Power, Kaufman	9,793	9,793	9,793	9,793	9,793	9,793
Talty SUD	1,946	2,166	3,192	4,583	6,321	7,433
Total Projected Demands	***19,423***	***21,532***	***25,307***	***29,884***	***34,878***	***37,981***
Currently Available Supplies						
North Texas MWD	9,666	9,873	10,850	12,160	13,799	14,441
Reuse from Garland (SEP only)	8,672	8,672	8,672	8,672	8,672	8,672
Total Current Supplies	***18,338***	***18,545***	***19,522***	***20,832***	***22,471***	***23,113***
Need (Demand less Supply)	***1,085***	***2,987***	***5,785***	***9,052***	***12,407***	***14,868***
Water Management Strategies						
Conservation (retail)	184	440	647	784	871	830
Conservation (wholesale)	163	382	675	1,238	1,923	2,268
Additional NTMWD	738	2,165	4,463	7,030	9,613	11,770
Increase delivery infrastructure from NTWMD (pump station)	*0*	*0*	*872*	*4,749*	*8,971*	*11,770*
Total Supplies from Strategies	***1,085***	***2,987***	***5,785***	***9,052***	***12,407***	***14,868***
Total Supplies	***19,423***	***21,532***	***25,307***	***29,884***	***34,878***	***37,981***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

Forney Lake Water Supply Corporation

Forney Lake WSC supplies water to northwestern Kaufman County and southwestern Rockwall County. The water supply for this WSC is purchased water from North Texas Municipal Water District (NTMWD). Water management strategies for Forney Lake WSC include implementing conservation measures and purchasing additional water from NTMWD. **Table 5E.273** shows the projected population and demand, the current supplies, and the water management strategies for Forney Lake WSC.

TABLE 5E.273 SUMMARY OF WATER USER GROUP – FORNEY LAKE WATER SUPPLY CORPORATION

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**19,207**	**22,100**	**23,000**	**25,000**	**25,500**	**26,000**
Projected Water Demand						
Municipal Demand	3,061	3,512	3,655	3,972	4,052	4,131
Total Projected Demand	***3,061***	***3,512***	***3,655***	***3,972***	***4,052***	***4,131***
Currently Available Water Supplies						
North Texas MWD	2,795	2,738	2,437	2,352	2,220	2,148
Total Current Supplies	***2,795***	***2,738***	***2,437***	***2,352***	***2,220***	***2,148***
Need (Demand - Current Supply)	***266***	***774***	***1,218***	***1,620***	***1,832***	***1,983***
Water Management Strategies						
Water Conservation	82	234	278	324	329	340
Additional Water from NTMWD	184	540	940	1,296	1,503	1,643
Total Water Management Strategies	***266***	***774***	***1,218***	***1,620***	***1,832***	***1,983***
Forney Lake WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Gastonia Scurry Special Utility District

Gastonia Scurry SUD supplies water to western Kaufman County. The water supply for this SUD is purchased water from North Texas Municipal Water District (NTMWD). Water management strategies for Gastonia Scurry SUD include conservation and purchasing additional water from NTMWD. **Table 5E.274** shows the projected population and demand, the current supplies, and the water management strategies for Gastonia Scurry SUD.

TABLE 5E.274 SUMMARY OF WATER USER GROUP – GASTONIA SCURRY SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**12,512**	**14,583**	**19,563**	**32,939**	**48,748**	**59,846**
Projected Water Demand						
Municipal Demand	1,430	1,666	2,235	3,763	5,570	6,838
Total Projected Demand	***1,430***	***1,666***	***2,235***	***3,763***	***5,570***	***6,838***
Currently Available Water Supplies						
North Texas MWD	1,306	1,299	1,491	2,228	3,052	3,555
Total Current Supplies	***1,306***	***1,299***	***1,491***	***2,228***	***3,052***	***3,555***
Need (Demand - Current Supply)	***124***	***367***	***744***	***1,535***	***2,518***	***3,283***
Water Management Strategies						
Water Conservation	27	37	59	264	497	597
Additional Supplies from NTMWD	97	330	685	1,271	2,021	2,686
Total Water Management Strategies	***124***	***367***	***744***	***1,535***	***2,518***	***3,283***
Gastonia Scurry SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

High Point Water Supply Corporation

High Point WSC supplies water to northwestern Kaufman County and southern Rockwall County. The water supplies for this WSC are purchased water from Forney and Terrell, both of which purchase treated water from North Texas Municipal Water District (NTWMD). Water management strategies for High Point WSC include conservation and purchasing additional water from Forney and Terrell, increasing contract amounts as appropriate. **Table 5E.275** shows the projected population and demand, the current supplies, and the water management strategies for High Point WSC.

TABLE 5E.275 SUMMARY OF WATER USER GROUP – HIGH POINT WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**21,311**	**32,764**	**47,362**	**64,034**	**82,333**	**102,444**
Projected Water Demand						
Municipal Demand	1,870	2,862	4,137	5,593	7,192	8,948
Total Projected Demand	***1,870***	***2,862***	***4,137***	***5,593***	***7,192***	***8,948***
Currently Available Water Supplies						
Forney	854	1,115	1,379	1,655	1,970	2,326
Terrell	854	1,115	1,379	1,655	1,970	2,326
Total Current Supplies	***1,708***	***2,230***	***2,758***	***3,310***	***3,940***	***4,652***
Need (Demand - Current Supply)	***162***	***632***	***1,379***	***2,283***	***3,252***	***4,296***
Water Management Strategies						
Water Conservation	98	292	470	651	835	1,036
Additional Water from Forney	32	170	454	816	1,208	1,630
Additional Water from Terrell (increase contract amount)	32	170	455	816	1,209	1,630
Total Water Management Strategies	***162***	***632***	***1,379***	***2,283***	***3,252***	***4,296***
High Point WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Kaufman

Kaufman is located in central Kaufman County. Kaufman provides supplies to Becker Jiba WSC, County Other Kaufman, Manufacturing Kaufman, and North Kaufman WSC. The city's water supply is purchased water from North Texas Municipal Water District (NTMWD). Water management strategies for Kaufman include conservation and additional water from NTMWD. **Table 5E.276** shows the projected population and demand, the current supplies, and the water management strategies for Kaufman.

TABLE 5E.276 SUMMARY OF WATER USER GROUP – CITY OF KAUFMAN

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**7,626**	**8,606**	**12,368**	**15,632**	**18,682**	**21,791**
Projected Water Demand						
Municipal Demand	1,252	1,408	2,024	2,558	3,057	3,565
Becker Jiba WSC	*390*	*611*	*828*	*978*	*1,145*	*1,329*
County-Other, Kaufman	*832*	*961*	*1,285*	*1,504*	*1,933*	*2,206*
Manufacturing, Kaufman	*12*	*12*	*13*	*13*	*14*	*14*
North Kaufman WSC	*35*	*46*	*60*	*76*	*93*	*112*
Total Projected Demand	***2,521***	***3,038***	***4,210***	***5,129***	***6,242***	***7,226***
Currently Available Water Supplies						
North Texas MWD	1,143	1,098	1,350	1,514	1,675	1,853
Becker Jiba WSC	*357*	*476*	*553*	*579*	*627*	*691*
County-Other, Kaufman	*759*	*749*	*856*	*890*	*1,059*	*1,147*
Manufacturing, Kaufman	*11*	*9*	*9*	*8*	*7*	*7*
North Kaufman WSC	*32*	*36*	*40*	*45*	*51*	*58*
Total Current Supplies	***2,302***	***2,368***	***2,808***	***3,036***	***3,419***	***3,756***
Need (Demand - Current Supply)	***219***	***670***	***1,402***	***2,093***	***2,823***	***3,470***
Water Management Strategies						
Water Conservation	16	23	43	66	89	230
Becker Jiba WSC	9	19	29	39	51	64
County-Other, Kaufman	13	20	35	49	76	98
Manufacturing, Kaufman	0	0	0	0	0	0
North Kaufman WSC	9	26	43	57	71	90
Additional Water from NTMWD	93	287	631	978	1,293	1,482
Becker Jiba WSC	24	116	246	360	467	574
County-Other, Kaufman	66	201	409	586	831	1,003
Manufacturing, Kaufman	1	3	4	5	7	7
North Kaufman WSC	2	6	14	22	31	41
Total Water Management Strategies	***233***	***701***	***1,454***	***2,162***	***2,916***	***3,589***
Kaufman Reserve (Shortage)	***14***	***31***	***52***	***69***	***93***	***119***

Kaufman County Development District 1

Kaufman County Development District 1 supplies water in Kaufman County and gets its water from North Texas Municipal Water District (NTMWD) through Forney. The water management strategies include conservation and additional NTMWD water through Forney. **Table 5E.277** shows the projected population and demand, the current supplies, and the water management strategies for Kaufman County Development District 1.

TABLE 5E.277 SUMMARY OF WATER USER GROUP – KAUFMAN COUNTY DEVELOPMENT DISTRICT 1

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,842**	**4,083**	**6,318**	**9,791**	**14,527**	**16,798**
Projected Water Demand						
Municipal Demand	905	959	1,484	2,300	3,412	3,945
Total Projected Water Demand	***905***	***959***	***1,484***	***2,300***	***3,412***	***3,945***
Currently Available Water Supplies						
North Texas MWD (through Forney)	827	748	990	1,361	1,870	2,051
Total Current Supplies	***827***	***748***	***990***	***1,361***	***1,870***	***2,051***
Need (Demand - Current Supply)	***78***	***211***	***494***	***939***	***1,542***	***1,894***
Water Management Strategies						
Water Conservation	54	144	290	456	693	820
Additional NTMWD through Forney	24	67	204	483	849	1,074
Total Water Management Strategies	***78***	***211***	***494***	***939***	***1,542***	***1,894***
Kaufman County Development District 1 Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Kaufman County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. Water supplies for Kaufman County Irrigation include purchased water from Tarrant Regional Water District (TRWD – Cedar Creek Lake), direct reuse (from the City of Crandall's WWTP for irrigation at Creekview golf course), local supplies (Trinity run-of-river), groundwater (Nacatoch aquifer), and Lake Ray Hubbard through Dallas Water Utilities (DWU). The water management strategies for Kaufman County Irrigation include water conservation and additional raw water from TRWD and DWU. TRWD has a contract with Cedar Creek Country Club and DWU has a contract with Travis Ranch for irrigation. **Table 5E.278** shows the projected demand, the current supplies, and the water management strategies for Kaufman County Irrigation.

TABLE 5E.278 SUMMARY OF WATER USER GROUP – KAUFMAN COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***353***	***353***	***353***	***353***	***353***	***353***
Currently Available Water Supplies						
Tarrant Regional WD	108	95	88	80	75	70
Direct Reuse	579	666	666	666	666	666
Trinity Run-of-River	83	83	83	83	83	83
Nacatoch Aquifer	50	50	50	50	50	50
Dallas	26	25	23	22	22	21
Total Current Supplies	***846***	***919***	***910***	***901***	***896***	***890***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation						
Additional Water from TRWD	17	30	37	45	50	55
Additional Water from Dallas Water Utilities	2	3	5	6	6	7
Total Water Management Strategies	***19***	***33***	***42***	***51***	***56***	***62***
Irrigation, Kaufman Reserve (Shortage)	***512***	***599***	***599***	***599***	***599***	***599***

Kaufman County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. The water supplies for Kaufman County Livestock include local surface water supplies. These supplies are sufficient and there are no water management strategies needed. **Table 5E.279** shows the projected demand, current supplies, and water management strategies for Kaufman County Livestock.

TABLE 5E.279 SUMMARY OF WATER USER GROUP – KAUFMAN COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,413***	***1,413***	***1,413***	***1,413***	***1,413***	***1,413***
Currently Available Water Supplies						
Sabine Livestock Local Supply	86	86	86	86	86	86
Trinity Livestock Local Supply	1,340	1,340	1,340	1,340	1,340	1,340
Total Current Supplies	***1,426***	***1,426***	***1,426***	***1,426***	***1,426***	***1,426***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Kaufman Reserve (Shortage)	***13***	***13***	***13***	***13***	***13***	***13***

Kaufman County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. The water supplies for Kaufman County Manufacturing is purchased treated water from North Texas Municipal Water District (NTMWD) through Forney, Kaufman, and Terrell. The only water management strategy for this water user group is to purchase additional water from NTMWD through the same suppliers. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG. **Table 5E.280** shows the projected demand and current supplies for Kaufman County Manufacturing.

TABLE 5E.280 SUMMARY OF WATER USER GROUP – KAUFMAN COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,177***	***1,221***	***1,266***	***1,313***	***1,362***	***1,412***
Currently Available Water Supplies						
North Texas MWD (through Forney)	946	838	743	685	657	646
North Texas MWD (through Kaufman)	11	9	9	8	7	7
North Texas MWD (through Terrell)	118	105	93	85	82	80
Total Current Supplies	***1,075***	***952***	***845***	***778***	***746***	***733***
Need (Demand - Current Supply)	***102***	***269***	***421***	***535***	***616***	***679***
Water Management Strategies						
Additional Supplies from NTMWD	338	479	607	705	780	839
Total Water Management Strategies	***338***	***479***	***607***	***705***	***780***	***839***
Manufacturing, Kaufman Reserve (Shortage)	***236***	***210***	***186***	***170***	***164***	***160***

Kaufman County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. The water supplies for Kaufman County Mining are local supplies and groundwater (Nacatoch aquifer). The water management strategies for Kaufman County Mining are conservation and new well(s) in the Nacatoch aquifer. **Table 5E.281** shows the projected demand, the current supplies, and the water management strategies for Kaufman County Mining.

TABLE 5E.281 SUMMARY OF WATER USER GROUP – KAUFMAN COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,453***	***1,736***	***2,101***	***2,679***	***3,357***	***4,134***
Currently Available Water Supplies						
Nacatoch Aquifer	590	590	590	590	590	590
Trinity Other Local Supply	1,162	1,162	1,162	1,162	1,162	1,162
Total Current Supplies	***1,752***	***1,752***	***1,752***	***1,752***	***1,752***	***1,752***
Need (Demand - Current Supply)	***0***	***0***	***349***	***927***	***1,605***	***2,382***
Water Management Strategies						
Water Conservation	0	0	310	888	1,566	2,343
New Well(s) in Nacatoch Aquifer	0	0	39	39	39	39
Total Water Management Strategies	***0***	***0***	***349***	***927***	***1,605***	***2,382***
Mining, Kaufman Reserve (Shortage)	***299***	***16***	***0***	***0***	***0***	***0***

Kaufman County Municipal Utility District 11

Kaufman County MUD 11 supplies water in Kaufman County. The MUD gets its water supply from North Texas Municipal Water District (NTMWD) through Mesquite. The water management strategies include conservation and additional NTMWD supplies through Mesquite. **Table 5E.282** shows the projected population and demand, the current supplies, and the water management strategies for Kaufman County MUD 11.

TABLE 5E.282 SUMMARY OF WATER USER GROUP – KAUFMAN COUNTY MUD 11

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,340**	**5,159**	**6,629**	**8,374**	**10,269**	**11,378**
Projected Water Demand						
Municipal Demand	720	853	1,096	1,385	1,698	1,882
Total Projected Water Demand	***720***	***853***	***1,096***	***1,385***	***1,698***	***1,882***
Currently Available Water Supplies						
North Texas MWD (through Mesquite)	658	665	731	820	930	978
Total Current Supplies	***658***	***665***	***731***	***820***	***930***	***978***
Need (Demand - Current Supply)	***62***	***188***	***365***	***565***	***768***	***904***
Water Management Strategies						
Water Conservation	18	28	39	54	74	93
Additional NTMWD through Mesquite	44	160	326	511	694	811
Total Water Management Strategies	***62***	***188***	***365***	***565***	***768***	***904***
Kaufman County MUD 11 Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Kaufman County Municipal Utility District 14

Kaufman County MUD 14 supplies water in Kaufman County. The MUD gets its water supply from North Texas Municipal Water District (NTMWD) through Mesquite. The water management strategies include conservation and additional NTMWD supplies through Mesquite. **Table 5E.283** shows the projected population and demand, the current supplies, and the water management strategies for Kaufman County MUD 14.

TABLE 5E.283 SUMMARY OF WATER USER GROUP – KAUFMAN COUNTY MUD 14

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,300**	**6,300**	**6,300**	**6,300**	**6,300**	**6,300**
Projected Water Demand						
Municipal Demand	1,714	1,712	1,712	1,712	1,712	1,712
Total Projected Water Demand	***1,714***	***1,712***	***1,712***	***1,712***	***1,712***	***1,712***
Currently Available Water Supplies						
North Texas MWD (through Mesquite)	1,565	1,335	1,142	1,013	938	890
Total Current Supplies	***1,565***	***1,335***	***1,142***	***1,013***	***938***	***890***
Need (Demand - Current Supply)	***149***	***377***	***570***	***699***	***774***	***822***
Water Management Strategies						
Water Conservation	54	68	74	80	86	91
Additional NTMWD through Mesquite	95	309	496	619	688	731
Total Water Management Strategies	***149***	***377***	***570***	***699***	***774***	***822***
Kaufman County MUD 14 Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Kaufman County Other

Kaufman County Other includes individual domestic supplies and other water suppliers too small to be classified as water user groups. The water supplies for these entities include purchased water from North Texas Municipal Water District (NTMWD) through Kaufman and Terrell and purchased water from Tarrant Regional Water District (TRWD) through Mabank. Water management strategies for these entities include conservation, purchasing additional water from NTMWD and TRWD, and additional water from TRWD with new delivery and treatment facilities. **Table 5E.284** shows the projected population and demand, the current supplies, and the water management strategies for Kaufman County Other.

TABLE 5E.284 SUMMARY OF WATER USER GROUP – KAUFMAN COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**13,740**	**15,926**	**21,310**	**24,949**	**32,058**	**36,575**
Projected Water Demand						
Municipal Demand	1,460	1,685	2,254	2,639	3,391	3,869
Total Projected Water Demand	***1,460***	***1,685***	***2,254***	***2,639***	***3,391***	***3,869***
Currently Available Water Supplies						
TRWD (through Mabank)	86	76	71	64	60	56
North Texas MWD (through Kaufman)	759	749	856	890	1,059	1,147
North Texas MWD (through Terrell)	507	499	571	594	706	764
Total Current Supplies	***1,352***	***1,324***	***1,498***	***1,548***	***1,825***	***1,967***
Need (Demand - Current Supply)	***108***	***361***	***756***	***1,091***	***1,566***	***1,902***
Water Management Strategies						
Water Conservation	13	20	35	49	76	98
Additional Supplies from NTMWD	109	334	681	976	1,384	1,672
Additional Supplies from TRWD through Mabank	14	24	29	36	40	44
Water from TRWD with new delivery and treatment facilities (0.5 MGD)	60	64	78	83	94	95
Total Water Management Strategies	***196***	***442***	***823***	***1,144***	***1,594***	***1,909***
County-Other, Kaufman Reserve (Shortage)	***88***	***81***	***67***	***53***	***28***	***7***

Kaufman County Steam Electric Power

Steam electric power demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. Kaufman County's Steam Electric Power demand is attributed to the FPLE Forney LP. The water supplies for Kaufman County SEP include direct reuse from Garland through Forney and purchased treated water from North Texas Municipal Water District (NTMWD) through Forney. Water management strategies for this water user group include purchasing treated water from Forney (originating from NTMWD). Conservation was considered for this water user group, but it is not recommended because the steam electric demand projections themselves considered items such as future efficiency programs. **Table 5E.285** shows the projected demand, the current supplies, and the water management strategies for Kaufman County SEP.

TABLE 5E.285 SUMMARY OF WATER USER GROUP – KAUFMAN COUNTY SEP

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***9,793***	***9,793***	***9,793***	***9,793***	***9,793***	***9,793***
Currently Available Water Supplies						
Direct Reuse from Garland through Forney	8,672	8,672	8,672	8,672	8,672	8,672
North Texas MWD (through Forney)	1,023	874	747	663	615	582
Total Current Supplies	***9,695***	***9,546***	***9,419***	***9,335***	***9,287***	***9,254***
Need (Demand - Current Supply)	***98***	***247***	***374***	***458***	***506***	***539***
Water Management Strategies						
Additional Supplies from NTMWD through Forney	98	247	374	458	506	539
Total Water Management Strategies	***98***	***247***	***374***	***458***	***506***	***539***
Steam-Electric Power, Kaufman Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Kemp

Kemp is located in southern Kaufman County. The city purchases raw water from Tarrant Regional Water District (TRWD) for its water supply and treats the water at its own water treatment plant. Water management strategies for Kemp include conservation and purchasing additional raw water from TRWD. **Table 5E.286** shows the projected population and demand, the current supplies, and the water management strategies for Kemp.

TABLE 5E.286 SUMMARY OF WATER USER GROUP – CITY OF KEMP

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,611**	**1,671**	**1,745**	**1,813**	**1,894**	**1,987**
Projected Water Demand						
Municipal Demand	281	290	303	315	329	345
Total Projected Demand	***281***	***290***	***303***	***315***	***329***	***345***
Currently Available Water Supplies						
Tarrant Regional WD	242	220	213	202	196	193
Total Current Supplies	***242***	***220***	***213***	***202***	***196***	***193***
Need (Demand - Current Supply)	***39***	***70***	***90***	***113***	***133***	***152***
Water Management Strategies						
Water Conservation	6	9	11	12	14	16
Additional Water from TRWD	33	61	79	101	119	136
Total Water Management Strategies	***39***	***70***	***90***	***113***	***133***	***152***
Kemp Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Mabank

Mabank is located in southeastern Kaufman County and northern Henderson County in Region C and Van Zandt in Region D. The city supplies treated water to Kaufman County Other. The city buys and treats raw water from Tarrant Regional Water District (TRWD) for its water supply. Water management strategies for Mabank include conservation, purchasing additional water from TRWD, and water treatment plant expansions including any needed increase in delivery infrastructure from Cedar Creek Reservoir to the water treatment plant. **Table 5E.287** shows the projected population and demand, the current supplies, and the water management strategies for Mabank.

TABLE 5E.287 SUMMARY OF WATER USER GROUP – CITY OF MABANK

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**10,137**	**10,592**	**10,605**	**10,778**	**10,992**	**11,241**
Projected Water Demand						
Municipal Demand	1,975	2,057	2,059	2,093	2,134	2,183
County-Other, Kaufman	*100*	*100*	*100*	*100*	*100*	*100*
Total Projected Demand	***2,075***	***2,157***	***2,159***	***2,193***	***2,234***	***2,283***
Currently Available Water Supplies						
Tarrant Regional WD	1,704	1,562	1,453	1,347	1,272	1,221
County-Other, Kaufman	86	76	71	64	60	56
Total Current Supplies	***1,790***	***1,638***	***1,524***	***1,411***	***1,332***	***1,277***
Need (Demand - Current Supply)	***285***	***519***	***635***	***782***	***902***	***1,006***
Water Management Strategies						
Water Conservation	94	213	270	280	292	309
Additional Raw Water Needed from TRWD with treatment as below:	191	306	365	502	610	697
2 MGD WTP Expansion	*191*	*306*	*365*	*502*	*610*	*697*
Increase Delivery Infrastructure from TRWD (Cedar Creek Lake)	*191*	*306*	*365*	*502*	*610*	*697*
Total Water Management Strategies	***285***	***519***	***635***	***782***	***902***	***1,006***
Mabank Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

MacBee Special Utility District

MacBee SUD supplies water to Van Zandt County, Hunt County, and a small part of northeastern Kaufman County. Most of the SUD's service area is in the North East Texas Region (Region D). MacBee SUD gets its water supply by treating raw water purchased from the Sabine River Authority (SRA) from Lake Tawakoni and groundwater from the Carrizo-Wilcox aquifer. The only strategy for MacBee SUD is increasing their contract with SRA, which is addressed in the North East Texas Region Plan. **Table 5E.288** shows the projected population and demand, the current supplies, and the water management strategies for MacBee SUD in Region C.

TABLE 5E.288 SUMMARY OF WATER USER GROUP – MACBEE SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**8,904**	**10,951**	**13,480**	**16,595**	**20,435**	**25,172**
Projected Water Demand						
Municipal Demand	1,045	1,285	1,583	1,948	2,399	2,955
Total Projected Demand in Region C	***1,045***	***1,285***	***1,583***	***1,948***	***2,399***	***2,955***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	66	58	60	61	60	62
Sabine River Authority System through Region D	2,006	1,984	1,962	1,940	1,918	1,897
Total Current Supplies	***2,072***	***2,042***	***2,022***	***2,001***	***1,978***	***1,959***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***421***	***996***
Water Management Strategies						
Increase Contract with SRA	0	0	0	0	997	997
Total Water Management Strategies	***0***	***0***	***0***	***0***	***997***	***997***
MacBee SUD Reserve (Shortage)	***1,027***	***757***	***439***	***53***	***576***	***1***

[a]Water Management Strategies for MacBee SUD are covered in Region D plan.

Markout Water Supply Corporation

Markout WSC supplies water to Kaufman County. The WSC gets its water supply from North Texas Municipal Water District (NTMWD) through Forney. The recommended water management strategies include conservation and additional supplies from NTMWD. **Table 5E.289** shows the projected population and demand, the current supplies, and the water management strategies for Markout WSC.

TABLE 5E.289 SUMMARY OF WATER USER GROUP – MARKOUT WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,958**	**3,514**	**4,903**	**7,062**	**9,422**	**12,571**
Projected Water Demand						
Municipal Demand	504	597	833	1,200	1,602	2,137
Total Projected Water Demand	***504***	***597***	***833***	***1,200***	***1,602***	***2,137***
Currently Available Water Supplies						
North Texas MWD (through Forney)	309	312	313	314	316	316
Total Current Supplies	***309***	***312***	***313***	***314***	***316***	***316***
Need (Demand - Current Supply)	***195***	***285***	***520***	***886***	***1,286***	***1,821***
Water Management Strategies						
Water Conservation	13	19	30	47	68	102
Additional Supplies from NTMWD	182	266	490	839	1,218	1,719
Total Water Management Strategies	***195***	***285***	***520***	***886***	***1,286***	***1,821***
Markout WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Mesquite

Mesquite is located in eastern Dallas County extending into western Kaufman County. Mesquite's water supply is discussed under Dallas County in **Section 5E.3**.

North Kaufman Water Supply Corporation

North Kaufman WSC supplies water to Kaufman County. The WSC gets its water supply from North Texas Municipal Water District (NTMWD) through both Kaufman and Terrell. The water management strategies include conservation and additional water from NTMWD through Kaufman and Terrell. **Table 5E.290** shows the projected population and demand, the current supplies, and the water management strategies for North Kaufman WSC.

TABLE 5E.290 SUMMARY OF WATER USER GROUP – NORTH KAUFMAN WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,448**	**4,535**	**5,920**	**7,495**	**9,231**	**11,141**
Projected Water Demand						
Municipal Demand	232	305	398	504	620	749
Total Projected Water Demand	***232***	***305***	***398***	***504***	***620***	***749***
Currently Available Water Supplies						
North Texas MWD (through Kaufman)	32	36	40	45	51	58
North Texas MWD (through Terrell)	180	202	225	254	289	331
Total Current Supplies	***212***	***238***	***265***	***299***	***340***	***389***
Need (Demand - Current Supply)	***20***	***67***	***133***	***205***	***280***	***360***
Water Management Strategies						
Water Conservation	9	26	43	57	71	90
Additional NTMWD through Kaufman	2	6	14	22	31	41
Additional NTMWD through Terrell	9	35	76	126	178	229
Total Water Management Strategies	***20***	***67***	***133***	***205***	***280***	***360***
North Kaufman WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Poetry Water Supply Corporation

Poetry WSC supplies water to Kaufman County in Region C and Hunt County in Region D. The WSC gets its water supply from North Texas Municipal Water District (NTMWD) through Terrell. The only water management strategy is additional supplies from NTMWD. **Table 5E.291** shows the projected population and demand, the current supplies, and the water management strategies for Poetry WSC.

TABLE 5E.291 SUMMARY OF WATER USER GROUP – POETRY WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,867**	**4,698**	**6,403**	**8,868**	**11,937**	**13,865**
Projected Water Demand						
Municipal Demand	453	548	747	1,034	1,392	1,617
Total Projected Water Demand	***453***	***548***	***747***	***1,034***	***1,392***	***1,617***
Currently Available Water Supplies						
North Texas MWD (through Terrell)	414	427	499	612	763	841
Total Current Supplies	***414***	***427***	***499***	***612***	***763***	***841***
Need (Demand - Current Supply)	***39***	***121***	***248***	***422***	***629***	***776***
Water Management Strategies						
Additional Supplies from NTMWD	39	121	248	422	629	776
Total Water Management Strategies	***39***	***121***	***248***	***422***	***629***	***776***
Poetry WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Rose Hill Special Utility District

Rose Hill SUD provides water to central and northern Kaufman County. The SUD purchases treated water from NTMWD and is expected to continue to do so. Recommended water management strategies for Rose Hill SUD include conservation and purchasing additional water from NTWMD. **Table 5E.292** shows the projected population and demand, current supplies, and water management strategies for Rose Hill SUD.

TABLE 5E.292 SUMMARY OF WATER USER GROUP – ROSE HILL SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,968**	**6,001**	**7,087**	**8,151**	**9,005**	**9,948**
Projected Water Demand						
Municipal Demand	410	492	581	668	738	815
Total Projected Demand	***410***	***492***	***581***	***668***	***738***	***815***
Currently Available Water Supplies						
North Texas MWD	375	384	387	395	404	424
Total Current Supplies	***375***	***384***	***387***	***395***	***404***	***424***
Need (Demand - Current Supply)	***35***	***108***	***194***	***273***	***334***	***391***
Water Management Strategies						
Water Conservation	5	7	12	15	20	24
Additional Supplies from NTWMD	30	101	182	258	314	367
Total Water Management Strategies	***35***	***108***	***194***	***273***	***334***	***391***
Rose Hill SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Seagoville

Seagoville is a wholesale water provider and is discussed under Dallas County in **Section 5E.3**.

Talty Special Utility District

Talty SUD provides water to central and northern Kaufman County. The SUD purchases treated water from North Texas Municipal Water District (NTWMD) through Forney. Water management strategies for Talty SUD include conservation and purchasing additional water from NTWMD. **Table 5E.293** shows the projected population and demand, current supplies, and water management strategies for Talty SUD.

TABLE 5E.293 SUMMARY OF WATER USER GROUP – TALTY SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**12,151**	**13,567**	**20,000**	**28,710**	**39,600**	**46,568**
Projected Water Demand						
Municipal Demand	1,946	2,166	3,192	4,583	6,321	7,433
Total Projected Demand	***1,946***	***2,166***	***3,192***	***4,583***	***6,321***	***7,433***
Currently Available Water Supplies						
North Texas MWD (through Forney)	1,777	1,689	2,129	2,713	3,464	3,864
Total Current Supplies	***1,777***	***1,689***	***2,129***	***2,713***	***3,464***	***3,864***
Need (Demand - Current Supply)	***169***	***477***	***1,063***	***1,870***	***2,857***	***3,569***
Water Management Strategies						
Water Conservation	47	73	120	410	744	828
Additional Supplies from NTMWD	122	404	943	1,460	2,113	2,741
Total Water Management Strategies	***169***	***477***	***1,063***	***1,870***	***2,857***	***3,569***
Talty SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Terrell

The City of Terrell is located in northern Kaufman County. Terrell is a wholesale water provider (WWP) that supplies water to College Mound WSC, Kaufman County Other, Elmo WSC, High Point WSC, Kaufman County Manufacturing, North Kaufman WSC, and Poetry WSC. Terrell gets all of its water supplies from North Texas Municipal Water District (NTMWD) and plans to continue to obtain treated water from NTMWD through the planning period. As shown in **Table 5E.294**, the recommended water management strategies for Terrell include implementing water conservation measures, purchasing additional treated water from NTMWD, and constructing facilities to take water from NTMWD and to deliver water to Terrell's customers.

TABLE 5E.294 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – CITY OF TERRELL

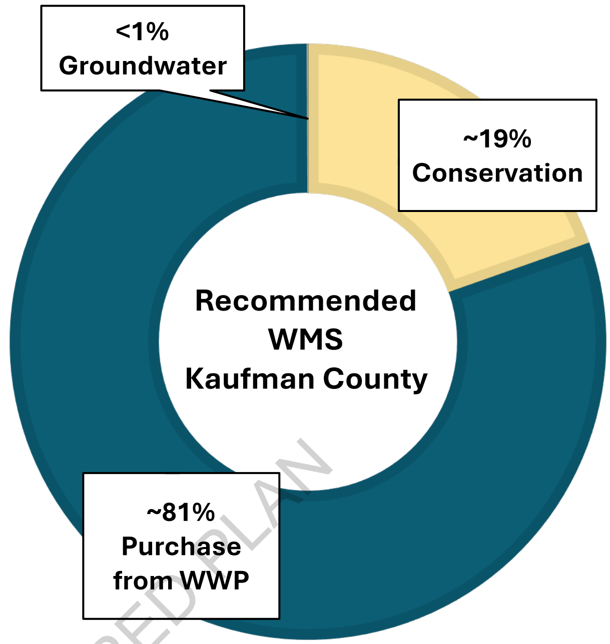
(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Terrell	4,128	4,698	5,760	6,695	7,929	8,893
College Mound WSC	646	718	971	1,501	2,048	2,594
County-Other, Kaufman	555	640	856	1,003	1,288	1,470
Elmo WSC	190	221	263	309	360	416
High Point WSC	935	1,431	2,068	2,796	3,596	4,474
Manufacturing, Kaufman	129	134	139	144	150	155
North Kaufman WSC	197	259	338	428	527	637
Poetry WSC	453	548	747	1,034	1,392	1,617
Total Projected Water Demand	***7,233***	***8,649***	***11,142***	***13,910***	***17,290***	***20,256***
Currently Available Supplies						
North Texas MWD	6,354	6,525	7,125	7,690	8,697	9,527
Total Current Supplies	***6,354***	***6,525***	***7,125***	***7,690***	***8,697***	***9,527***
Need (Demand less Supply)	***879***	***2,124***	***4,017***	***6,220***	***8,593***	***10,729***
Water Management Strategies						
Conservation (retail)	351	918	1,455	1,714	2,064	2,329
Conservation (wholesale)	77	197	314	502	691	869
Additional Supplies from NTMWD	451	1,009	2,248	4,004	5,838	7,531
Infrastructure Upgrades to Deliver water to Wholesale Customers	*451*	*1,009*	*2,248*	*4,004*	*5,838*	*7,531*
Total Supplies from Strategies	***879***	***2,124***	***4,017***	***6,220***	***8,593***	***10,729***
Total Supplies	***7,233***	***8,649***	***11,142***	***13,910***	***17,290***	***20,256***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

West Cedar Creek Municipal Utility District

West Cedar Creek MUD supplies water to northwestern Henderson County and southwestern Kaufman County. The District is a wholesale water provider, and its plans are discussed under Henderson County in **Section 5E.9.1**.

5E.11.2 Summary of Costs for Kaufman County

Table 5E.295 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Kaufman County. Total quantities from **Table 5E.295** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Kaufman County are projected to come through purchases from wholesale water providers. Other strategies include conservation and groundwater. Many suppliers will develop additional delivery infrastructure and/or treatment capacity.

Table 5E.296 summarizes the recommended water management strategies within Kaufman County for individual WUGs and WWPs. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.295 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR KAUFMAN COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	11,735	$1,426,698
Purchase from WWP	48,104	$0
Additional Infrastructure	*22,833*	*$129,516,000*
Groundwater	39	$2,686,000
Total	**59,878**	**$133,628,698**

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.296 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR KAUFMAN COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Forney	Conservation (retail)	2030	871	$150,000	$1.49	$0.48
	Conservation (wholesale)	2030	Included with WUGs.			
	Additional NTMWD	2030	11,770	$0	$4.00	$4.00
	Increase delivery infrastructure from NTWMD (pump station)	*2050*	*11,770*	*$21,276,000*	*$0.49*	*$0.19*
Terrell	Conservation (retail)	2030	2,329	$150,000	$1.25	$1.14
	Conservation (wholesale)	2030	Included with WUGs.			
	NTMWD	2030	7,538	$0	$4.00	$4.00
	Infrastructure Upgrades to Deliver water to Wholesale Customers	*2030*	*7,538*	*$9,971,000*	*$0*	*$0*
WUGs						
Ables Springs SUD[a]	Conservation	2030	21	$0	$5.50	$1.86
	NTMWD	2030	319	$0	$4.00	$4.00
Becker Jiba WSC	Conservation	2030	64	$0	$5.17	$2.87
	NTMWD	2030	574	$0	$4.00	$4.00
College Mound SUD	Conservation	2030	424	$158,560	$4.19	$1.68
	NTMWD	2030	1,033	$0	$4.00	$4.00
	Terrell	2030	2036	$0	$4.00	$4.00
	Additional delivery from Terrell	*2030*	*2,036*	*$25,952,000*	*$2.62*	*$0.49*
Combine WSC	Conservation	2030	18	$0	$3.07	$1.47
	DWU through Seagoville	2030	140	$0	$4.00	$4.00
Crandall	Conservation	2030	918	$150,000	$2.45	$0.77
	NTMWD	2030	3,271	$0	$4.00	$4.00
Elmo WSC	Conservation	2030	18	$0	$5.45	$3.13
	NTMWD through Terrell	2030	182	$0	$4.00	$4.00
Forney Lake WSC[a]	Conservation	2030	340	$158,560	$1.27	$0.64
	NTMWD	2030	1,643	$0	$4.00	$4.00
Gastonia Scurry SUD	Conservation	2030	597	$158,560	$3.26	$1.53
	NTMWD	2030	2,686	$0	$4.00	$4.00
	Conservation	2030	1,036	$158,560	$2.70	$1.01

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
High Point WSC[a]	NTMWD through Forney	2030	1,630	$0	$4.00	$4.00
	NTMWD through Terrell	2030	1,630	$0	$4.00	$4.00
Kaufman	Conservation	2030	230	$150,000	$1.46	$0.86
	NTMWD	2030	1,482	$0	$4.00	$4.00
Kaufman County Development District 1	Conservation	2030	820	$0	$1.64	$1.35
	NTMWD	2030	1,074	$0	$4.00	$4.00
Kaufman County MUD 11	Conservation	2030	93	$8,560	$3.49	$1.73
	NTMWD through Mesquite	2030	811	$0	$4.00	$4.00
Kaufman County MUD 14	Conservation	2030	91	$8,560	$2.32	$1.02
	NTMWD through Mesquite	2030	731	$0	$4.00	$4.00
Kemp	Conservation	2030	16	$0	$3.15	$1.60
	TRWD	2030	136	$0	$1.50	$1.50
Mabank[a]	Conservation	2030	309	$8,218	$2.52	$1.07
	TRWD	2030	697	$0	$1.50	$1.50
	2 MGD WTP Expansion	*2030*	*697*	*$38,763,000*	*$11.45*	*$5.68*
	Additional Delivery Infrastructure from TRWD (Cedar Creek Reservoir)	*2030*	*697*	*$6,090,000*	*$1.94*	*$0.48*
MacBee SUD[a]	Conservation	See 2026 Region D Plan.				
	SRA					
Markout WSC	Conservation	2030	102	$0	$3.04	$1.69
	NTMWD	2030	1,719	$0	$4.00	$4.00
Mesquite[a]	Conservation	See Dallas County.				
	NTMWD					
North Kaufman WSC	Conservation	2030	90	$0	$4.63	$1.82
	NTMWD through Kaufman	2030	41	$0	$4.00	$4.00
	NTMWD through Terrell	2030	229	$0	$4.00	$4.00
Poetry WSC	Conservation	See 2026 Region D Plan				
	NTMWD					
Rose Hill SUD	Conservation	2030	24	$0	$4.75	$1.49
	NTMWD	2030	367	$0	$4.00	$4.00
Seagoville[a]	Conservation	See Dallas County.				

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL) WITH DEBT SERVICE	UNIT COST ($/1000 GAL) AFTER DEBT SERVICE
	DWU					
Talty SUD	Conservation	2030	828	$150,000	$2.78	$1.52
	NTMWD	2030	2,741	$0	$4.00	$4.00
West Cedar Creek MUD[a]	Conservation	2030	55	$8,560	$2.93	$1.38
	TRWD	2030	468	$0	$1.50	$1.50
County Other and Non-Municipal						
County Other, Kaufman	Conservation	2030	98	$8,560	$5.31	$0.94
	NTMWD	2030	1,672	$0	$4.00	$4.00
	TRWD through Mabank	2030	44	$0	$1.50	$1.50
	0.5 MGD WTP for TRWD water	*2030*	*95*	*$27,464,000*	*$79.65*	*$31.43*
Irrigation, Kaufman	TRWD	2030	55	$0	$1.50	$1.50
	DWU	2030	7	$0	$4.00	$4.00
Livestock, Kaufman	None.	None				
Manufacturing, Kaufman	NTMWD	2030	839	$0	$1.50	$1.50
Mining, Kaufman	Conservation	2050	2,343	$0	$0.00	$0.61
	New Well(s) in Nacatoch Aquifer	2050	39	$2,686,000	$16.52	$1.65
Steam Electric Power, Kaufman	NTMWD through Forney	2030	539	$0	$4.00	$4.00

[a]Water User Groups extend into more than one county.
[b]Quantities listed are for the WUG only. They do not include the WUG's customers.
[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.12 Navarro County

Navarro County is in the southern portion of Region C. **Figure 5E.24** shows the service areas for water user groups in Navarro County.

The population of Navarro County is projected to increase by over 23,000 between 2030 and 2080.

Demands for the county are predominantly municipal, with the City of Corsicana providing much of the water to the county. Mining and manufacturing demands are the second and third largest demands within the county. There is no demand from steam electric power.

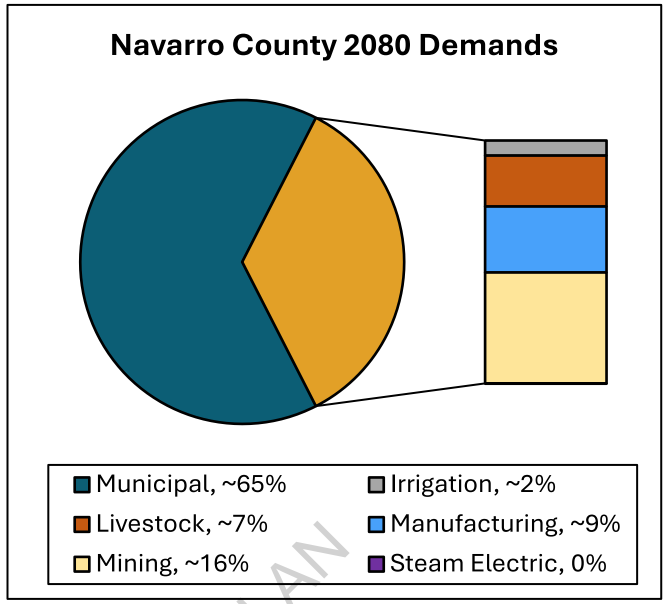


Table 5E.297 gives an overall summary of the county's projections, and water management strategies for individual WWPs and WUGs are discussed on the following pages. Strategies for Corsicana are discussed in **Chapter 5D**.

Navarro County Quick Facts

2020 Population: 52,624

Projected 2080 Population: 80,385

Projected 2080 Demand: 18 MGD

County Seat: Corsicana

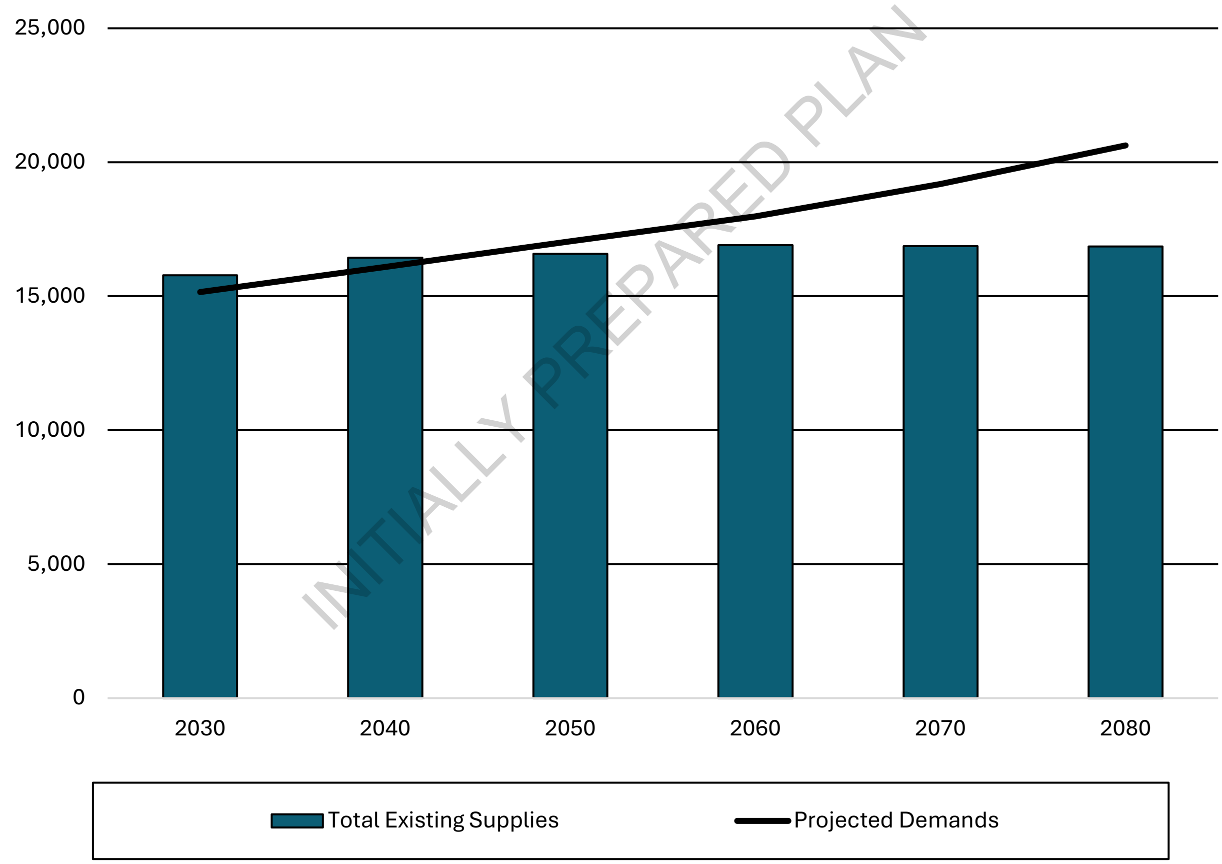
Economy: Manufacturing; agribusinesses; oil-field operations, distribution

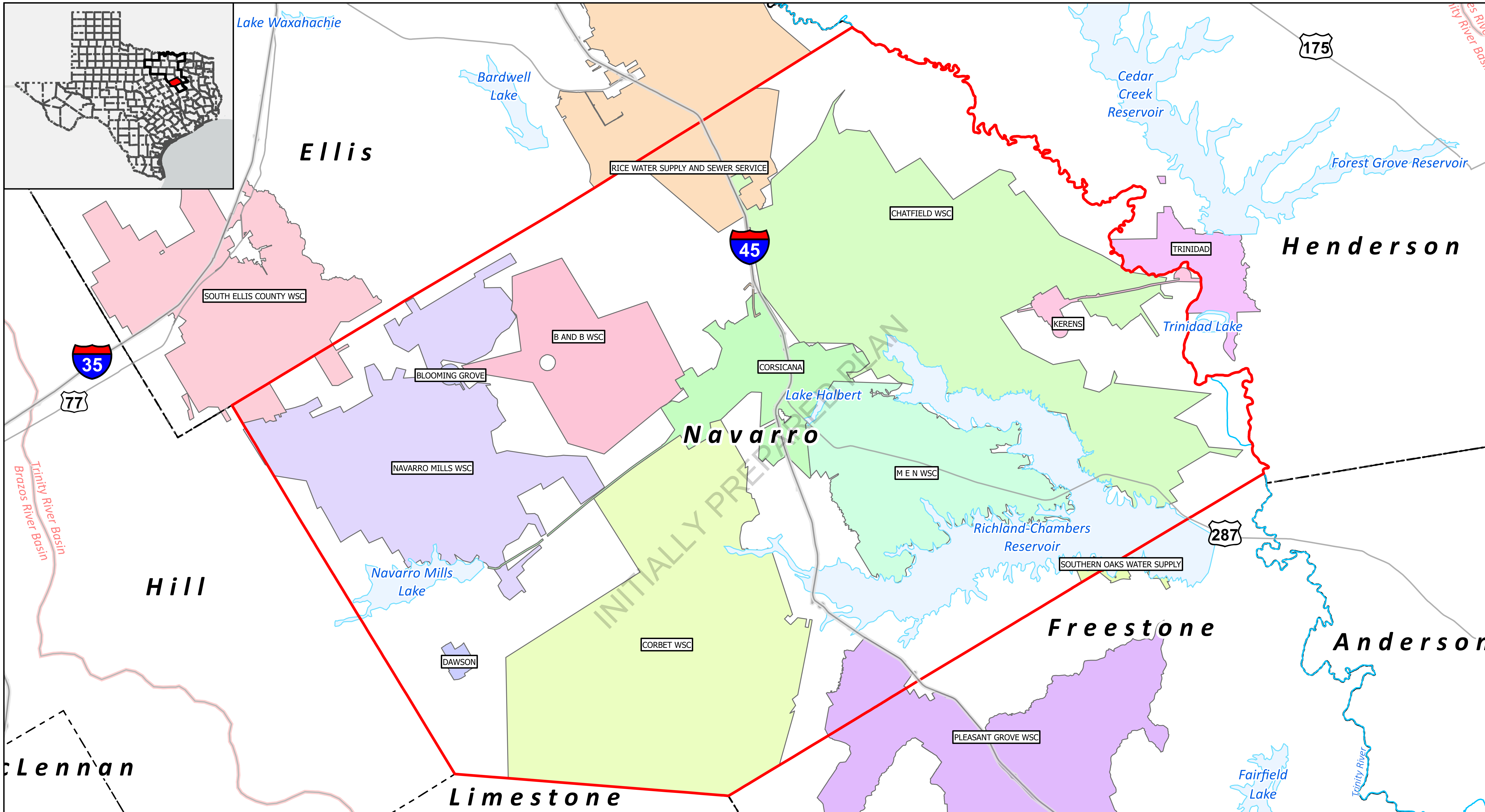
River Basins: Trinity (100%)

TABLE 5E.297 SUMMARY OF NAVARRO COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**57,263**	**61,718**	**65,957**	**70,146**	**75,206**	**80,385**
Projected Demands	**15,156**	**16,093**	**17,046**	**17,985**	**19,187**	**20,628**
Municipal	9,815	10,525	11,205	11,852	12,616	13,417
Irrigation	447	447	447	447	447	447
Livestock	1,512	1,512	1,512	1,512	1,512	1,512
Manufacturing	1,634	1,694	1,757	1,822	1,889	1,959
Mining	1,748	1,915	2,125	2,352	2,723	3,293
Steam Electric	0	0	0	0	0	0
Total Existing Supplies	***15,782***	***16,441***	***16,586***	***16,906***	***16,870***	***16,856***
Need (Demand - Supply)	***0***	***0***	***460***	***1,079***	***2,317***	***3,772***

FIGURE 5E.23 SUMMARY OF NAVARRO COUNTY





REGION C
Water Planning for North Texas

Navarro County, Texas
Figure 5E.24

Data Source(s): ESRI, TWDB, TxDOT

N
0 4.75 9.5 Mi

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.12.1 Wholesale Water Providers and Water User Groups

Water management strategies for Navarro County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs and a summary for Navarro County are presented in **Section 5E.12.2.**

B and B Water Supply Corporation

B and B WSC supplies water to Navarro County. The WSC gets its water supply from Corsicana, and the recommended water management strategies include conservation and additional supplies from Corsicana. **Table 5E.298** shows the projected population and demand, the current supplies, and the water management strategies for B and B WSC.

TABLE 5E.298 SUMMARY OF WATER USER GROUP – B AND B WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,871**	**2,060**	**2,217**	**2,364**	**2,525**	**2,701**
Projected Water Demand						
Municipal Demand	307	337	363	387	413	442
Total Projected Water Demand	***307***	***337***	***363***	***387***	***413***	***442***
Currently Available Water Supplies						
Corsicana	307	329	333	335	337	339
Total Current Supplies	***307***	***329***	***333***	***335***	***337***	***339***
Need (Demand - Current Supply)	***0***	***8***	***30***	***52***	***76***	***103***
Water Management Strategies						
Water Conservation	8	11	13	15	17	20
Additional Supplies from Corsicana System	0	0	17	37	59	83
Total Water Management Strategies	***8***	***11***	***30***	***52***	***76***	***103***
B and B WSC Reserve (Shortage)	***8***	***3***	***0***	***0***	***0***	***0***

Blooming Grove

Blooming Grove is located in northwestern Navarro County. The city buys treated water from Corsicana for its current supply. Water management strategies for Blooming Grove include conservation and purchasing additional water from Corsicana. **Table 5E.299** shows the projected population and demand, the current supplies, and the water management strategies for Blooming Grove.

TABLE 5E.299 SUMMARY OF WATER USER GROUP – CITY OF BLOOMING GROVE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,038**	**1,078**	**1,168**	**1,251**	**1,355**	**1,465**
Projected Water Demand						
Municipal Demand	170	176	191	204	221	239
Total Projected Water Demand	***170***	***176***	***191***	***204***	***221***	***239***
Currently Available Water Supplies						
Corsicana	170	172	175	177	180	183
Total Current Supplies	***170***	***172***	***175***	***177***	***180***	***183***
Need (Demand - Current Supply)	***0***	***4***	***16***	***27***	***41***	***56***
Water Management Strategies						
Water Conservation	5	6	7	8	9	11
Additional Supplies from Corsicana System	0	0	9	19	32	45
Total Water Management Strategies	***5***	***6***	***16***	***27***	***41***	***56***
Blooming Grove Reserve (Shortage)	***5***	***2***	***0***	***0***	***0***	***0***

Brandon Irene Water Supply Corporation

Brandon Irene WSC serves part of Ellis, Hill and Navarro Counties. The majority of the WSC's service area is in Hill County in the Brazos G region, so the water supply plans are covered in more detail in the Brazos G Regional Water Plan. The current supply is water from the Trinity aquifer and Aquilla Water Supply District, which purchases and treats water from the Brazos River Authority (Lake Aquilla). The only water management strategy for the WSC is conservation (Region G). **Table 5E.300** shows the projected population and demand, the current supplies, and the water management strategies for Brandon Irene WSC.

TABLE 5E.300 SUMMARY OF WATER USER GROUP – BRANDON IRENE WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Region C Population	**1,999**	**2,069**	**2,118**	**2,168**	**2,222**	**2,286**
Projected Water Demand						
Municipal Demand	553	571	584	598	613	631
Total Projected Region C Demand	***553***	***571***	***584***	***598***	***613***	***631***
Currently Available Water Supplies						
Trinity Aquifer	235	235	235	235	235	235
Lake Aquilla through Aquilla WSC	256	255	254	252	239	226
Total Current Supplies	***491***	***490***	***489***	***487***	***474***	***461***
Need (Demand - Current Supply)	***62***	***81***	***95***	***111***	***139***	***170***
Water Management Strategies						
Water Conservation (Region G)	45	104	167	231	260	268
Total Water Management Strategies	***45***	***104***	***167***	***231***	***260***	***268***
Brandon Irene WSC Reserve (Shortage)	***(17)***	***23***	***72***	***120***	***121***	***98***

Chatfield Water Supply Corporation

Chatfield WSC serves eastern Navarro County. The WSC gets its water supply by purchasing treated water from Corsicana. The water management strategies for Chatfield WSC include conservation and additional water from Corsicana. **Table 5E.301** shows the projected population and demand, the current supplies, and the water management strategies for Chatfield WSC.

TABLE 5E.301 SUMMARY OF WATER USER GROUP – CHATFIELD WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,318**	**3,572**	**3,782**	**3,967**	**4,172**	**4,396**
Projected Water Demand						
Municipal Demand	344	368	389	408	429	452
Total Projected Water Demand	***344***	***368***	***389***	***408***	***429***	***452***
Currently Available Water Supplies						
Corsicana	344	359	357	354	350	347
Total Current Supplies	***344***	***359***	***357***	***354***	***350***	***347***
Need (Demand - Current Supply)	***0***	***9***	***32***	***54***	***79***	***105***
Water Management Strategies						
Water Conservation	8	11	14	15	18	20
Additional Supplies from Corsicana	0	0	18	39	61	85
Total Water Management Strategies	***8***	***11***	***32***	***54***	***79***	***105***
Chatfield WSC Reserve (Shortage)	***8***	***2***	***0***	***0***	***0***	***0***

Corbet Water Supply Corporation

Corbet WSC is located in southern Navarro County. The WSC buys treated water from Corsicana for its current supply. Water management strategies for Corbet WSC include conservation and purchasing additional water from Corsicana. **Table 5E.302** shows the projected population and demand, the current supplies, and the water management strategies for Corbet WSC.

TABLE 5E.302 SUMMARY OF WATER USER GROUP – CORBET WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,465**	**2,647**	**2,797**	**2,928**	**3,072**	**3,232**
Projected Water Demand						
Municipal Demand	211	225	238	249	261	275
Total Projected Demand	***211***	***225***	***238***	***249***	***261***	***275***
Currently Available Water Supplies						
Corsicana	211	220	218	216	213	211
Total Current Supplies	***211***	***220***	***218***	***216***	***213***	***211***
Need (Demand - Current Supply)	***0***	***5***	***20***	***33***	***48***	***64***
Water Management Strategies						
Water Conservation	5	8	8	9	10	13
Additional Supplies from Corsicana	0	0	12	24	38	51
Total Water Management Strategies	***5***	***8***	***20***	***33***	***48***	***64***
Corbet WSC Reserve (Shortage)	***5***	***3***	***0***	***0***	***0***	***0***

Corsicana

Corsicana is a regional wholesale water provider located in Navarro County. Corsicana's water supply plans are discussed in **Chapter 5D**.

Dawson

Dawson is located in southwestern Navarro County. The city buys treated water from Corsicana for its current supply. Water management strategies for Dawson include conservation and purchasing additional water from Corsicana. **Table 5E.303** shows the projected population and demand, the current supplies, and the water management strategies for Dawson.

TABLE 5E.303 SUMMARY OF WATER USER GROUP – CITY OF DAWSON

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**825**	**834**	**842**	**839**	**837**	**835**
Projected Water Demand						
Municipal Demand	134	135	137	136	136	135
Total Projected Water Demand	***134***	***135***	***137***	***136***	***136***	***135***
Currently Available Water Supplies						
Corsicana	134	132	126	118	111	104
Total Current Supplies	***134***	***132***	***126***	***118***	***111***	***104***
Need (Demand - Current Supply)	***0***	***3***	***11***	***18***	***25***	***31***
Water Management Strategies						
Water Conservation	3	5	5	6	6	7
Additional Water from Corsicana	0	0	6	12	19	24
Total Water Management Strategies	***3***	***5***	***11***	***18***	***25***	***31***
Dawson Reserve (Shortage)	***3***	***2***	***0***	***0***	***0***	***0***

Kerens

Kerens is located in eastern Navarro County. The city gets its current water supply by purchasing treated water from Corsicana. Water management strategies for Kerens include conservation and additional water from Corsicana. **Table 5E.304** shows the projected population and demand, the current supplies, and the water management strategies for Kerens.

TABLE 5E.304 SUMMARY OF WATER USER GROUP – CITY OF KERENS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,469**	**1,359**	**1,257**	**1,163**	**1,076**	**995**
Projected Water Demand						
Municipal Demand	169	155	143	133	123	114
Total Projected Demand	***169***	***155***	***143***	***133***	***123***	***114***
Currently Available Water Supplies						
Corsicana	169	151	131	115	100	88
Total Current Supplies	***169***	***151***	***131***	***115***	***100***	***88***
Need (Demand - Current Supply)	***0***	***4***	***12***	***18***	***23***	***26***
Water Management Strategies						
Water Conservation	5	5	5	6	5	5
Additional Water from Corsicana	0	0	7	12	18	21
Total Water Management Strategies	***5***	***5***	***12***	***18***	***23***	***26***
Kerens Reserve (Shortage)	***5***	***1***	***0***	***0***	***0***	***0***

M E N Water Supply Corporation

MEN WSC serves central and southern Navarro County. The WSC purchases treated water from Corsicana. The water management strategies for MEN WSC include conservation and purchasing additional water from Corsicana, including increasing delivery infrastructure from Corsicana. **Table 5E.305** shows the projected population and demand, the current supplies, and the water management strategies for MEN WSC.

TABLE 5E.305 SUMMARY OF WATER USER GROUP – MEN WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,732**	**4,307**	**4,782**	**5,255**	**5,771**	**6,334**
Projected Water Demand						
Municipal Demand	512	589	654	718	789	866
Total Projected Demand	***512***	***589***	***654***	***718***	***789***	***866***
Currently Available Water Supplies						
Corsicana	512	575	600	622	643	665
Total Current Supplies	***512***	***575***	***600***	***622***	***643***	***665***
Need (Demand - Current Supply)	***0***	***14***	***54***	***96***	***146***	***201***
Water Management Strategies						
Water Conservation	13	19	23	28	33	38
Additional Water from Corsicana	0	0	31	68	113	163
Increase Delivery Infrastructure from Corsicana (Upsize Lake Halbert connection)	*0*	*0*	*31*	*68*	*113*	*163*
Total Water Management Strategies	***13***	***19***	***54***	***96***	***146***	***201***
M-E-N WSC Reserve (Shortage)	***13***	***5***	***0***	***0***	***0***	***0***

Navarro County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. The current irrigation supply in Navarro County is local surface water (Trinity run-of-river). Current supplies are sufficient to meet the need, and there are no recommended water management strategies. **Table 5E.306** shows the projected demand, the current supplies, and the water management strategies for Navarro County Irrigation.

TABLE 5E.306 SUMMARY OF WATER USER GROUP – NAVARRO COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***447***	***447***	***447***	***447***	***447***	***447***
Currently Available Water Supplies						
Trinity Run-of-River	535	535	535	535	535	535
Total Current Supplies	***535***	***535***	***535***	***535***	***535***	***535***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Irrigation, Navarro Reserve (Shortage)	***88***	***88***	***88***	***88***	***88***	***88***

Navarro County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. The current supplies in Navarro County are local surface water supplies and groundwater (Carrizo-Wilcox, Nacatoch, and Other aquifers). These sources are sufficient to meet projected demands, and there are no water management strategies for this water user group. **Table 5E.307** shows the projected demand, current supplies, and water management strategies for Navarro County Livestock.

TABLE 5E.307 SUMMARY OF WATER USER GROUP – NAVARRO COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,512***	***1,512***	***1,512***	***1,512***	***1,512***	***1,512***
Currently Available Water Supplies						
Trinity Livestock Local Supply	1,492	1,492	1,492	1,492	1,492	1,492
Carrizo-Wilcox Aquifer	10	10	10	10	10	10
Nacatoch Aquifer	10	10	10	10	10	10
Other Aquifer	69	69	69	69	69	69
Total Current Supplies	***1,581***	***1,581***	***1,581***	***1,581***	***1,581***	***1,581***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Navarro Reserve (Shortage)	***69***	***69***	***69***	***69***	***69***	***69***

Navarro County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. Current supplies are treated water from Corsicana and water through the Winkler WSC from Tarrant Regional Water District (TRWD). Winkler WSC is not large enough to be considered by TWDB as a water user group, so it is included in Navarro County Other. The water management strategy for Navarro County Manufacturing is additional water from Corsicana and TRWD. **Table 5E.308** shows the projected demand, current supplies, and water management strategies for Navarro County Manufacturing. Conservation was considered for this water user group but not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG.

TABLE 5E.308 SUMMARY OF WATER USER GROUP – NAVARRO COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,634***	***1,694***	***1,757***	***1,822***	***1,889***	***1,959***
Currently Available Water Supplies						
Corsicana	1,629	1,648	1,605	1,572	1,533	1,496
TRWD (through County-Other, Navarro)	4	4	5	5	5	5
Total Current Supplies	***1,633***	***1,652***	***1,610***	***1,577***	***1,538***	***1,501***
Need (Demand - Current Supply)	***1***	***42***	***147***	***245***	***351***	***458***
Water Management Strategies						
Additional Supplies from Corsicana	0	40	145	242	347	453
Additional supplies from TRWD through Winkler WSC	1	2	2	3	4	5
Total Water Management Strategies	***1***	***42***	***147***	***245***	***351***	***458***
Manufacturing, Navarro Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Navarro County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Navarro County Mining is supplied from local surface water supplies and groundwater from the Carrizo-Wilcox and Nacatoch aquifers. The only water management strategy for this water user group is conservation. **Table 5E.309** shows the projected demand and the current supplies for Navarro County Mining.

TABLE 5E.309 SUMMARY OF WATER USER GROUP – NAVARRO COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,748***	***1,915***	***2,125***	***2,352***	***2,723***	***3,293***
Currently Available Water Supplies						
Carrizo-Wilcox Aquifer	6	6	6	6	6	6
Nacatoch Aquifer	970	970	970	970	970	970
Trinity Other Local Supply	800	1,000	1,200	1,568	1,568	1,568
Total Current Supplies	***1,776***	***1,976***	***2,176***	***2,544***	***2,544***	***2,544***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***179***	***749***
Water Management Strategies						
Water Conservation	0	0	0	0	179	749
Total Water Management Strategies	***0***	***0***	***0***	***0***	***179***	***749***
Mining, Navarro Reserve (Shortage)	***28***	***61***	***51***	***192***	***0***	***0***

Navarro County Other

Navarro County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups. The entities included under Navarro County Other receive their water supply from the groundwater (Other aquifer), Corsicana, Tarrant Regional Water District (TRWD), and surface water from Trinity Run-of-River. Water management strategies for these entities include conservation, additional water from Corsicana, and additional water from TRWD. **Table 5E.310** shows the projected population and demand, the current supplies, and the water management strategies for Navarro County Other.

TABLE 5E.310 SUMMARY OF WATER USER GROUP – NAVARRO COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,928**	**7,261**	**7,776**	**8,390**	**9,400**	**10,000**
Projected Water Demand						
Municipal Demand	756	787	843	910	1,019	1,084
Manufacturing, Navarro	*5*	*6*	*7*	*8*	*9*	*10*
Total Projected Water Demand	***761***	***793***	***850***	***918***	***1,028***	***1,094***
Currently Available Water Supplies						
Other Aquifer	200	200	200	200	200	200
Corsicana	643	653	658	671	706	707
Tarrant Regional WD	129	114	106	96	90	84
Manufacturing, Navarro	*4*	*4*	*5*	*5*	*5*	*5*
Trinity Run-of-River	252	252	252	252	252	252
Total Current Supplies	***1,228***	***1,223***	***1,221***	***1,224***	***1,253***	***1,248***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	7	9	13	18	23	28
Additional Supplies from Corsicana	0	8	48	88	140	190
Additional Supplies from TRWD	20	34	42	51	57	62
Manufacturing, Navarro	*1*	*2*	*2*	*3*	*4*	*5*
Total Water Management Strategies	***28***	***53***	***105***	***160***	***224***	***285***
County-Other, Navarro Reserve (Shortage)	***495***	***483***	***476***	***466***	***449***	***439***

Navarro County Steam Electric Power

There is no demand in Navarro County for Steam Electric Power.

Navarro Mills Water Supply Corporation

Navarro Mills WSC provides water for northwestern Navarro County. The WSC gets its water supply from groundwater (Woodbine aquifer) and by purchasing treated water from Corsicana. The water management strategies for Navarro Mills WSC include conservation and purchasing additional water from Corsicana. **Table 5E.311** shows the projected population and demand, the current supplies, and the water management strategies for Navarro Mills WSC.

TABLE 5E.311 SUMMARY OF WATER USER GROUP – NAVARRO MILLS WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,831**	**3,040**	**3,211**	**3,362**	**3,526**	**3,709**
Projected Water Demand						
Municipal Demand	290	310	327	343	359	378
Total Projected Demand	***290***	***310***	***327***	***343***	***359***	***378***
Currently Available Water Supplies						
Corsicana	288	301	298	296	291	289
Woodbine Aquifer	20	20	20	20	20	20
Total Current Supplies	***308***	***321***	***318***	***316***	***311***	***309***
Need (Demand - Current Supply)	***0***	***0***	***9***	***27***	***48***	***69***
Water Management Strategies						
Water Conservation	6	10	12	14	15	18
Additional Supplies from Corsicana	0	0	15	31	51	69
Total Water Management Strategies	***6***	***10***	***27***	***45***	***66***	***87***
Navarro Mills WSC Reserve (Shortage)	***24***	***21***	***18***	***18***	***18***	***18***

Pleasant Grove Water Supply Corporation

Pleasant Grove WSC provides water to Freestone and Navarro Counties. Water management strategies for Pleasant Grove WSC are discussed under Freestone County in **Section 5E.7**.

Post Oak Special Utility District

Post Oak SUD supplies water to Navarro County in Region C and Hill and Limestone Counties in Region G. The SUD gets its water supply from Corsicana, and the recommended water management strategies are conservation (Region G) and additional water from Corsicana. **Table 5E.312** shows the projected population and demand, the current supplies, and the water management strategies for Post Oak SUD.

TABLE 5E.312 SUMMARY OF WATER USER GROUP – POST OAK SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,495**	**1,481**	**1,462**	**1,433**	**1,401**	**1,371**
Projected Water Demand						
Municipal Demand	339	336	333	327	320	316
Birome	*184*	*189*	*195*	*200*	*205*	*211*
Coolidge	*191*	*202*	*217*	*230*	*239*	*239*
Hubbard	*156*	*157*	*157*	*162*	*167*	*169*
Total Projected Water Demand	***870***	***884***	***902***	***919***	***931***	***935***
Currently Available Water Supplies						
Corsicana	339	328	305	283	261	243
Birome	*184*	*185*	*179*	*173*	*167*	*162*
Coolidge	*191*	*197*	*199*	*199*	*195*	*183*
Hubbard	*156*	*153*	*144*	*140*	*136*	*130*
Total Current Supplies	***870***	***863***	***827***	***795***	***759***	***718***
Need (Demand - Current Supply)	***0***	***21***	***75***	***124***	***172***	***217***
Water Management Strategies						
Water Conservation	25	60	93	97	94	96
Additional Corsicana	0	21	75	124	172	217
Total Water Management Strategies	***25***	***81***	***168***	***221***	***266***	***313***
Post Oak SUD Reserve (Shortage)	***25***	***60***	***93***	***97***	***94***	***96***

Rice Water Supply and Sewer Service

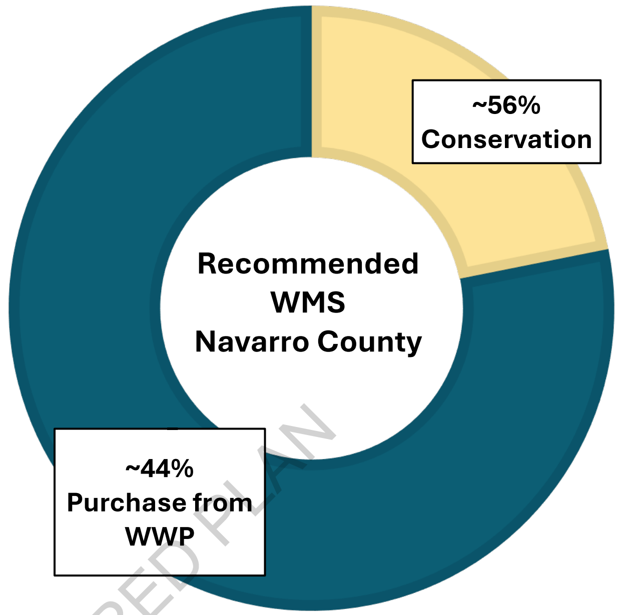
Rice Water Supply and Sewer Service provides retail water service to northern Navarro County and southeastern Ellis County. The WSC's water supply plans are discussed under Ellis County in **Section 5E.5**.

South Ellis County Water Supply Corporation

South Ellis County WSC serves Ellis and Navarro Counties. The water supplies for South Ellis County WSC are discussed under Ellis County in **Section 5E.5**.

5E.12.2 Summary of Costs for Navarro County

Table 5E.313 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Navarro County. Total quantities from **Table 5E.313** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Navarro County are projected to come through purchases from wholesale water providers and the only other strategy is conservation.

Table 5E.314 summarizes the recommended water management strategies within Navarro County for individual WUGs and WWPs. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.313 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR NAVARRO COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	1,595	$158,560
Purchase from WWP	1,256	$0
Additional Infrastructure	*163*	*$6,316,000*
Total	***2,851***	***$6,474,560***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

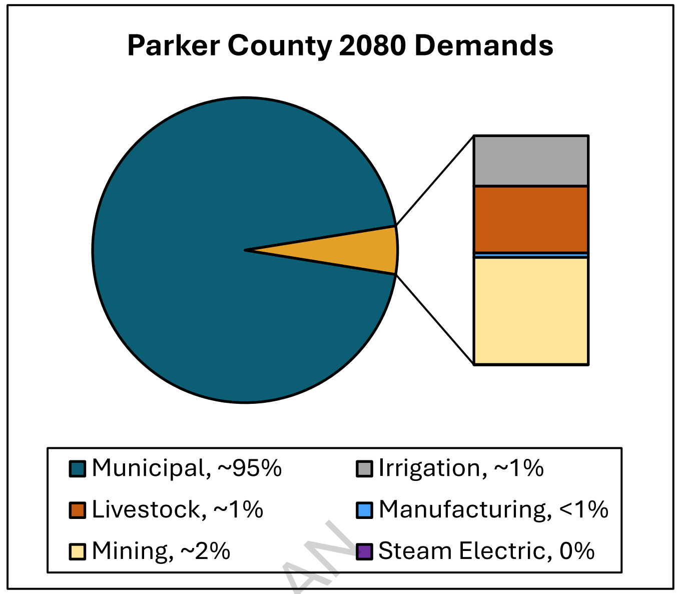
TABLE 5E.314 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR NAVARRO COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Corsicana is a regional wholesale water provider and discussed in **Chapter 5D**.						
WUGs						
B and B WSC	Conservation	2030	20	$0	$3.14	$1.64
B and B WSC	Corsicana	2040	83	$0	$4.00	$4.00
Blooming Grove	Conservation	2030	11	$0	$2.77	$1.65
Blooming Grove	Corsicana	2050	45	$0	$4.00	$4.00
Brandon Irene WSC[a] (Region C only)	Conservation	See 2026 Region G Plan.				
Chatfield WSC	Conservation	2030	20	$0	$9.02	$2.46
Chatfield WSC	Corsicana	2050	85	$0	$4.00	$4.00
Corbet WSC	Conservation	2030	13	$0	$12.28	$3.09
Corbet WSC	Corsicana	2050	51	$0	$4.00	$4.00
Corsicana	Conservation	2030	671	$150,000	$1.04	$0.65
Corsicana	Other WMSs	See Corsicana in **Chapter 5D.**				
Dawson	Conservation	2030	7	$0	$5.41	$1.79
Dawson	Corsicana	2050	24	$0	$4.00	$4.00
Kerens	Conservation	2030	6	$0	$3.40	$2.55
Kerens	Corsicana	2050	21	$0	$4.00	$4.00
M E N WSC	Conservation	2030	38	$0	$3.51	$1.88
M E N WSC	Corsicana	2050	163	$0	$4.00	$4.00
M E N WSC	*Additional delivery infrastructure from Corsicana (Upsize Lake Halbert Connection)*	*2050*	*163*	*$6,316,000*	*$7.53*	*$1.07*
Navarro Mills WSC	Conservation	2030	18	$0	$16.13	$2.50
Navarro Mills WSC	Corsicana	2050	69	$0	$4.00	$4.00
Pleasant Grove WSC	Conservation	See Freestone County.				
Post Oak SUD	Conservation	See 2026 Region G Plan.				
Post Oak SUD	Corsicana					
	Conservation	See Ellis County.				
	Ennis					

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
Rice Water Supply and Sewer Service[a]	Corsicana					
South Ellis County WSC	Conservation	See Ellis County.				
	TRWD through Waxahachie					
Southern Oaks Water Supply	Conservation	2030	14	$8,560	$2.93	$1.46
County Other and Non-Municipal						
County Other, Navarro	Conservation	2030	28	$0	$4.07	$0.93
	Corsicana	2040	190	$0	$4.00	$4.00
	TRWD	2030	67	$0	$1.26	$1.26
Irrigation, Navarro	None	None				
Livestock, Navarro	None	None				
Manufacturing, Navarro	Corsicana	2040	453	$0	$4.00	$4.00
	TRWD through Winkler WSC	2030	5	$0	$4.00	$4.00
Mining, Navarro	Conservation	2070	749	$0	$0.61	$0.61
Steam Electric Power, Navarro	None	None				

[a]Water User Groups extend into more than one county.
[b]Quantities listed are for the WUG only. They do not include the WUG's customers.
[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.13 Parker County



Parker County is located immediately west of Tarrant County in Region C. **Figure 5E.26** shows the service areas for water user groups in Parker County.

The population of Parker County is projected to more than triple between 2030 and 2080.

Demands in the county are predominately municipal at approximately 95%. The county has relatively minimal irrigation, livestock, manufacturing, mining demands and no steam electric demands.

Weatherford is the largest city in Parker County. Walnut Creek SUD and Weatherford are wholesale water providers in the county. Groundwater in Parker County is limited, especially in the western part of the county. The county is expected to use surface water and other sources to meet their needs generated by the expected growth.

An overall summary of the county's projections is shown in **Table 5E.315,** and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Parker County Quick Facts

2020 Population: 148,222

Projected 2080 Population: 675,719

Projected 2080 Demand: 90 MGD

County Seat: Weatherford

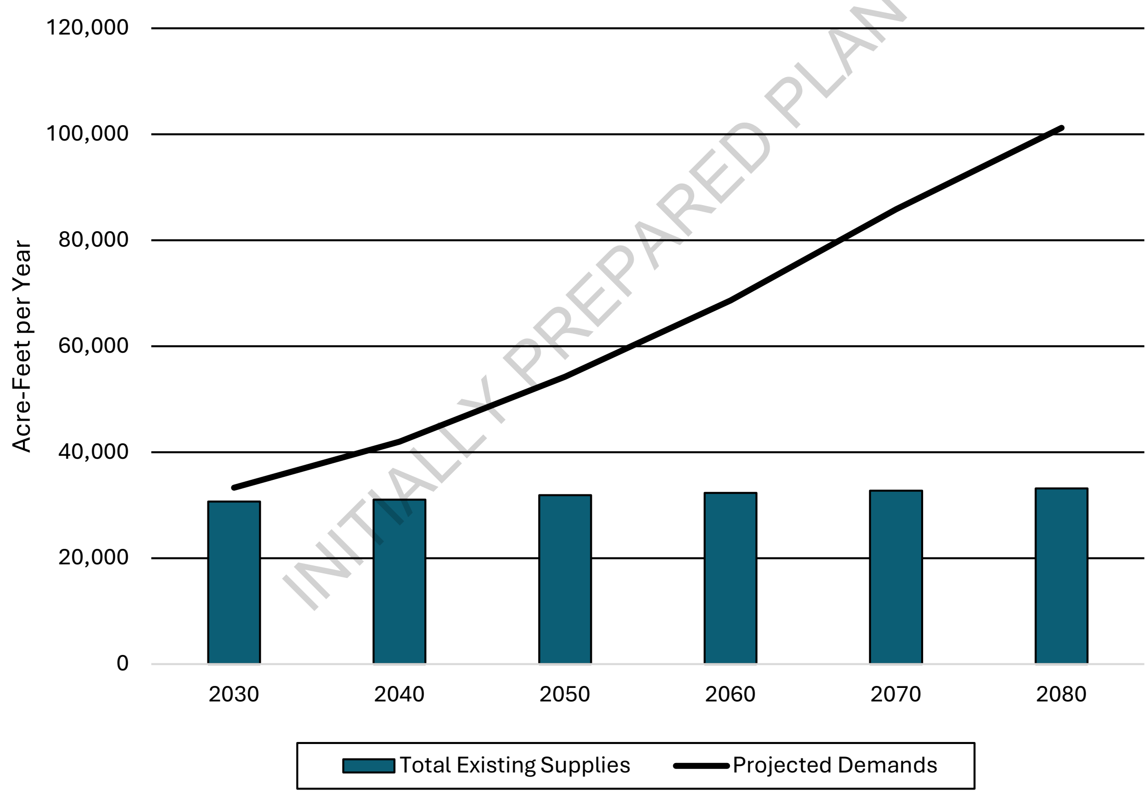
Economy: Agribusiness; manufacturing; government/services

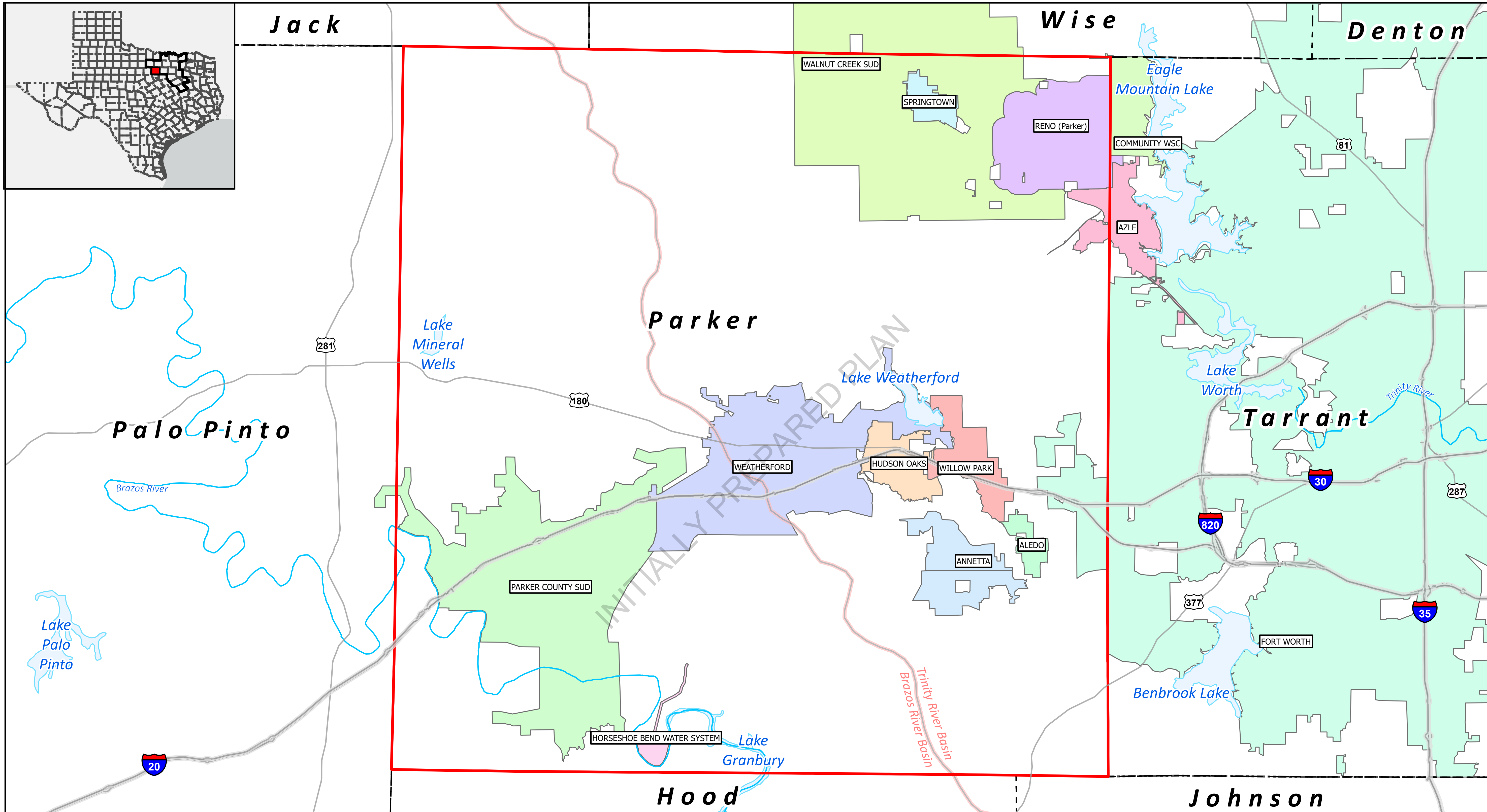
River Basins: Trinity (53%), Brazos (47%)

TABLE 5E.315 SUMMARY OF PARKER COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**190,921**	**254,388**	**340,869**	**442,691**	**566,315**	**675,719**
Projected Demands	**33,291**	**41,987**	**54,233**	**68,619**	**85,846**	**101,206**
Municipal	29,505	38,134	50,118	64,174	81,050	96,055
Irrigation	1,136	1,136	1,136	1,136	1,136	1,136
Livestock	1,503	1,503	1,503	1,503	1,503	1,503
Manufacturing	85	88	91	94	97	101
Mining	1,062	1,126	1,385	1,712	2,060	2,411
Steam Electric	0	0	0	0	0	0
Total Existing Supplies	***30,650***	***31,056***	***31,865***	***32,302***	***32,750***	***33,144***
Need (Demand - Supply)	***2,641***	***10,931***	***22,368***	***36,317***	***53,096***	***68,062***

FIGURE 5E.25 SUMMARY OF PARKER COUNTY





REGION C
Water Planning for North Texas

Parker County, Texas
Figure 5E.26

N
0 4 8 Mi

Data Source(s): ESRI, TWDB, TxDOT

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.13.1 Wholesale Water Providers and Water User Groups

Water management strategies for Parker County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs and a summary for Parker County are presented in **Section 5E.13.2.**

Aledo

Aledo is located in eastern Parker County. The city gets part of its current water supply from wells in the Trinity aquifer, and the city also purchases treated water from Fort Worth. Water management strategies for Aledo include conservation and purchasing additional treated water from Fort Worth, including adding delivery infrastructure (pipeline and pump station). **Table 5E.316** shows the projected population and demand, the current supplies, and the water management strategies for Aledo.

TABLE 5E.316 SUMMARY OF WATER USER GROUP – CITY OF ALEDO

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**7,847**	**8,462**	**10,380**	**11,847**	**13,500**	**14,500**
Projected Water Demand						
Municipal Demand	1,410	1,515	1,858	2,121	2,417	2,596
Total Projected Water Demand	***1,410***	***1,515***	***1,858***	***2,121***	***2,417***	***2,596***
Currently Available Water Supplies						
Trinity Aquifer	423	455	557	636	725	779
Fort Worth	851	805	919	955	1,009	1,017
Total Current Supplies	***1,274***	***1,260***	***1,476***	***1,591***	***1,734***	***1,796***
Need (Demand - Current Supply)	***136***	***255***	***382***	***530***	***683***	***800***
Water Management Strategies						
Water Conservation	46	104	163	194	230	256
Additional Supplies from Fort Worth (TRWD) with infrastructure as below:	104	182	268	394	522	621
Additional infrastructure from TRWD	*104*	*182*	*268*	*394*	*522*	*621*
Total Water Management Strategies	***150***	***286***	***431***	***588***	***752***	***877***
Aledo Reserve (Shortage)	***14***	***31***	***49***	***58***	***69***	***77***

Annetta

Annetta is located in eastern Parker County. The current water supply for residents comes from wells in the Trinity aquifer. Water management strategies for Annetta include conservation and new groundwater wells in the Trinity Aquifer. An alternative water management strategy for Annetta is to connect to and purchase water from Weatherford. Weatherford is not currently planning to provide supplies to Annetta but may in the future. **Table 5E.317** shows the projected population and demand, the current supplies, and the water management strategies for Annetta.

TABLE 5E.317 SUMMARY OF WATER USER GROUP – TOWN OF ANNETTA

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,180**	**3,810**	**4,439**	**5,068**	**5,698**	**6,327**
Projected Water Demand						
Municipal Demand	445	531	619	707	795	883
Total Projected Water Demand	***445***	***531***	***619***	***707***	***795***	***883***
Currently Available Water Supplies						
Trinity Aquifer	787	787	787	787	787	787
Total Current Supplies	***787***	***787***	***787***	***787***	***787***	***787***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***8***	***96***
Water Management Strategies						
Water Conservation	10	18	21	27	33	40
New Well(s) in Trinity Aquifer	75	100	100	100	100	100
Total Water Management Strategies	***85***	***118***	***121***	***127***	***133***	***140***
Annetta Reserve (Shortage)	***427***	***374***	***289***	***207***	***125***	***44***
Connect to Weatherford	0	100	100	100	100	100

Azle

Azle is located in northwestern Tarrant County and northeastern Parker County. The water management strategies for Azle are discussed under Tarrant County in **Section 5E.15.1**.

Horseshoe Bend Water System

Horseshoe Bend Water System supplies water to Parker County and gets its water supply from the Trinity aquifer. The only recommended water management strategy is conservation. **Table 5E.318** shows the projected population and demand, the current supplies, and the water management strategies for Horseshoe Bend Water System.

TABLE 5E.318 SUMMARY OF WATER USER GROUP – HORSESHOE BEND WATER SYSTEM

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,304**	**1,474**	**1,864**	**2,452**	**3,334**	**4,367**
Projected Water Demand						
Municipal Demand	179	201	255	335	456	597
Total Projected Water Demand	***179***	***201***	***255***	***335***	***456***	***597***
Currently Available Water Supplies						
Trinity Aquifer	179	201	255	335	456	597
Total Current Supplies	***179***	***201***	***255***	***335***	***456***	***597***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	5	6	9	13	19	27
Total Water Management Strategies	***5***	***6***	***9***	***13***	***19***	***27***
Horseshoe Bend Water System Reserve (Shortage)	***5***	***6***	***9***	***13***	***19***	***27***

Hudson Oaks

Hudson Oaks is located in central and eastern Parker County. The city gets its current water supply from wells in the Trinity aquifer and treated water purchased from Fort Worth. Water management strategies for Hudson Oaks include conservation and purchasing additional water from Fort Worth. **Table 5E.319** shows the projected population and demand, the current supplies, and the water management strategies for Hudson Oaks.

TABLE 5E.319 SUMMARY OF WATER USER GROUP – CITY OF HUDSON OAKS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,500**	**5,693**	**5,851**	**6,044**	**6,300**	**6,500**
Projected Water Demand						
Municipal Demand	1,872	1,934	1,987	2,053	2,140	2,208
Total Projected Demand	***1,872***	***1,934***	***1,987***	***2,053***	***2,140***	***2,208***
Currently Available Water Supplies						
Trinity Aquifer	400	400	400	400	400	400
Fort Worth	1,270	1,166	1,120	1,063	1,037	1,011
Total Current Supplies	***1,670***	***1,566***	***1,520***	***1,463***	***1,437***	***1,411***
Need (Demand - Current Supply)	***202***	***368***	***467***	***590***	***703***	***797***
Water Management Strategies						
Water Conservation	54	75	83	92	104	114
Additional Water from Fort Worth	160	309	401	516	618	704
Total Water Management Strategies	***214***	***384***	***484***	***608***	***722***	***818***
Hudson Oaks Reserve (Shortage)	***12***	***16***	***17***	***18***	***19***	***21***

Mineral Wells

Mineral Wells is in eastern Palo Pinto County (in the Brazos G Region) and western Parker County. The city gets its water supply from Palo Pinto County WCID 1 (which diverts and treats water from Lake Palo Pinto in the Brazos G region). Recommended water management strategies include conservation and additional supplies from Palo Pinto County WCID #1. **Table 5E.320** shows the projected population and demand, the current supplies, and the water management strategies for Mineral Wells. Strategies for Mineral Wells are discussed in the Brazos G Regional Water Plan.

TABLE 5E.320 SUMMARY OF WATER USER GROUP – CITY OF MINERAL WELLS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**18,727**	**19,763**	**20,794**	**21,836**	**21,836**	**21,836**
Projected Water Demand						
Municipal Demand	3,674	3,865	4,066	4,270	4,270	4,270
Total Projected Demand in Region C	***3,674***	***3,865***	***4,066***	***4,270***	***4,270***	***4,270***
Currently Available Water Supplies						
Palo Pinto County WCID #1	2,754	2,619	2,483	2,348	2,182	1,955
Total Current Supplies	***2,754***	***2,619***	***2,483***	***2,348***	***2,182***	***1,955***
Need (Demand - Current Supply)	***920***	***1,246***	***1,583***	***1,922***	***2,088***	***2,315***
Water Management Strategies*						
Water Conservation	1,190	1,728	1,817	1,908	1,908	1,908
Lake Palo Pinto through Palo Pinto County WCID # 1	543	778	983	1,186	1,386	1,386
Total Water Management Strategies	***1,733***	***2,506***	***2,800***	***3,094***	***3,294***	***3,294***
Mineral Wells Reserve (Shortage)	***813***	***1,260***	***1,217***	***1,172***	***1,206***	***979***

North Rural Water Supply Corporation

North Rural WSC supplies water to Parker County in Region C and Palo Pinto County in Region G. The WSC gets its water supply from Mineral Wells, and there are no recommended water management strategies. **Table 5E.321** shows the projected population and demand, the current supplies, and the water management strategies for North Rural WSC.

TABLE 5E.321 SUMMARY OF WATER USER GROUP – NORTH RURAL WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,027**	**3,322**	**3,636**	**3,976**	**4,349**	**4,761**
Projected Water Demand						
Municipal Demand	326	355	388	425	464	508
Total Projected Water Demand	***326***	***355***	***388***	***425***	***464***	***508***
Currently Available Water Supplies						
Mineral Wells	326	355	388	425	464	508
Total Current Supplies	***326***	***355***	***388***	***425***	***464***	***508***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
North Rural WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Parker County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. The current supplies are surface water supplies (Trinity and Brazos run-of-river), direct reuse, purchase from Weatherford and Brazos River Authority, and groundwater (Trinity aquifer). The only water management strategy recommended is conservation. **Table 5E.322** shows the projected demand, the current supplies, and the water management strategies for Parker County Irrigation. Region C shows unmet needs for Parker County Irrigation until 2060. See **Chapter 6** for more information on unmet needs.

TABLE 5E.322 SUMMARY OF WATER USER GROUP – PARKER COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,136***	***1,136***	***1,136***	***1,136***	***1,136***	***1,136***
Currently Available Water Supplies						
Direct Reuse	131	156	182	207	233	258
Weatherford	123	123	123	123	123	123
Brazos River Authority	430	426	411	398	384	372
Trinity Run-of-River	68	68	68	68	68	68
Brazos Run-of-River	66	66	66	66	66	66
Trinity Aquifer	185	185	185	185	185	185
Total Current Supplies	***1,003***	***1,024***	***1,035***	***1,047***	***1,059***	***1,072***
Need (Demand - Current Supply)	***133***	***112***	***101***	***89***	***77***	***64***
Water Management Strategies						
Water Conservation	2	32	62	78	92	107
Total Water Management Strategies	***2***	***32***	***62***	***78***	***92***	***107***
Irrigation, Parker Reserve (Shortage)	***(131)***	***(80)***	***(39)***	***(11)***	***15***	***43***

Parker County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. The current supplies are local surface water supplies and groundwater from the Trinity aquifer. These sources are sufficient to meet projected demands, and there are no recommended water management strategies. **Table 5E.323** shows the projected demand, current supplies, and water management strategies for Parker County Livestock.

TABLE 5E.323 SUMMARY OF WATER USER GROUP – PARKER COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,503***	***1,503***	***1,503***	***1,503***	***1,503***	***1,503***
Currently Available Water Supplies						
Trinity Aquifer	122	122	122	122	122	122
Brazos Livestock Local Supply	649	649	649	649	649	649
Trinity Livestock Local Supply	732	732	732	732	732	732
Total Current Supplies	***1,503***	***1,503***	***1,503***	***1,503***	***1,503***	***1,503***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Parker Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Parker County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. Current supplies are groundwater (Trinity aquifer), treated water from Parker County SUD through Mineral Wells from Lake Palo Pinto, treated water from Weatherford (part from Lake Weatherford and part from Tarrant Regional Water District (TRWD), and treated water from Walnut Creek SUD (from TRWD sources). The water management strategies for this water user group include additional water from Weatherford and additional water from Walnut Creek SUD. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG. **Table 5E.324** shows the projected demand and current supplies for Parker County Manufacturing.

TABLE 5E.324 SUMMARY OF WATER USER GROUP – PARKER COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***85***	***88***	***91***	***94***	***97***	***101***
Currently Available Water Supplies						
Trinity Aquifer	30	30	30	30	30	30
Mineral Wells	25	25	25	25	25	25
Weatherford	17	17	18	18	19	20
Walnut Creek SUD	8	8	8	6	6	5
Total Current Supplies	***80***	***80***	***81***	***79***	***80***	***80***
Need (Demand - Current Supply)	***5***	***8***	***10***	***15***	***17***	***21***
Water Management Strategies						
Additional Supplies from TRWD through Weatherford	3	6	8	11	13	16
Additional Supplies from TRWD through Walnut Creek SUD	2	2	2	4	4	5
Total Water Management Strategies	***5***	***8***	***10***	***15***	***17***	***21***
Manufacturing, Paker Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Parker County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Parker County Mining is supplied from local supplies, purchased supplies from Brazos River Authority (BRA), and groundwater from the Trinity aquifer. The only recommended water management strategy is conservation. **Table 5E.325** shows the projected demand, the current supplies, and the water management strategies for Parker County Mining.

TABLE 5E.325 SUMMARY OF WATER USER GROUP – PARKER COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,062***	***1,126***	***1,385***	***1,712***	***2,060***	***2,411***
Currently Available Water Supplies						
Brazos Other Local Supply	20	20	20	20	20	20
Brazos River Authority	1,387	1,374	1,327	1,282	1,240	1,200
Trinity Aquifer	200	300	400	500	500	500
Total Current Supplies	***1,607***	***1,694***	***1,747***	***1,802***	***1,760***	***1,720***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***300***	***691***
Water Management Strategies						
Water Conservation	0	0	0	0	300	691
Total Water Management Strategies	***0***	***0***	***0***	***0***	***300***	***691***
Mining, Parker Reserve (Shortage)	***545***	***568***	***362***	***90***	***0***	***0***

Parker County Other

Parker County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups. By 2080, the County Other population is projected to be over five times the 2030 population. Sources of supply for Parker County Other include Mineral Wells (from Lake Palo Pinto) and groundwater (Trinity and Cross Timbers aquifers). Water management strategies for Parker County Other include implementing conservation measures, new groundwater wells in the Trinity aquifer, purchasing supplies from Weatherford, and purchasing supplies from TRWD through a new Regional Water District.

The County Commissioners in Parker County are currently seeking to form a regional water district to provide water to the fast-growing rural areas in Parker County. Parker County is split between the Trinity River Basin and the Brazos River Basin. Water to the Trinity River Basin portion of the county would be supplied through TRWD, while water to the Brazos River Basin would be supplied through entities in the Brazos River Basin, such as Brazos River Authority (BRA) and/or Mineral Wells. See **Chapter 5C** and **Appendix G** for more information on the new Paker County Regional Water District.

Table 5E.326 shows the projected population and demand, the current supplies, and the water management strategies for Parker County Other.

Region C shows unmet needs for Parker County-Other over the planning period. The county is experiencing rapid growth and groundwater is insufficient to meet this demand. This need is greater in the Brazos Basin part of the county because there are limited groundwater supplies and little to no water from other providers to serve these areas. The Trinity River Basin portion of Parker County (eastern part) shows an unmet need only in 2040. TRWD has committed to providing water to customers within the Trinity River portion of Parker County to the extent it has water supplies. Currently, supplies in the western part of TRWD's system are limited until additional water management strategies are constructed. Due to the timing of these new supplies, TRWD is unable to fully meet the projected needs in the Trinity River Basin portion of the county in 2040. For more information on unmet needs, see **Chapter 6**.

TABLE 5E.326 SUMMARY OF WATER USER GROUP – PARKER COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**69,436**	**111,025**	**163,883**	**223,591**	**298,000**	**355,000**
Projected Water Demand						
Municipal Demand	8,769	13,957	20,602	28,108	37,463	44,628
Trinity Basin	*6,475*	*10,306*	*15,213*	*20,755*	*27,663*	*32,953*
Brazos Basin	*2,294*	*3,651*	*5,389*	*7,353*	*9,800*	*11,675*
Total Projected Water Demand	***8,769***	***13,957***	***20,602***	***28,108***	***37,463***	***44,628***
Currently Available Water Supplies						
Trinity Aquifer	5,983	5,983	5,983	5,983	5,983	5,983
Trinity Basin	*4,418*	*4,418*	*4,418*	*4,418*	*4,418*	*4,418*
Brazos Basin	*1,565*	*1,565*	*1,565*	*1,565*	*1,565*	*1,565*
Cross Timbers Aquifer	50	50	50	50	50	50

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Trinity Basin	*37*	*37*	*37*	*37*	*37*	*37*
Brazos Basin	*13*	*13*	*13*	*13*	*13*	*13*
Mineral Wells	663	663	663	663	663	663
Trinity Basin	*490*	*490*	*490*	*490*	*490*	*490*
Brazos Basin	*173*	*173*	*173*	*173*	*173*	*173*
Total Current Supplies	***6,696***	***6,696***	***6,696***	***6,696***	***6,696***	***6,696***
Trinity Basin	***4,945***	***4,945***	***4,945***	***4,945***	***4,945***	***4,945***
Brazos Basin	***1,751***	***1,751***	***1,751***	***1,751***	***1,751***	***1,751***
Total Need (Demand - Current Supply)	***2,073***	***7,261***	***13,906***	***21,412***	***30,767***	***37,932***
Trinity Basin	***1,530***	***5,361***	***10,268***	***15,810***	***22,718***	***28,008***
Brazos Basin	***543***	***1,900***	***3,638***	***5,602***	***8,049***	***9,924***
Water Management Strategies						
Water Conservation	79	174	326	539	842	1,152
New Well(s) in Trinity Aquifer	4,000	4,000	3,500	3,500	3,500	3,500
Trinity Basin	3,506	3,528	3,082	3,162	3,283	3,424
Brazos Basin	494	472	418	338	217	76
Supplies from TRWD (through Weatherford)	0	1,000	1,500	2,000	2,500	4,000
Trinity Basin	*0*	*1,000*	*1,500*	*1,700*	*1,900*	*3,000*
Brazos Basin	*0*	*0*	*0*	*300*	*600*	*1,000*
Supplies from TRWD (new Regional Water District)	0	0	8,500	13,000	18,000	22,000
Trinity Basin	*0*	*0*	*8,500*	*13,000*	*18,000*	*22,000*
Brazos Basin	*0*	*0*	*0*	*0*	*0*	*0*
Total Water Management Strategies	***4,000***	***5,000***	***13,500***	***18,500***	***24,000***	***29,500***
Trinity Basin	***3,506***	***4,528***	***13,082***	***17,862***	***23,183***	***28,424***
Brazos Basin	***494***	***472***	***418***	***638***	***817***	***1,076***
County-Other, Parker Reserve (Shortage)	***1,927***	***(2,261)***	***(406)***	***(2,912)***	***(6,767)***	***(8,432)***
Trinity Basin	***1,976***	***(833)***	***2,814***	***2,052***	***465***	***416***
Brazos Basin	***(49)***	***(1,428)***	***(3,220)***	***(4,964)***	***(7,232)***	***(8,848)***

Parker County Special Utility District

Parker County SUD is located in rural western Parker County and receives its water supply from Mineral Wells, the Brazos River Authority (in Region G), and groundwater (Trinity aquifer). Water management strategies for Parker County SUD include conservation and expansion of the desalination water treatment plant to treat Brazos River water purchased from the Brazos River Authority (BRA). **Table 5E.327** shows the projected population and demand, the current supplies, and the water management strategies for Parker County SUD.

TABLE 5E.327 SUMMARY OF WATER USER GROUP – PARKER COUNTY SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**9,100**	**12,400**	**16,800**	**22,592**	**30,900**	**41,800**
Projected Water Demand						
Municipal Demand	937	1,271	1,722	2,316	3,167	4,285
Total Projected Demand	***937***	***1,271***	***1,722***	***2,316***	***3,167***	***4,285***
Currently Available Water Supplies						
Mineral Wells	448	448	448	448	448	448
Brazos River Authority	1,100	1,100	1,100	1,100	1,100	1,100
Trinity Aquifer	36	36	36	36	36	36
Total Current Supplies	***1,584***	***1,584***	***1,584***	***1,584***	***1,584***	***1,584***
Need (Demand - Current Supply)	***0***	***0***	***138***	***732***	***1,583***	***2,701***
Water Management Strategies						
Water Conservation	23	42	65	185	315	442
Water from BRA and 3.5 MGD WTP Desal Expansion	0	0	73	547	1,268	2,259
Total Water Management Strategies	***23***	***42***	***138***	***732***	***1,583***	***2,701***
Parker County SUD Reserve (Shortage)	***670***	***355***	***0***	***0***	***0***	***0***

Parker County Steam Electric Power

Steam electric power demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. There is no projected demand for Parker County Steam Electric Power.

Reno

Reno is located in northeastern Parker County and northwest Tarrant County. The city gets its current water supply from wells in the Trinity aquifer and treated water purchased from Walnut Creek SUD (from Tarrant Regional Water District (TRWD) raw water). Water management strategies for Reno include conservation and purchasing additional treated water from Walnut Creek SUD. **Table 5E.328** shows the projected population and demand, the current supplies, and the water management strategies for Reno.

TABLE 5E.328 SUMMARY OF WATER USER GROUP – CITY OF RENO

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,273**	**5,195**	**6,233**	**7,327**	**8,530**	**9,854**
Projected Water Demand						
Municipal Demand	287	349	419	493	573	663
Total Projected Demand	***287***	***349***	***419***	***493***	***573***	***663***
Currently Available Water Supplies						
Trinity Aquifer	142	142	142	142	142	142
Walnut Creek SUD	116	116	116	116	116	116
Total Current Supplies	***258***	***258***	***258***	***258***	***258***	***258***
Need (Demand - Current Supply)	***29***	***91***	***161***	***235***	***315***	***405***
Water Management Strategies						
Water Conservation	6	11	14	19	24	29
Additional Supplies from TRWD through Walnut Creek SUD	26	84	152	221	297	382
Total Water Management Strategies	***32***	***95***	***166***	***240***	***321***	***411***
Reno Reserve (Shortage)	***3***	***4***	***5***	***5***	***6***	***6***

Santo Special Utility District

Santo SUD supplies water to Parker County in Region C, and Hood and Palo Pinto Counties in Region G. The SUD gets its water from Lake Palo Pinto through Mineral Wells, and there are no recommended water management strategies. **Table 5E.329** shows the projected population and demand, the current supplies, and the water management strategies for Santo SUD.

TABLE 5E.329 SUMMARY OF WATER USER GROUP – SANTO SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,137**	**2,166**	**2,178**	**2,203**	**2,231**	**2,259**
Projected Water Demand						
Municipal Demand	291	294	295	299	302	306
Total Projected Water Demand	***291***	***294***	***295***	***299***	***302***	***306***
Currently Available Water Supplies						
Lake Palo Pinto through Mineral Wells	331	331	331	331	331	331
Total Current Supplies	***331***	***331***	***331***	***331***	***331***	***331***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None	0	0	0	0	0	0
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***15***
Santo SUD Reserve (Shortage)	***40***	***37***	***36***	***32***	***29***	***25***

Springtown

Springtown is located in northern Parker County. The city gets its current water supply from wells in the Trinity aquifer and purchased from Tarrant Regional Water District (TRWD). Water management strategies for Springtown include conservation and additional raw water from TRWD with infrastructure improvements. **Table 5E.330** shows the projected population and demand, the current supplies, and the water management strategies for Springtown.

TABLE 5E.330 SUMMARY OF WATER USER GROUP – CITY OF SPRINGTOWN

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,436**	**7,245**	**10,032**	**12,229**	**14,192**	**15,677**
Projected Water Demand						
Municipal Demand	1,182	1,572	2,177	2,653	3,079	3,401
Total Projected Demand	***1,182***	***1,572***	***2,177***	***2,653***	***3,079***	***3,401***
Currently Available Water Supplies						
Trinity Aquifer	118	157	218	265	308	340
Tarrant Regional WD	918	1,075	1,344	1,344	1,344	1,344
Total Current Supplies	***1,036***	***1,232***	***1,562***	***1,609***	***1,652***	***1,684***
Need (Demand - Current Supply)	***146***	***340***	***615***	***1,044***	***1,427***	***1,717***
Water Management Strategies						
Water Conservation	58	185	334	418	496	559
Additional Supplies from TRWD	94	173	314	668	981	1,214
Infrastructure needs - Surface Water Treatment Plant & Supply Project	*94*	*173*	*314*	*668*	*981*	*1,214*
Total Water Management Strategies	***152***	***358***	***648***	***1,086***	***1,477***	***1,773***
Springtown Reserve (Shortage)	***6***	***18***	***33***	***42***	***50***	***56***

Walnut Creek Special Utility District

Walnut Creek SUD is a wholesale water provider (WWP) that purchases raw water from Tarrant Regional Water District (TRWD) and provides treated water to its own retail customers and to suppliers in Parker and Wise Counties. Its current wholesale customers include Boyd, Reno, Rhome, West Wise SUD, and Parker County Manufacturing. Walnut Creek SUD also provides wholesale service to portions of Wise County Other. Potential future customers for Walnut Creek SUD include Newark and portions of Jack County Other. The SUD has a water treatment plant with a current peak capacity of 8 MGD. Using a peaking factor of 2, Walnut Creek SUD can treat up to 4,400 acre-feet per year.

The recommended water management strategies for Walnut Creek SUD include implementing water conservation measures, purchasing additional water from TRWD, expanding their current water treatment facilities, constructing new treatment facilities, and constructing other infrastructure to deliver water to customers. **Table 5E.331** shows the recommended plan for Walnut Creek SUD.

TABLE 5E.331 SUMMARY OF WATER USER GROUP – WALNUT CREEK SUD

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Walnut Creek SUD	3,800	4,121	5,722	8,574	11,960	15,309
Boyd	87	152	264	366	463	528
County-Other, Wise	100	100	100	100	100	100
Manufacturing, Parker	10	10	10	10	10	10
Reno	145	207	277	351	431	521
Rhome	216	326	562	892	1,393	1,914
County-Other, Wise	*100*	*100*	*100*	*100*	*100*	*100*
West Wise SUD	24	26	28	30	32	34
Potential Future Customers						
Newark	6	41	115	226	397	541
County-Other, Jack	49	46	43	41	39	37
Total Projected Water Demand	***4,537***	***5,129***	***7,221***	***10,690***	***14,925***	***19,094***
Currently Available Supplies						
TRWD	3,600	3,592	3,582	3,566	3,558	3,549
Total Current Supplies	***3,600***	***3,592***	***3,582***	***3,566***	***3,558***	***3,549***
Need (Demand less Supply)	***937***	***1,537***	***3,639***	***7,124***	***11,367***	***15,545***
Water Management Strategies						
Conservation (retail)	193	274	475	803	1,164	1,498
Conservation (wholesale)	13	26	48	77	119	169
Additional TRWD with infrastructure below:	731	1,237	3,116	6,244	10,084	13,878
10 MGD WTP Expansion	*731*	*1,237*	*3,116*	*5,605*	*5,605*	*5,605*
New 15 MGD WTP-Eagle Mountain	*0*	*0*	*0*	*639*	*4,479*	*8,273*
Infrastructure to Deliver to Customers	*731*	*1,237*	*3,116*	*6,244*	*10,084*	*13,878*
Total Supplies from Strategies	***937***	***1,537***	***3,639***	***7,124***	***11,367***	***15,545***
Total Supplies	***4,537***	***5,129***	***7,221***	***10,690***	***14,925***	***19,094***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

Weatherford

Weatherford is located in central Parker County. The City of Weatherford is a wholesale water provider (WWP) that provides manufacturing and irrigation water to users in Parker County. A potential future customer for Weatherford is Parker County Other. The city is not currently planning to provide supplies to Annetta due to the distance but may in the future. For this Plan, connecting to Weatherford is an alternative strategy for Annetta and is shown as a potential future customer of Weatherford with a 0 demand. The city is under no obligation to provide services to these entities just because they are listed in this plan as potential future customers.

Weatherford's water supply consists of water from Lake Weatherford (city water right), Benbrook Lake (city water right through its Sunshine Lake permit and purchase from Tarrant Regional Water District), and reuse. Weatherford currently utilizes effluent from their water treatment plant lagoons for irrigation at Oeste Ranch Golf Course. In 2024, Weatherford completed an additional indirect reuse project that allows the city to pump up to 1 MGD from their water treatment plant lagoons back into Lake Weatherford. This project works in conjunction with the existing direct reuse for Oeste Ranch Golf Course. Additionally, the city pumps treated effluent from Weatherford's wastewater treatment plant to Lake Weatherford for diversion and use. Weatherford has a water treatment plant with a current peak capacity of 14 MGD. Using a peaking factor of 2, Weatherford can treat up to 7,800 acre-feet per year for municipal supplies.

The recommended water management strategies for Weatherford include implementing water conservation measures, developing additional indirect reuse, purchasing additional water from TRWD, increasing treatment capacity (new plant and expansions), and increasing transmission capacity from Benbrook Lake. The additional indirect reuse strategy is to capture additional flows from the city's water treatment plant lagoons above the permitted 1 MGD. The currently available supplies for Weatherford are 7,970 acre-feet per year, which reflects existing treatment plant capacity and raw water use for irrigation demand. To fully utilize its existing water rights and contracts, Weatherford will need to expand its water treatment plant capacity to reach a total treatment capacity of 38 MGD by 2080. The city will also need to develop additional transmission from the Benbrook Lake pump station to Weatherford and to expand the pumping capacity of the existing pipeline from Benbrook Lake. **Table 5E.332** shows the recommended water management strategies for Weatherford.

TABLE 5E.332 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – CITY OF WEATHERFORD

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Weatherford	8,205	9,760	11,548	13,424	15,491	17,767
Irrigation, Parker	123	123	123	123	123	123
Manufacturing, Parker	20	23	26	29	32	36
Potential Future Customers						
Annetta	0	0	0	0	0	0
County-Other, Parker	0	1,000	1,500	2,000	2,500	4,000
Total Projected Water Demand	***8,348***	***10,906***	***13,197***	***15,576***	***18,146***	***21,926***
Currently Available Supplies						
Lake Weatherford	2,860	2,810	2,760	2,717	2,673	2,630
TRWD	4,628	5,298	6,220	6,905	7,658	8,489
Direct Reuse - Oeste Ranch Golf Course	123	123	123	123	123	123
Indirect Reuse - From WWTP to Lake Weatherford	2,860	2,810	2,760	2,717	2,673	2,630
Indirect Reuse - From WTP Lagoons to Lake Weatherford	700	855	1,034	1,121	1,121	1,121
Total Current Supplies	***11,171***	***11,896***	***12,897***	***13,583***	***14,248***	***14,993***
Current Supply Limited by Plant Capacity (14 MGD)	***7,970***	***7,970***	***7,970***	***7,970***	***7,970***	***7,970***
Need (Demand less Supply)	***378***	***2,936***	***5,227***	***7,606***	***10,176***	***13,956***
Water Management Strategies						
Conservation (retail)	191	424	592	745	911	1,098
Additional Indirect Reuse	123	123	123	344	681	1,059
Existing TRWD Supplies from WTP Expansions	3,201	3,926	4,927	5,613	6,278	7,023
Additional Supplies from TRWD	0	1,000	1,500	1,700	2,463	4,939
Treatment Plant & Infrastructure needed to treat and deliver TRWD and reuse water as below:						
8 MGD WTP Expansion	*3,324*	*4,484*	*4,484*	*4,484*	*4,484*	*4,484*
10 MGD WTP Expansion	*0*	*565*	*2,066*	*3,173*	*4,938*	*5,605*
6 MGD WTP Expansion	*0*	*0*	*0*	*0*	*0*	*2,932*
3 MGD Lake Benbrook PS Expansion	*1,682*	*1,682*	*1,682*	*1,682*	*1,682*	*1,682*
Additional Transmission	*0*	*1,000*	*1,500*	*1,700*	*2,463*	*4,939*
Total Supplies from Strategies	***3,515***	***5,473***	***7,142***	***8,402***	***10,333***	***14,119***
Total Supplies	***11,485***	***13,443***	***15,112***	***16,372***	***18,303***	***22,089***
Surplus or (Shortage)	***3,137***	***2,537***	***1,915***	***796***	***157***	***163***
Management Supply Factor	***1.38***	***1.23***	***1.15***	***1.05***	***1.01***	***1.01***

Willow Park

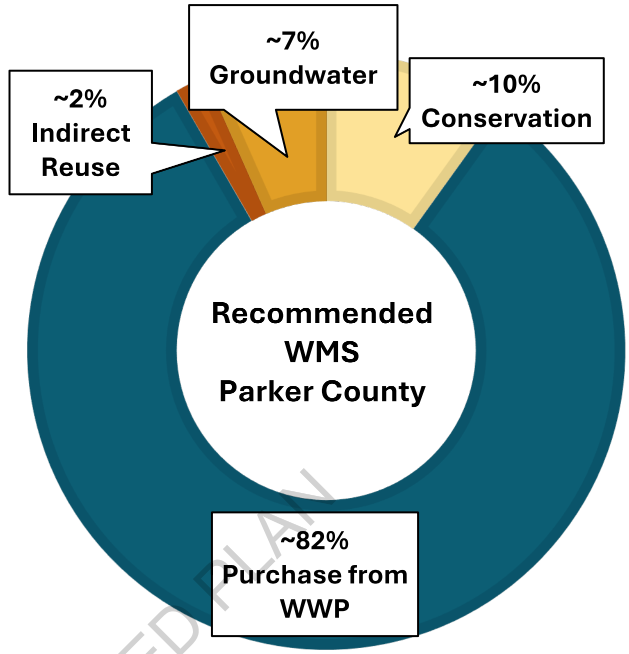
Willow Park is located in eastern Parker County. Willow Park gets its water supply from groundwater (Trinity aquifer) and purchased treated water from Fort Worth. Water management strategies for Willow Park include conservation, purchasing additional supplies Fort Worth (with the raw water supplied to Fort Worth by Tarrant Regional Water District (TRWD)), and additional infrastructure. **Table 5E.333** shows the projected population and demand, the current supplies, and the water management strategies for Willow Park.

TABLE 5E.333 SUMMARY OF WATER USER GROUP – CITY OF WILLOW PARK

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**8,080**	**9,714**	**11,560**	**13,501**	**15,638**	**17,991**
Projected Water Demand						
Municipal Demand	1,228	1,471	1,750	2,044	2,368	2,724
Total Projected Demand	***1,228***	***1,471***	***1,750***	***2,044***	***2,368***	***2,724***
Currently Available Water Supplies						
Trinity Aquifer	690	690	690	690	690	690
Fort Worth	464	594	748	871	1,000	1,138
Total Current Supplies	***1,154***	***1,284***	***1,438***	***1,561***	***1,690***	***1,828***
Need (Demand - Current Supply)	***74***	***187***	***312***	***483***	***678***	***896***
Water Management Strategies						
Water Conservation	29	47	65	84	106	131
Additional Supplies from Fort Worth (TRWD)	61	162	273	427	603	798
Additional Infrastructure	*61*	*162*	*273*	*427*	*603*	*798*
Total Water Management Strategies	***90***	***209***	***338***	***511***	***709***	***929***
Willow Park Reserve (Shortage)	***16***	***22***	***26***	***28***	***31***	***33***

5E.13.2 Summary of Costs for Parker County

Table 5E.334 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Parker County. Total quantities from **Table 5E.334** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies to meet demands for WUGs located within Parker County are projected to come through purchases from wholesale water providers. Other strategies include conservation, groundwater, and indirect reuse.

Table 5E.335 summarizes the recommended water management strategies within Parker County for individual WUGs and WWPs. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.334 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR PARKER COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	6,144	$501,359
Purchase from WWP	50,641	$593,307,000
Additional Infrastructure	*57,229*	*$633,921,000*
Indirect Reuse	1,059	$0
Groundwater	4,100	$18,555,000
Total	***61,944***	***$1,246,284,359***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.335 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR PARKER COUNTY

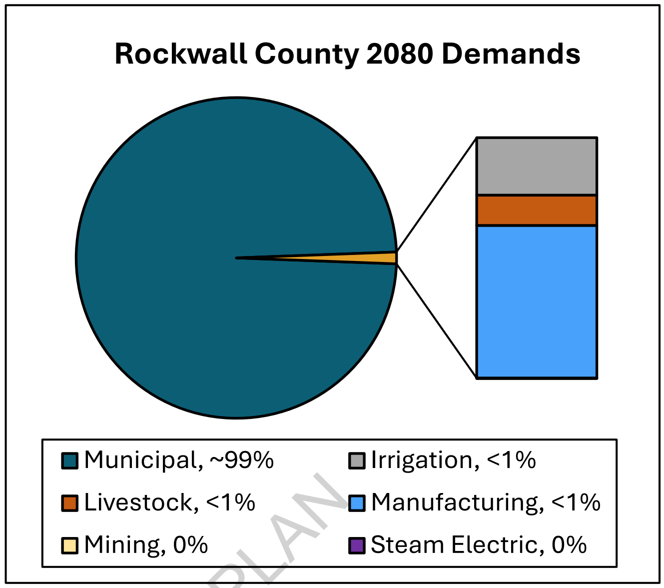
WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Walnut Creek SUD	Conservation (retail)	2030	1,498	$158,560	$1.82	$0.83
	Conservation (wholesale)	2030	Included with WUGs.			
	TRWD	2030	13,878	$0	$1.50	$1.50
	10 MGD WTP Expansion	*2030*	*5,605*	*$103,449,000*	*$5.83*	*$2.75*
	New 15 MGD WTP-Eagle Mountain	*2060*	*8,273*	*$132,171,000*	*$5.05*	*$2.38*
	Infrastructure to deliver to customers	*2030*	*13,878*	*$28,145,000*	*$0.52*	*$0.18*
Weatherford	Conservation (retail)	2030	1,098	$150,000	$1.94	$0.68
	Additional Indirect Reuse	2030	1,059	No costs associated.		
	Existing TRWD Supplies from WTP Expansions	2030	7,023	$0	$0.30	$0.30
	Additional Supplies from TRWD	2040	4,939	$0	$0.30	$0.30
	8 MGD WTP Expansion	*2030*	*4,484*	*$87,279,000*	*$6.18*	*$2.94*
	10 MGD WTP Expansion	*2040*	*5,605*	*$103,449,000*	*$5.83*	*$2.75*
	6 MGD WTP Expansion	*2080*	*2,932*	*$27,916,000*	*$2.65*	*$1.27*
	3 MGD Lake Benbrook PS Expansion	*2030*	*1,682*	*$20,804,000*	*$2.72*	*$0.66*
	Additional Transmission	*2040*	*4,939*	*$4,533,000*	*$0.17*	*$0.02*
WUGs						
Aledo	Conservation	2030	256	$0	$3.52	$1.24
	TRWD through Fort Worth	2030	621	$0	$4.00	$4.00
	Additional Infrastructure	*2030*	*621*	*$22,567,000*	*$6.99*	*$0.93*
Annetta	Conservation	2030	40	$0	$3.20	$1.93
	New Well(s) in Trinity Aquifer	2030	100	$3,827,000	$9.73	$1.47
	ALTERNATIVE Connect to Weatherford	*2030*	*100*	*$1,624,000*	*$3.31*	*$0.61*

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL) WITH DEBT SERVICE	UNIT COST ($/1000 GAL) AFTER DEBT SERVICE
Azle[a]	Conservation	See Tarrant County.				
	TRWD					
	4 MGD WTP expansion					
Fort Worth[a]	Conservation	See Fort Worth in **Chapter 5D**.				
	Other WMSs					
Horseshoe Bend Water System	Conservation	2030	27	$0	$3.24	$1.90
Hudson Oaks	Conservation	2030	114	$8,560	$2.07	$0.79
	Fort Worth	2030	704	$0	$4.00	$4.00
Mineral Wells[a]	Conservation	See 2026 Region G Plan.				
	Lake Palo Pinto through Palo Pinto County WCID #1					
North Rural WSC	Conservation					
Parker County SUD[a]	Conservation	2030	442	$158,560	$9.46	$2.52
	BRA with Treatment Plant Expansion	*2050*	*2,259*	*$90,989,000*	*$17.25*	*$10.53*
Reno	Conservation	2030	29	$0	$6.53	$3.89
	Walnut Creek SUD	2030	382	$0	$4.00	$4.00
Santo SUD	Conservation	See 2026 Region G Plan.				
	Lake Palo Pinto through Mineral Wells					
Springtown	Conservation	2030	559	$0	$2.28	$1.25
	TRWD	2030	1,214	$0	$1.50	$1.50
	Infrastructure improvements - Surface Water Treatment Plant & Supply Project	*2030*	*1,214*	*$5,209,000*	*$0.76*	*$0.04*
Willow Park	Conservation	2030	131	$8,560	$3.23	$1.82
	Fort Worth	2030	798	$0	$1.50	$1.50
	Connect to Fort Worth (TRWD)	*2030*	*798*	*$7,410,000*	*$1.81*	*$0.27*
County Other and Non-Municipal						
	Conservation	2030	1,152	$17,119	$6.62	$1.37

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
County Other, Parker	TRWD through Weatherford	2040	4,000	$0	$4.00	$4.00
	TRWD (New Regional Water District for Trinity Basin)	2050	22,000	$593,307,000	$7.40	$2.90
	ALTERNATIVE TRWD (New Regional Water District for Brazos Basin)	*2040*	*5,259*	*$269,795,000*	*$17.93*	*$9.37*
	New Well(s) in Trinity Aquifer	2030	4,000	$14,728,000	$1.00	$0.20
Irrigation, Parker	Conservation	2030	107	$0	$0.94	$0.94
Livestock, Parker	None	None				
Manufacturing, Parker	TRWD through Weatherford	2030	16	$0	$4.00	$4.00
	TRWD through Walnut Creek SUD	2030	5	$0	$4.00	$4.00
Mining, Parker	Conservation	2070	691	$0	$0.61	$0.61
Steam Electric Power, Parker	None	None				

[a]Water User Groups extend into more than one county.
[b]Quantities listed are for the WUG only. They do not include the WUG's customers.
[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.14 Rockwall County

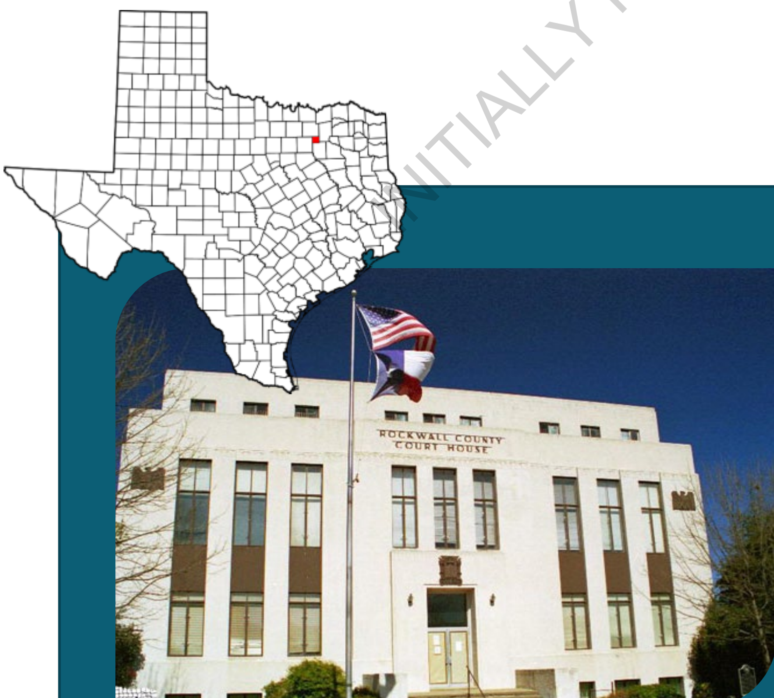


Rockwall is a small county located east of Dallas and south of Collin County. **Figure 5E.28** shows the service area for the water user groups in Rockwall County.

The population of Rockwall County is expected to increase by over 247,000 between 2030 and 2080.

Demands for the county are predominately municipal. There is no mining or steam electric demand on the county, and all other non-municipal demand accounts for less than 1% of the total county demand.

North Texas Municipal Water District (NTMWD) is a major water provider that provides most of the water to Rockwall County. An overall summary of the county's projections is shown in **Table 5E.336**, and water management strategies for individual WWPs and WUGs are discussed on the following pages.



Rockwall County Quick Facts

2020 Population: 107,819

Projected 2080 Population: 403,891

Projected 2080 Demand: 64 MGD

County Seat: Rockwall

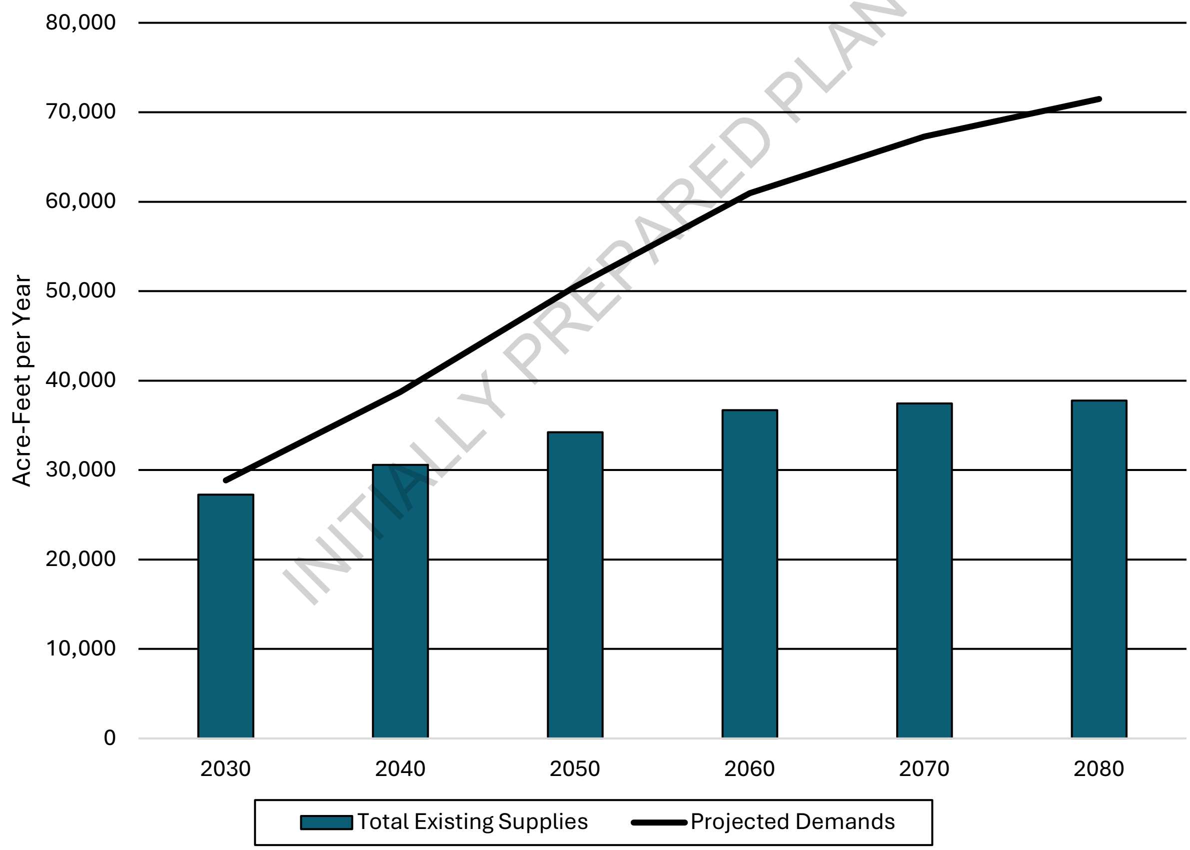
Economy: Industry

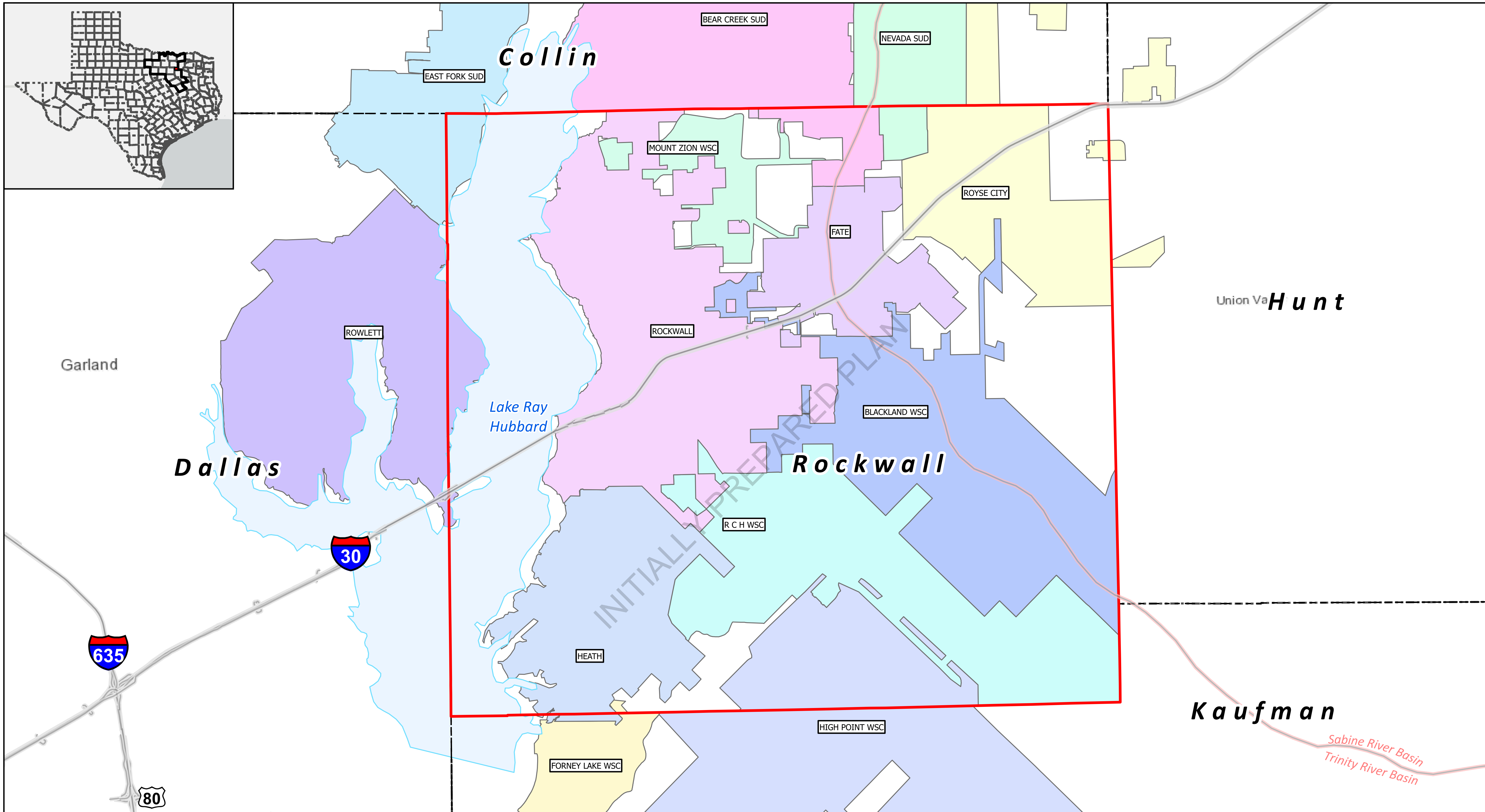
River Basins: Trinity (76%), Sabine (24%)

TABLE 5E.336 SUMMARY OF ROCKWALL COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**155,987**	**214,364**	**280,320**	**340,099**	**378,980**	**403,891**
Projected Demands	**28,848**	**38,732**	**50,519**	**60,940**	**67,289**	**71,482**
Municipal	28,096	37,964	49,734	60,137	66,468	70,642
Irrigation	201	201	201	201	201	201
Livestock	106	106	106	106	106	106
Manufacturing	445	461	478	496	514	533
Mining	0	0	0	0	0	0
Steam Electric	0	0	0	0	0	0
Total Existing Supplies	***27,262***	***30,582***	***34,236***	***36,715***	***37,462***	***37,758***
Need (Demand - Supply)	***1,586***	***8,150***	***16,283***	***24,225***	***29,827***	***33,724***

FIGURE 5E.27 ROCKWALL COUNTY SUMMARY





REGION C
Water Planning for North Texas

Rockwall County, Texas

Figure 5E.28

Data Source(s): ESRI, TWDB, TxDOT

N
0 1.75 3.5 Mi

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.14.1 Wholesale Water Providers and Water User Groups

Water management strategies for Rockwall County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs and a summary for Rockwall County are presented in **Section 5E.14.2.**

B H P Water Supply Corporation

B H P WSC supplies retail water service to Rockwall and Hunt Counties. The SUD is primarily located in Hunt County in Region D. The WSC gets treated water supplies from NTMWD through Royse City. Water management strategies for B H P WSC are conservation and additional supplies from NTMWD. **Table 5E.335** shows the projected population and demand, the current supplies, and the water management strategies for B H P WSC.

TABLE 5E.337 SUMMARY OF WATER USER GROUP – B H P WATER SUPPLY CORPORATION

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	6,056	7,047	7,913	8,719	9,533	10,352
Projected Demands						
Municipal Demand	568	656	736	811	887	963
Total Projected Demand	***568***	***656***	***736***	***811***	***887***	***963***
Currently Available Supplies						
North Texas MWD (through Royse City)	519	512	490	480	486	501
Total Currently Available Supplies	***519***	***512***	***490***	***480***	***486***	***501***
Need (Demand – Supply)	***49***	***144***	***246***	***331***	***401***	***462***
Water Management Strategies						
Water Conservation	0	1	1	1	2	3
NTMWD through Royse City	49	143	245	330	399	459
Total Supplies from Strategies	***49***	***144***	***246***	***331***	***401***	***462***
Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Bear Creek Water Supply Corporation

Bear Creek WSC is located in Collin and Rockwall Counties. Water management strategies for Bear Creek WSC are discussed under Collin County in **Section 5E.1**.

Blackland Water Supply Corporation

Blackland WSC is located in eastern Rockwall County, with a small area in Hunt County. The WSC gets its water supply from North Texas Municipal Water District (NTMWD). Water management strategies for Blackland WSC include conservation and additional supplies through NTMWD. **Table 5E.338** shows the projected population and demand, the current supplies, and the water management strategies for Blackland WSC.

TABLE 5E.338 SUMMARY OF WATER USER GROUP – BLACKLAND WSC (REGIONS C & D)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,634**	**4,824**	**5,199**	**6,029**	**6,491**	**6,988**
Projected Water Demand						
Municipal Demand	916	950	1,024	1,188	1,279	1,376
Total Projected Water Demand	***916***	***950***	***1,024***	***1,188***	***1,279***	***1,376***
Currently Available Water Supplies						
North Texas MWD	837	741	683	703	701	715
Total Current Supplies	***837***	***741***	***683***	***703***	***701***	***715***
Need (Demand - Current Supply)	***79***	***209***	***341***	***485***	***578***	***661***
Water Management Strategies						
Water Conservation	23	31	36	47	54	64
Additional Supplies through NTMWD	56	178	305	438	524	597
Total Water Management Strategies	***79***	***209***	***341***	***485***	***578***	***661***
Blackland WSC (Regions C & D) Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Cash Special Utility District

Cash SUD provides water supply in eastern Rockwall County in Region C and in Hopkins, Hunt and Rains Counties in the North East Texas Region (Region D). Most of the SUD's customers are in the North East Texas Region. Cash SUD's current water supplies are from North Texas Municipal Water District (NTMWD) in Region C and from Sabine River Authority (SRA) in the North East Texas Region.

Cash SUD has a contract with NTMWD for 1MGD (1,121 acre-feet per year). Additional supply comes from the SRA in the North East Texas Region (either as currently available supply or as part of a future strategy; see the North East Texas Regional Plan for details on supply and strategies from SRA). Cash SUD operates its own water treatment plant in the North East Texas Region to treat the supply from SRA. The only water management strategy for Cash SUD is additional supplies from NTMWD. **Table 5E.339** shows the projected total population and demand for the WSC, the current supplies, and the water management strategies for the Region C portion of Cash SUD.

TABLE 5E.339 SUMMARY OF WATER USER GROUP – CASH SUD (REGION C & D)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Region Population	**23,510**	**27,252**	**31,197**	**34,545**	**36,139**	**39,330**
Projected Water Demand						
Municipal Demand	2,967	3,423	3,918	4,339	4,539	4,940
Total Projected Total Demand	***2,967***	***3,423***	***3,918***	***4,339***	***4,539***	***4,940***
Currently Available Water Supplies						
North Texas MWD	1,023	874	747	663	615	582
Sabine River Authority	1,846	2,302	2,797	3,218	3,418	3,819
Total Current Supplies	***2,869***	***3,176***	***3,544***	***3,881***	***4,033***	***4,401***
Need (Demand - Current Supply)	***98***	***247***	***374***	***458***	***506***	***539***
Water Management Strategies						
Additional Supplies from NTMWD	98	247	374	458	506	539
Total Water Management Strategies	***98***	***247***	***374***	***458***	***506***	***539***
Cash SUD Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

East Fork Special Utility District

East Fork SUD is located in southern Collin County and extends into Dallas and Rockwall Counties. The water management strategies for East Fork SUD are described under Collin County in **Section 5E.1**.

Fate

Fate is located in northern Rockwall County. The city gets its water supply from the North Texas Municipal Water District (NTMWD). Water management strategies for Fate include conservation and additional water from NTMWD with additional delivery infrastructure. **Table 5E.340** shows the projected population and demand, the current supplies, and the water management strategies for Fate.

TABLE 5E.340 SUMMARY OF WATER USER GROUP – CITY OF FATE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**25,597**	**36,969**	**50,748**	**65,318**	**81,326**	**98,927**
Projected Water Demand						
Municipal Demand	4,426	6,376	8,752	11,265	14,025	17,061
Total Projected Demand	***4,426***	***6,376***	***8,752***	***11,265***	***14,025***	***17,061***
Currently Available Water Supplies						
North Texas MWD	4,041	4,971	5,836	6,668	7,684	8,869
Total Current Supplies	***4,041***	***4,971***	***5,836***	***6,668***	***7,684***	***8,869***
Need (Demand - Current Supply)	***385***	***1,405***	***2,916***	***4,597***	***6,341***	***8,192***
Water Management Strategies						
Water Conservation	227	550	842	1,109	1,398	1,718
Additional Supplies from NTMWD	158	855	2,074	3,488	4,943	6,474
Increase Delivery Infrastructure from NTMWD	*0*	*0*	*0*	*1,287*	*3,758*	*6,474*
Total Water Management Strategies	***385***	***1,405***	***2,916***	***4,597***	***6,341***	***8,192***
Fate Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Forney Lake Water Supply Corporation

Forney Lake WSC supplies water to northwestern Kaufman County and southwestern Rockwall County. Water management strategies for Forney Lake WSC are discussed under Kaufman County in **Section 0**.

Garland

Garland is located in northeastern Dallas, Collin, and Rockwall Counties. Garland is a wholesale water provider and is discussed under Dallas County in **Section 5E.3**.

Heath

Heath is located in southwestern Rockwall County. The city gets its water supply from North Texas Municipal Water District (NTMWD) through the City of Rockwall. The water management strategies for Heath are conservation and additional water from NTMWD through Rockwall. **Table 5E.341** shows the projected population and demand, the current supplies, and the water management strategies for Heath.

TABLE 5E.341 SUMMARY OF WATER USER GROUP – CITY OF HEATH

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**11,828**	**15,718**	**20,850**	**21,363**	**21,363**	**21,363**
Projected Water Demand						
Municipal Demand	3,813	5,058	6,709	6,874	6,874	6,874
Total Projected Demand	***3,813***	***5,058***	***6,709***	***6,874***	***6,874***	***6,874***
Currently Available Water Supplies						
North Texas MWD (through Rockwall)	3,481	3,944	4,474	4,069	3,766	3,573
Total Current Supplies	***3,481***	***3,944***	***4,474***	***4,069***	***3,766***	***3,573***
Need (Demand - Current Supply)	***332***	***1,114***	***2,235***	***2,805***	***3,108***	***3,301***
Water Management Strategies						
Water Conservation	117	288	756	832	790	779
Additional Water from NTMWD (Rockwall)	215	826	1,479	1,973	2,318	2,522
Total Water Management Strategies	***332***	***1,114***	***2,235***	***2,805***	***3,108***	***3,301***
Heath Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

High Point Water Supply Corporation

High Point WSC supplies water to northwestern Kaufman County and southern Rockwall County. Water management strategies for High Point WSC are discussed under Kaufman County in **Section 0**.

Mount Zion Water Supply Corporation

Mount Zion WSC serves northern Rockwall County. The WSC gets its water supply from North Texas Municipal Water District (NTMWD). Water management strategies for Mount Zion WSC include conservation and additional water from NTMWD. **Table 5E.342** shows the projected population and demand, the current supplies, and the water management strategies for Mount Zion WSC.

TABLE 5E.342 SUMMARY OF WATER USER GROUP – MOUNT ZION WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,079**	**2,148**	**2,226**	**2,294**	**2,373**	**2,462**
Projected Water Demand						
Municipal Demand	403	415	430	443	458	476
Total Projected Demand	***403***	***415***	***430***	***443***	***458***	***476***
Currently Available Water Supplies						
North Texas MWD	368	324	286	262	251	247
Total Current Supplies	***368***	***324***	***286***	***262***	***251***	***247***
Need (Demand - Current Supply)	***35***	***91***	***144***	***181***	***207***	***229***
Water Management Strategies						
Water Conservation	5	7	8	10	12	14
Additional Supplies from NTMWD	30	84	136	171	195	215
Total Water Management Strategies	***35***	***91***	***144***	***181***	***207***	***229***
Mount Zion WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Nevada Special Utility District

Nevada SUD supplies water to Collin and Rockwall Counties. The SUD's water supply is discussed under Collin County in **Section 5E.1**.

R C H Water Supply Corporation

R C H WSC supplies water to Rockwall County. The WSC gets its water supply from North Texas Municipal Water District (NTMWD) through Rockwall. The water management strategies include conservation and additional supplies from NTMWD. **Table 5E.343** shows the projected population and demand, the current supplies, and the water management strategies for R C H WSC.

TABLE 5E.343 SUMMARY OF WATER USER GROUP – R C H WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,684**	**6,457**	**8,240**	**10,994**	**13,407**	**16,350**
Projected Water Demand						
Municipal Demand	1,179	1,336	1,705	2,275	2,775	3,384
Total Projected Water Demand	***1,179***	***1,336***	***1,705***	***2,275***	***2,775***	***3,384***
Currently Available Water Supplies						
Rockwall	1,077	1,041	1,137	1,347	1,520	1,759
Total Current Supplies	***1,077***	***1,041***	***1,137***	***1,347***	***1,520***	***1,759***
Need (Demand - Current Supply)	***102***	***295***	***568***	***928***	***1,255***	***1,625***
Water Management Strategies						
Water Conservation	29	44	63	94	127	166
Additional Supplies from NTMWD	73	251	505	834	1,128	1,459
Total Water Management Strategies	***102***	***295***	***568***	***928***	***1,255***	***1,625***
R C H WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Rockwall County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. In Rockwall County, the irrigation demand is for golf courses. The current supplies are reuse from North Texas Municipal Water District (NTMWD) and water from Dallas Water Utilities (DWU). The recommended water management strategies are conservation and additional water from DWU to meet the existing demand of the golf course. **Table 5E.344** shows the projected demand, the current supplies, and the water management strategies for Rockwall County Irrigation.

TABLE 5E.344 SUMMARY OF WATER USER GROUP – ROCKWALL COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***201***	***201***	***201***	***201***	***201***	***201***
Currently Available Water Supplies						
North Texas MWD	672	0	0	0	0	0
Dallas	320	306	290	278	267	258
Total Current Supplies	***992***	***306***	***290***	***278***	***267***	***258***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	0	7	13	16	19	22
Additional Supplies from DWU	27	29	35	41	47	51
Total Water Management Strategies	***27***	***36***	***48***	***57***	***66***	***73***
Irrigation, Rockwall Reserve (Shortage)	***818***	***141***	***137***	***134***	***132***	***130***

Rockwall County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. The current supply is local surface water supplies. This source is sufficient to meet projected demands, and there is no recommended water management strategy for this water user group. **Table 5E.345** shows the projected demand, current supplies, and water management strategies for Rockwall County Livestock.

TABLE 5E.345 SUMMARY OF WATER USER GROUP – ROCKWALL COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***106***	***106***	***106***	***106***	***106***	***106***
Currently Available Water Supplies						
Trinity Livestock Local Supply	72	72	72	72	72	72
Sabine Livestock Local Supply	64	64	64	64	64	64
Total Current Supplies	***136***	***136***	***136***	***136***	***136***	***136***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Rockwall Reserve (Shortage)	***30***	***30***	***30***	***30***	***30***	***30***

Rockwall County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. Current supplies are from Rockwall, which is supplied by North Texas Municipal Water District (NTMWD). The only water management strategy for this water user group is additional water from NTMWD. Conservation was considered for this water user group but not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG. **Table 5E.346** shows the projected demand and current supplies for Rockwall County Manufacturing.

TABLE 5E.346 SUMMARY OF WATER USER GROUP – ROCKWALL COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***445***	***461***	***478***	***496***	***514***	***533***
Currently Available Water Supplies						
North Texas MWD (through Rockwall)	406	359	319	294	282	277
Total Current Supplies	***406***	***359***	***319***	***294***	***282***	***277***
Need (Demand - Current Supply)	***39***	***102***	***159***	***202***	***232***	***256***
Water Management Strategies						
Water Conservation	0	0	0	0	0	0
Additional Supplies from NTMWD through Rockwall	39	102	159	202	232	256
Total Water Management Strategies	***39***	***102***	***159***	***202***	***232***	***256***
Manufacturing, Rockwall Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Rockwall County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. There is no mining demand in Rockwall County.

Rockwall County Other

Rockwall County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups. Rockwall County Other gets its water supply from North Texas Municipal Water District (NTMWD) through Rockwall. Water management strategies for Rockwall County Other include conservation and additional water from NTMWD. **Table 5E.347** shows the projected population and demand, the current supplies, and the water management strategies for Rockwall County Other.

TABLE 5E.347 SUMMARY OF WATER USER GROUP – ROCKWALL COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,650**	**2,193**	**3,269**	**3,768**	**5,843**	**7,294**
Projected Water Demand						
Municipal Demand	415	342	510	588	912	1,139
Total Projected Water Demand	***415***	***342***	***510***	***588***	***912***	***1,139***
Currently Available Water Supplies						
North Texas MWD (through Rockwall)	379	267	341	348	500	593
Total Current Supplies	***379***	***267***	***341***	***348***	***500***	***593***
Need (Demand - Current Supply)	***36***	***75***	***169***	***240***	***412***	***546***
Water Management Strategies						
Water Conservation	3	4	8	11	21	30
Additional Supplies from NTMWD	33	71	161	229	391	516
Total Water Management Strategies	***36***	***75***	***169***	***240***	***412***	***546***
County-Other, Rockwall Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Rockwall County Steam Electric Power

Steam electric power demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. There is no demand from steam electric power in Rockwall County.

Rockwall

Rockwall is located in central Rockwall County. Rockwall is a wholesale water provider (WWP) that sells water to Heath, R C H WSC, Rockwall County Other, and Rockwall County Manufacturing. Rockwall's current water supply is treated water purchased from North Texas Municipal Water District (NTMWD). Recommended strategies for Rockwall include implementing conservation measures, purchasing additional supplies from NTMWD, and increasing delivery infrastructure from NTMWD. **Table 5E.348** shows the projected demand, the current supplies, and the water management strategies for the City of Rockwall.

TABLE 5E.348 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – ROCKWALL

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Rockwall	10,089	12,332	16,427	21,919	22,762	22,762
County-Other, Rockwall	415	342	510	588	912	1,139
Heath	3,813	5,058	6,709	6,874	6,874	6,874
Manufacturing, Rockwall	445	461	478	496	514	533
R C H WSC	1,179	1,336	1,705	2,275	2,775	3,384
Total Projected Water Demand	***15,941***	***19,529***	***25,829***	***32,152***	***33,837***	***34,692***
Currently Available Supplies						
North Texas MWD	14,555	15,227	17,225	19,032	18,540	18,035
Total Current Supplies	***14,555***	***15,227***	***17,225***	***19,032***	***18,540***	***18,035***
Need (Demand less Supply)	***1,386***	***4,302***	***8,604***	***13,120***	***15,297***	***16,657***
Water Management Strategies						
Conservation (retail)	450	838	1,402	2,040	1,894	1,761
Conservation (wholesale)	149	336	827	937	938	975
Additional NTMWD	787	3,128	6,375	10,143	12,465	13,921
Increase delivery infrastructure from NTWMD	*0*	*0*	*4,879*	*10,143*	*12,284*	*13,235*
Total Supplies from Strategies	***1,386***	***4,302***	***8,604***	***13,120***	***15,297***	***16,657***
Total Supplies	***15,941***	***19,529***	***25,829***	***32,152***	***33,837***	***34,692***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

Rowlett

Rowlett is located in northeastern Dallas County and Rockwall County. Water management strategies for Rowlett are discussed under Dallas County in **Section 5E.3**.

Royse City

Royse City is located in northeast Rockwall County and southeast Collin County. The city is expected to grow considerably over the planning period, with the 2080 population projected to be over 120,000 people. The city gets its water supply from North Texas Municipal Water District (NTMWD). The water management strategies for Royse City include conservation and additional water from NTMWD. **Table 5E.349** shows the projected population and demand, the current supplies, and the water management strategies for Royse City.

TABLE 5E.349 SUMMARY OF WATER USER GROUP – ROYSE CITY

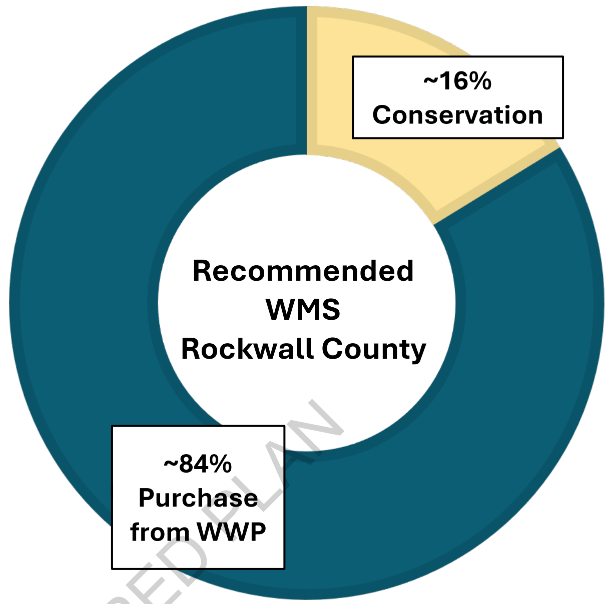
(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**39,473**	**74,452**	**98,371**	**107,834**	**120,640**	**120,640**
Projected Water Demand						
Municipal Demand	5,911	11,104	14,671	16,083	17,992	17,993
Total Projected Demand	***5,911***	***11,104***	***14,671***	***16,083***	***17,992***	***17,993***
Currently Available Water Supplies						
North Texas MWD	5,397	8,658	9,782	9,520	9,858	9,354
Total Current Supplies	***5,397***	***8,658***	***9,782***	***9,520***	***9,858***	***9,354***
Need (Demand - Current Supply)	***514***	***2,446***	***4,889***	***6,563***	***8,134***	***8,639***
Water Management Strategies						
Water Conservation	300	1,075	1,407	1,403	1,560	1,460
Additional Supplies from NTMWD	214	1,371	3,482	5,160	6,574	7,179
Total Water Management Strategies	***514***	***2,446***	***4,889***	***6,563***	***8,134***	***8,639***
Royse City Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Wylie

Wylie is located in southern Collin County with small areas in Dallas and Rockwall Counties. Wylie's water supply plans are discussed under Collin County in **Section 5E.1**.

5E.14.2 Summary of Costs for Rockwall County

Table 5E.350 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Rockwall County. Total quantities from **Table 5E.350** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands for WUGs located within Rockwall County are projected to come through purchases from wholesale water providers. The only other strategy in Rockwall County is conservation.

Table 5E.351 summarizes the recommended water management strategies within Rockwall County for individual WUGs and WWPs. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.350 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR ROCKWALL COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	6,424	$624,482
Purchase from WWP	33,212	$0
Additional Infrastructure	*20,306*	*$86,398,000*
Total	***39,636***	***$87,022,482***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

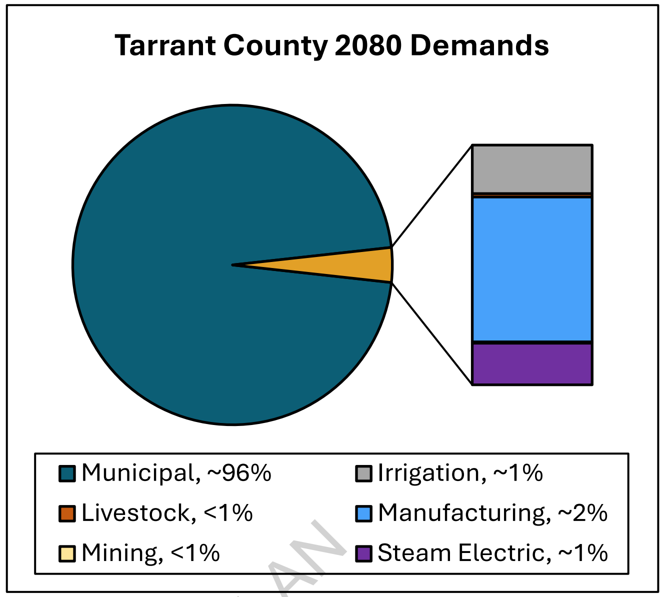
TABLE 5E.351 COSTS FOR RECOMMENDED WATER MANAGEMENT STRATEGIES FOR ROCKWALL COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL) WITH DEBT SERVICE	UNIT COST ($/1000 GAL) AFTER DEBT SERVICE
WWPs						
Rockwall	Conservation (retail)	2030	2,040	$150,000	$4.78	$0.31
	Conservation (wholesale)	2030	Included with WUGs.			
	Additional NTMWD	2030	13,921	$0	$4.00	$4.00
	Increase delivery infrastructure from NTWMD	*2050*	*13,235*	*$63,673,000*	*$0.99*	*$0.19*
WUGs						
Bear Creek SUD	Conservation	See Collin County.				
	NTMWD					
B H P WSC	Conservation	See 2026 Region D Plan.				
	NTMWD					
Blackland WSC[a]	Conservation	2030	64	$8,560	$4.76	$1.51
	NTMWD	2030	597	$0	$4.00	$0.00
	Direct Connection to NTMWD	*2030*	*597*	*$16,571,000*	*$5.46*	*$0.83*
Cash SUD[a]	Conservation	See 2026 Region D Plan.				
	SRA					
	NTMWD					
	Additional Delivery Infrastructure from NTWMD					
	WTP Expansion					
Dallas[a]	Conservation	See DWU in **Chapter 5D**.				
	Other WMS					
East Fork SUD[a]	Conservation	See Collin County.				
	NTMWD					
Fate	Conservation	2030	1,718	$158,764	$0.63	$0.28
	NTMWD	2030	6,474	$0	$4.00	$4.00
	Additional Delivery Infrastructure from NTMWD	*2060*	*6,474*	*$6,154,000*	*$0.23*	*$0.07*
	Conservation	See Kaufman County.				

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
Forney Lake WSC[a]	NTMWD					
Garland[a]	Conservation	See Dallas County.				
	NTMWD					
Heath	Conservation	2030	832	$150,000	$3.25	$0.65
	NTMWD	2030	2,522	$0	$4.00	$4.00
Mount Zion WSC	Conservation	2030	14	$0	$2.84	$0.84
	NTMWD	2030	215	$0	$4.00	$4.00
Nevada SUD	Conservation	See Collin County.				
	NTMWD					
R C H WSC	Conservation	2030	166	$8,560	$2.51	$1.52
	NTMWD	2030	1,459	$0	$4.00	$4.00
Rowlett[a]	Conservation	See Dallas County.				
	NTMWD					
Royse City[a]	Conservation	2030	1,560	$148,598	$1.31	$0.36
	NTMWD	2030	7,179	$0	$4.00	$4.00
Wylie[a]	Conservation	See Collin County.				
	NTMWD					
County Other and Non-Municipal						
County Other, Rockwall	Conservation	2030	30	$0	$5.40	$0.31
	NTMWD	2030	516	$0	$4.00	$4.00
Irrigation, Rockwall	Conservation	2040	22	$0	$0.94	$0.94
	DWU	2030	51	$0	$4.00	$4.00
Livestock, Rockwall	None	None				
Manufacturing, Rockwall	NTMWD	2030	256	$0	$4.00	$4.00
Mining, Rockwall	None	None				
Steam Electric Power, Rockwall	None	None				

[a]Water User Groups extend into more than one county.
[b]Quantities listed are for the WUG only. They do not include the WUG's customers.
[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.15 Tarrant County



Tarrant County is located in the central portion of Region C and is home to Fort Worth. **Figure 5E.30** shows the service areas for water user groups in Tarrant County.

Tarrant County's population is projected to increase by nearly a million between 2030 and 2080.

Demands for the county are predominately municipal. The county has relatively minimal irrigation, livestock, manufacturing and steam electric, and mining demands.

Much of the water for Tarrant County is supplied by the Tarrant Regional Water District (TRWD). Additional water from TRWD will also be a major part of Tarrant County water management strategies.

An overall summary of the county's projections is shown in **Table 5E.352**, and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Tarrant County Quick Facts

2020 Population: 2,110,640

Projected 2080 Population: 3,438,106

Projected 2080 Demand: 623 MGD

County Seat: Fort Worth

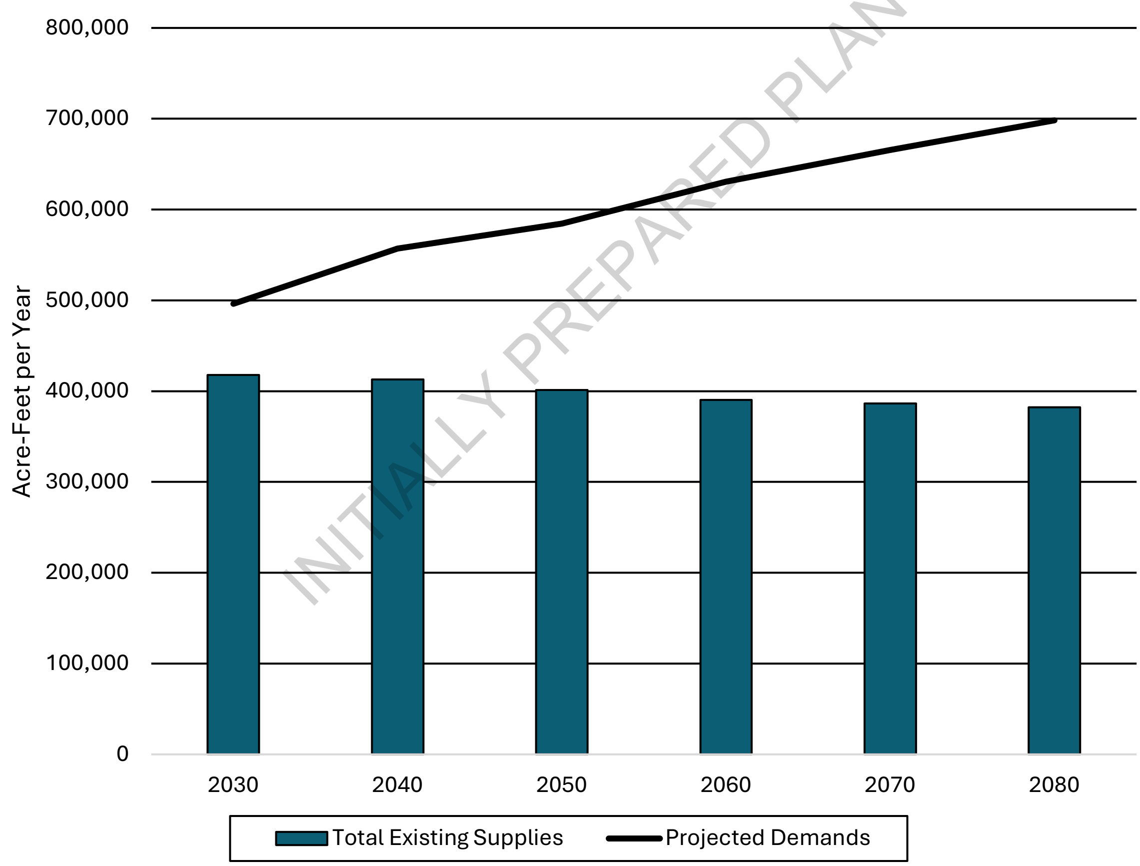
Economy: Tourism; manufacturing

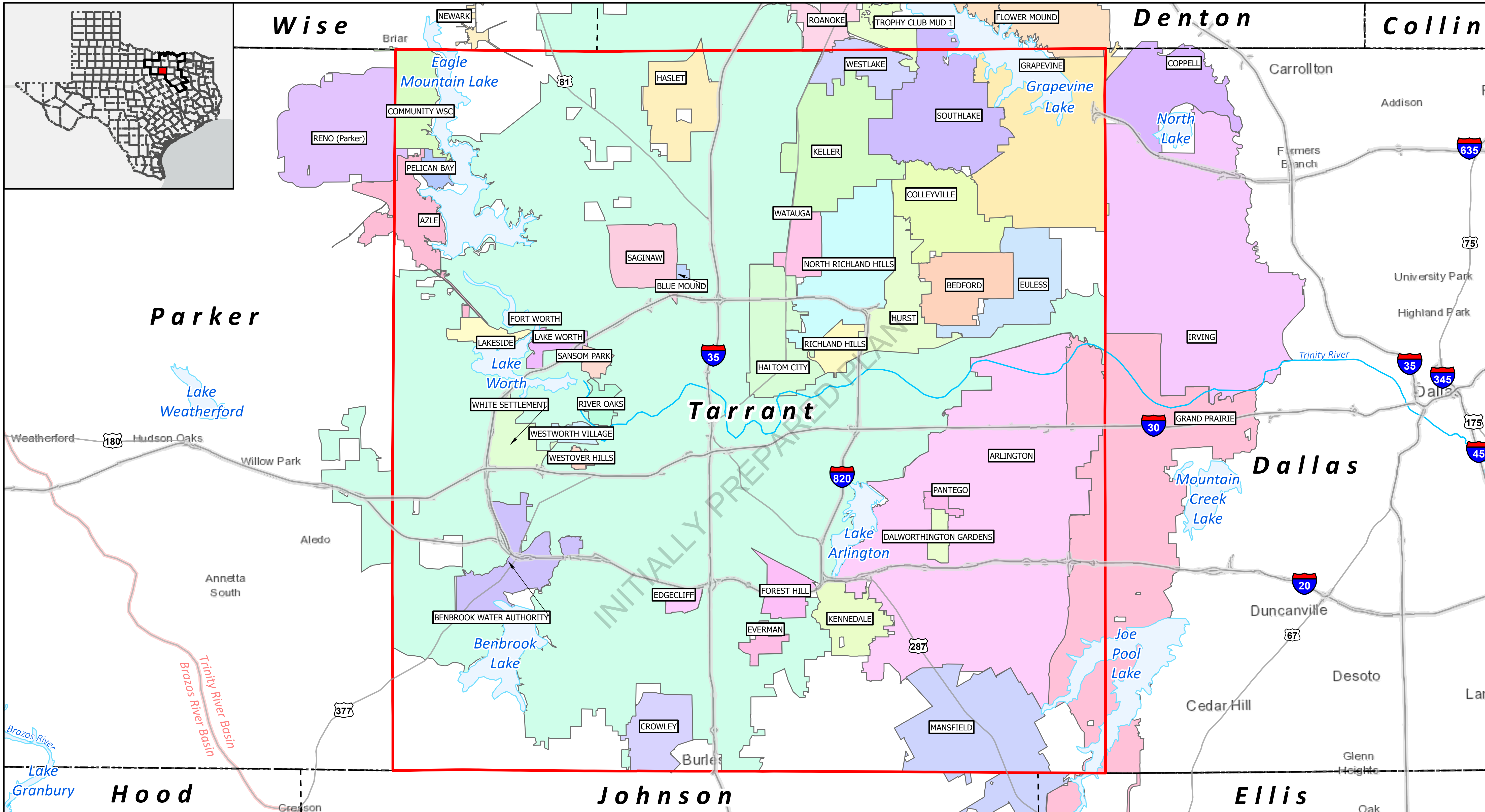
River Basins: Trinity (100%)

TABLE 5E.352 SUMMARY OF TARRANT COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**2,446,041**	**2,749,019**	**2,878,997**	**3,093,389**	**3,272,494**	**3,438,106**
Projected Demands	**496,189**	**556,887**	**584,574**	**630,705**	**665,633**	**698,257**
Municipal	476,863	534,431	561,636	607,270	641,681	673,770
Irrigation	4,964	4,964	4,964	4,964	4,964	4,964
Livestock	341	341	341	341	341	341
Manufacturing	12,339	12,796	13,269	13,760	14,269	14,797
Mining	525	106	115	121	129	136
Steam Electric	1,157	4,249	4,249	4,249	4,249	4,249
Total Existing Supplies	***417,750***	***412,867***	***401,390***	***390,222***	***386,335***	***382,235***
Need (Demand - Supply)	***78,439***	***144,020***	***183,184***	***240,483***	***279,298***	***316,022***

FIGURE 5E.29 SUMMARY OF TARRANT COUNTY





Tarrant County, Texas

Figure 5E.30

N

0 4 8 Mi

Data Source(s): ESRI, TWDB, TxDOT

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.15.1 Wholesale Water Providers and Water User Groups

Water management strategies for Tarrant County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs and a summary for Tarrant County are presented in **Section 5E.15.2.**

Arlington

Arlington is located in eastern Tarrant County. Arlington is a wholesale water provider (WWP) that currently provides treated water to its retail customers, Bethesda WSC, Dalworthington Gardens, Kennedale, and irrigation, manufacturing, and mining in Tarrant County. Potential future customers for Arlington include Grand Prairie and Pantego. The city is under no obligation to provide services to these entities just because they are listed in this plan as potential future customers.

Arlington's current sources of water supply include purchasing raw water from Tarrant Regional Water District (TRWD) and direct reuse from Fort Worth. Arlington has two water treatment plants, the John F. Kubala WTP and the Pierce-Burch WTP. The John F. Kubala WTP has a current peak capacity of 97.5 MGD and the Pierce-Burch WTP has a current peak capacity of 75 MGD. Using a peaking factor of 2, Arlington can treat up to 96,600 acre-feet per year for municipal supplies.

The proposed future strategies for Arlington are to implement water conservation measures, purchase additional supplies from TRWD, and develop infrastructure improvements such as WTP expansions and a 60-inch parallel raw water pipeline to the John F. Kubala WTP. Arlington will need to expand their water treatment plants to reach a total treatment capacity of approximately 180 MGD by 2080. The management supply factor is kept at 1.00 as Arlington may purchase additional water from TRWD if needed.

Table 5E.353 shows the projected demand, the current supplies, and the water management strategies for Arlington.

TABLE 5E.353 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – ARLINGTON

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Arlington	74,649	80,933	86,223	90,489	96,329	99,192
Bethesda WSC	1,670	2,043	2,425	2,771	3,159	3,595
Dalworthington Gardens	360	363	366	366	367	368
Irrigation, Tarrant	281	281	281	281	281	281
Kennedale	1,121	1,121	1,121	1,121	1,121	1,121
Manufacturing, Tarrant	2,024	2,099	2,176	2,257	2,340	2,427
Mining, Tarrant	105	105	105	105	105	105
Potential Future Customers						
Grand Prairie and Customers	0	2,242	2,242	2,242	2,242	2,242
Pantego	34	34	34	34	34	34
Total Projected Demands	***80,244***	***89,221***	***94,973***	***99,666***	***105,978***	***109,365***
Currently Available Water Supplies						
Tarrant Regional WD	69,048	65,922	65,288	62,526	61,697	59,817
Fort Worth Village Creek Direct Reuse	178	178	178	178	178	178
Total Current Supplies	***69,226***	***66,100***	***65,466***	***62,704***	***61,875***	***59,995***
Need (Demand less Supply)	***11,018***	***23,121***	***29,507***	***36,962***	***44,103***	***49,370***
Water Management Strategies						
Conservation (retail)	3,011	4,898	6,000	6,572	7,378	7,776
Conservation (wholesale)	53	284	342	405	441	455
Additional Supplies from TRWD with Infrastructure as Below:	7,954	17,939	23,165	29,985	36,284	41,139
8 MGD WTP Expansion	*0*	*0*	*0*	*0*	*1,295*	*4,270*
Parallel Raw Water Pipeline	*7,954*	*17,939*	*23,165*	*29,985*	*36,284*	*41,139*
Total Supplies from Strategies	***11,018***	***23,121***	***29,507***	***36,962***	***44,103***	***49,370***
Total Supplies	***80,244***	***89,221***	***94,973***	***99,666***	***105,978***	***109,365***
Reserve or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

Azle

Azle is located in northwestern Tarrant and northeastern Parker Counties. Azle purchases and treats raw water from Tarrant Regional Water District (TRWD). Water management strategies for the city include conservation, additional water from TRWD, and water treatment plant expansions. **Table 5E.354** shows the projected population and demand, the current supplies, and the water management strategies for Azle.

TABLE 5E.354 SUMMARY OF WATER USER GROUP – CITY OF AZLE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**16,328**	**18,775**	**21,074**	**23,169**	**25,472**	**28,005**
Projected Water Demand						
Municipal Demand	2,497	2,860	3,210	3,529	3,880	4,266
Total Projected Demand	***2,497***	***2,860***	***3,210***	***3,529***	***3,880***	***4,266***
Currently Available Water Supplies						
Tarrant Regional WD	1,680	1,680	1,680	1,680	1,680	1,680
Total Current Supplies	***1,680***	***1,680***	***1,680***	***1,680***	***1,680***	***1,680***
Need (Demand - Current Supply)	***817***	***1,180***	***1,530***	***1,849***	***2,200***	***2,586***
Water Management Strategies						
Water Conservation	63	100	225	285	326	372
Additional Raw Water Needed from TRWD with Treatment as below:	754	1,080	1,305	1,564	1,874	2,214
4 MGD WTP Expansion	*754*	*1,080*	*1,305*	*1,564*	*1,874*	*2,214*
Total Water Management Strategies	***817***	***1,180***	***1,530***	***1,849***	***2,200***	***2,586***
Azle Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Bedford

Bedford is located in northeastern Tarrant County. The city's water supply is groundwater (Trinity aquifer) and treated water from the Trinity River Authority (TRA), which gets raw water from Tarrant Regional Water District (TRWD). Water management strategies include conservation and additional water from TRA. **Table 5E.355** shows the projected population and demand, the current supplies, and the water management strategies for Bedford.

TABLE 5E.355 SUMMARY OF WATER USER GROUP – CITY OF BEDFORD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**52,345**	**56,345**	**57,255**	**60,166**	**60,166**	**60,166**
Projected Water Demand						
Municipal Demand	9,733	10,445	10,614	11,153	11,153	11,153
Total Projected Demand	***9,733***	***10,445***	***10,614***	***11,153***	***11,153***	***11,153***
Currently Available Water Supplies						
Trinity Aquifer	445	445	445	445	445	445
TRWD (through TRA)	8,013	7,598	7,176	6,887	6,382	5,991
Total Current Supplies	***8,458***	***8,043***	***7,621***	***7,332***	***6,827***	***6,436***
Need (Demand - Current Supply)	***1,275***	***2,402***	***2,993***	***3,821***	***4,326***	***4,717***
Water Management Strategies						
Water Conservation	393	541	569	655	662	684
Additional Supplies from TRWD through TRA	900	1,884	2,448	3,192	3,690	4,060
Total Water Management Strategies	***1,293***	***2,425***	***3,017***	***3,847***	***4,352***	***4,744***
Bedford Reserve (Shortage)	***18***	***23***	***24***	***26***	***26***	***27***

Benbrook

Benbrook is located in southwestern Tarrant County. The city's water supply is raw water from Tarrant Regional Water District (TRWD) which is treated at Benbrook's own water treatment plant and groundwater (Trinity aquifer). Water management strategies include conservation and additional water from TRWD, including water treatment plant expansions. **Table 5E.356** shows the projected population and demand, the current supplies, and the water management strategies for Benbrook.

TABLE 5E.356 SUMMARY OF WATER USER GROUP – CITY OF BENBROOK

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**27,156**	**29,353**	**31,526**	**33,698**	**35,871**	**38,044**
Projected Water Demand						
Municipal Demand	6,152	6,633	7,124	7,615	8,106	8,597
Total Projected Demand	***6,152***	***6,633***	***7,124***	***7,615***	***8,106***	***8,597***
Currently Available Water Supplies						
Trinity Aquifer	615	663	712	762	811	860
Tarrant Regional WD	4,777	4,536	4,524	4,408	4,347	4,329
Total Current Supplies	***5,392***	***5,199***	***5,236***	***5,170***	***5,158***	***5,189***
Need (Demand - Current Supply)	***760***	***1,434***	***1,888***	***2,445***	***2,948***	***3,408***
Water Management Strategies						
Water Conservation	383	654	803	890	975	1,062
Additional Raw Water Needed from TRWD beyond current contract with treatment as below:	415	845	1,165	1,644	2,071	2,452
3 MGD WTP Expansion	*0*	*0*	*1,682*	*1,682*	*1,682*	*1,682*
Total Water Management Strategies	***798***	***1,499***	***1,968***	***2,534***	***3,046***	***3,514***
Benbrook Water Authority Reserve (Shortage)	***38***	***65***	***80***	***89***	***98***	***106***

Bethesda Water Supply Corporation

Bethesda WSC serves southern Tarrant County and northern Johnson County (which is in the Brazos G water planning region). Most of the WSC's service area is located in Region G, and the Brazos G regional water plan will have additional details on strategies for this WUG. Bethesda WSC's water supplies are groundwater (Trinity aquifer) and supplies from Tarrant Regional Water District (TRWD) through both Arlington and Fort Worth. Water management strategies for Bethesda WSC include conservation, and additional water from Arlington and Fort Worth. **Table 5E.357** shows the projected population and demand, the current supplies, and the water management strategies for Bethesda WSC.

TABLE 5E.357 SUMMARY OF WATER USER GROUP – BETHESDA WSC (REGIONS C AND G)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**35,167**	**40,663**	**46,170**	**51,154**	**56,749**	**63,032**
Projected Water Demand						
Municipal Demand	7,344	8,463	9,609	10,646	11,811	13,119
Total Projected Water Demand	***7,344***	***8,463***	***9,609***	***10,646***	***11,811***	***13,119***
Currently Available Water Supplies						
Trinity Aquifer	2,333	2,333	2,333	2,333	2,333	2,333
TRWD (through Arlington)	1,441	1,552	1,712	1,782	1,883	2,012
TRWD (through Fort Worth)	2,882	3,105	3,423	3,564	3,765	4,024
Total Current Supplies	***6,656***	***6,990***	***7,468***	***7,679***	***7,981***	***8,369***
Need (Demand - Current Supply)	***688***	***1,473***	***2,141***	***2,967***	***3,830***	***4,750***
Water Management Strategies						
Water Conservation	592	1,533	2,265	2,510	2,784	3,092
Additional TRWD Supplies through Arlington	94	121	141	336	531	736
Additional TRWD through from Fort Worth	190	242	285	671	1,065	1,472
Total Water Management Strategies	***876***	***1,896***	***2,691***	***3,517***	***4,380***	***5,300***
Bethesda WSC (Regions C and G) Reserve (Shortage)	***188***	***423***	***550***	***550***	***550***	***550***

Blue Mound

The City of Blue Mound is located in the northern half of Tarrant County. The city's water supply is groundwater (Trinity aquifer) and the only water management strategy for the city is conservation. **Table 5E.356** shows the projected population and demand, the current supplies, and the water management strategies for Blue Mound.

TABLE 5E.358 SUMMARY OF WATER USER GROUP – BLUE MOUND

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,690**	**2,976**	**3,213**	**3,398**	**3,602**	**3,826**
Projected Water Demand						
Municipal Demand	195	214	231	244	258	275
Total Projected Water Demand	***195***	***214***	***231***	***244***	***258***	***275***
Currently Available Water Supplies						
Trinity Aquifer	195	214	231	244	258	275
Total Current Supplies	***195***	***214***	***231***	***244***	***258***	***275***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	5	6	8	9	10	13
Total Water Management Strategies	***5***	***6***	***8***	***9***	***10***	***13***
Blue Mound Reserve (Shortage)	***5***	***6***	***8***	***9***	***10***	***13***

Burleson

Burleson is located in southern Tarrant County and northern Johnson County (which is in the Brazos G water planning region). Most of Burleson's service area is located in Region G, and the Brazos G regional water plan will also have additional details on strategies for this WUG. The city provides water to a small portion of Johnson County Manufacturing. The city's water supply is treated water from Fort Worth, which gets its raw water from Tarrant Regional Water District (TRWD). The only water management strategy for Burleson is additional water from Fort Worth. **Table 5E.359** shows the projected population and demand, the current supplies, and the water management strategies for Burleson.

TABLE 5E.359 SUMMARY OF WATER USER GROUP – CITY OF BURLESON (REGIONS C AND G)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**51,966**	**60,546**	**68,952**	**76,495**	**84,944**	**94,407**
Projected Water Demand						
Municipal Demand	8,163	9,476	10,793	11,974	13,298	14,781
Manufacturing, Johnson	*2*	*2*	*2*	*2*	*2*	*2*
Total Projected Water Demand	***8,165***	***9,478***	***10,795***	***11,976***	***13,300***	***14,783***
Currently Available Water Supplies						
TRWD (through Fort Worth)	7,042	7,199	7,617	7,702	7,926	8,269
Manufacturing, Johnson	2	1	1	1	1	1
Total Current Supplies	***7,044***	***7,200***	***7,618***	***7,703***	***7,927***	***8,270***
Need (Demand - Current Supply)	***1,121***	***2,278***	***3,177***	***4,273***	***5,373***	***6,513***
Water Management Strategies						
Additional Supplies from TRWD through Fort Worth	1,121	2,277	3,176	4,272	5,372	6,512
Manufacturing, Johnson	0	1	1	1	1	1
Total Water Management Strategies	***1,121***	***2,278***	***3,177***	***4,273***	***5,373***	***6,513***
Burleson Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Colleyville

Colleyville is located in northeastern Tarrant County. The city's water supply is treated water from the Trinity River Authority (TRA), which gets raw water from Tarrant Regional Water District (TRWD). Colleyville's water management strategies include conservation and additional water from TRA. **Table 5E.360** shows the projected population and demand, the current supplies, and the water management strategies for Colleyville.

TABLE 5E.360 SUMMARY OF WATER USER GROUP – CITY OF COLLEYVILLE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**28,000**	**28,000**	**28,000**	**28,000**	**28,000**	**28,000**
Projected Water Demand						
Municipal Demand	10,775	10,758	10,758	10,758	10,758	10,758
Total Projected Water Demand	***10,775***	***10,758***	***10,758***	***10,758***	***10,758***	***10,758***
Currently Available Water Supplies						
TRWD (through TRA)	9,296	8,173	7,592	6,919	6,411	6,018
Total Current Supplies	***9,296***	***8,173***	***7,592***	***6,919***	***6,411***	***6,018***
Need (Demand - Current Supply)	***1,479***	***2,585***	***3,166***	***3,839***	***4,347***	***4,740***
Water Management Strategies						
Water Conservation	558	752	839	874	910	946
Additional Supplies from TRWD through TRA	921	1,833	2,327	2,965	3,437	3,794
Total Water Management Strategies	***1,479***	***2,585***	***3,166***	***3,839***	***4,347***	***4,740***
Colleyville Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Community Water Supply Corporation

Community WSC serves northwestern Tarrant County. The WSC gets raw water from Tarrant Regional Water District (TRWD) and operates its own water treatment plant. Water management strategies for Community WSC include conservation and additional water from TRWD. **Table 5E.361** shows the projected population and demand, the current supplies, and the water management strategies for Community WSC.

TABLE 5E.361 SUMMARY OF WATER USER GROUP – COMMUNITY WSC

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,123**	**4,630**	**5,054**	**5,396**	**5,773**	**6,186**
Projected Water Demand						
Municipal Demand	608	680	742	792	848	908
Total Projected Water Demand	***608***	***680***	***742***	***792***	***848***	***908***
Currently Available Water Supplies						
Tarrant Regional WD	524	516	524	510	505	508
Total Current Supplies	***524***	***516***	***524***	***510***	***505***	***508***
Need (Demand - Current Supply)	***84***	***164***	***218***	***282***	***343***	***400***
Water Management Strategies						
Water Conservation	44	129	183	199	215	234
Additional Supplies from TRWD	40	35	35	83	128	166
Total Water Management Strategies	***84***	***164***	***218***	***282***	***343***	***400***
Community WSC Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Crowley

Crowley is located in southern Tarrant County. The city's water supply is treated water from Fort Worth (which gets its raw water from Tarrant Regional Water District (TRWD)). Water management strategies for Crowley are conservation, additional water from Fort Worth, and an additional connection to Fort Worth (increase delivery infrastructure). **Table 5E.362** shows the projected population and demand, the current supplies, and the water management strategies for Crowley.

TABLE 5E.362 SUMMARY OF WATER USER GROUP – CITY OF CROWLEY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**22,372**	**26,629**	**30,180**	**33,059**	**36,223**	**39,700**
Projected Water Demand						
Municipal Demand	3,228	3,826	4,336	4,750	5,205	5,704
Total Projected Water Demand	***3,228***	***3,826***	***4,336***	***4,750***	***5,205***	***5,704***
Currently Available Water Supplies						
TRWD (through Fort Worth)	2,785	2,907	3,060	3,055	3,102	3,191
Total Current Supplies	***2,785***	***2,907***	***3,060***	***3,055***	***3,102***	***3,191***
Need (Demand - Current Supply)	***443***	***919***	***1,276***	***1,695***	***2,103***	***2,513***
Water Management Strategies						
Water Conservation	140	240	296	335	382	436
Additional Supplies from TRWD through Fort Worth	303	679	980	1,360	1,721	2,077
Increase Delivery Infrastructure from Ft Worth	*846*	*1,344*	*1,798*	*2,173*	*2,581*	*3,026*
Total Water Management Strategies	***443***	***919***	***1,276***	***1,695***	***2,103***	***2,513***
Crowley (Regions C and G) Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Dalworthington Gardens

Dalworthington Gardens is located in eastern Tarrant County. The city's water supply is treated water from Fort Worth and Arlington (both get raw water from Tarrant Regional Water District (TRWD)). Water management strategies for Dalworthington Gardens include conservation and additional water from Fort Worth and Arlington. **Table 5E.363** shows the projected population and demand, the current supplies, and the water management strategies for Dalworthington Gardens.

TABLE 5E.363 SUMMARY OF WATER USER GROUP – CITY OF DALWORTHINGTON GARDENS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,303**	**2,326**	**2,343**	**2,344**	**2,348**	**2,352**
Projected Water Demand						
Municipal Demand	901	908	915	915	917	919
Total Projected Water Demand	***901***	***908***	***915***	***915***	***917***	***919***
Currently Available Water Supplies						
TRWD (through Fort Worth)	467	414	387	353	327	309
TRWD (through Arlington)	311	275	258	235	218	206
Total Current Supplies	***778***	***689***	***645***	***588***	***545***	***515***
Need (Demand - Current Supply)	***123***	***219***	***270***	***327***	***372***	***404***
Water Management Strategies						
Water Conservation	18	21	24	27	30	33
Additional Supplies from TRWD through Arlington	42	80	98	120	137	149
Additional Supplies from TRWD through Fort Worth	63	118	148	180	205	222
Total Water Management Strategies	***123***	***219***	***270***	***327***	***372***	***404***
Dalworthington Gardens Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Edgecliff

Edgecliff (or Edgecliff Village) is located in southern Tarrant County. The city's water supply is treated water from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD). Water management strategies for Edgecliff include conservation and additional water from Fort Worth. **Table 5E.364** shows the projected population and demand, the current supplies, and the water management strategies for Edgecliff.

TABLE 5E.364 SUMMARY OF WATER USER GROUP – CITY OF EDGECLIFF

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,761**	**3,761**	**3,761**	**3,761**	**3,761**	**3,761**
Projected Water Demand						
Municipal Demand	636	634	634	634	634	634
Total Projected Demand	***636***	***634***	***634***	***634***	***634***	***634***
Currently Available Water Supplies						
TRWD (through Fort Worth)	549	482	447	408	378	355
Total Current Supplies	***549***	***482***	***447***	***408***	***378***	***355***
Need (Demand - Current Supply)	***87***	***152***	***187***	***226***	***256***	***279***
Water Management Strategies						
Water Conservation	11	13	15	17	20	22
Additional Supplies from TRWD through Fort Worth	76	139	172	209	236	257
Total Water Management Strategies	***87***	***152***	***187***	***226***	***256***	***279***
Edgecliff Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Euless

Euless is located in northeastern Tarrant County. The city's water supply is groundwater (Trinity aquifer), Fort Worth direct reuse, and treated water from the Trinity River Authority (TRA) which gets raw water from Tarrant Regional Water District (TRWD). Euless' water management strategies include conservation and additional water from TRA. An alternative strategy for Euless is to further increase treated water purchased from TRA to reduce reliance on groundwater. **Table 5E.365** shows the projected population and demand, the current supplies, and the water management strategies for Euless.

TABLE 5E.365 SUMMARY OF WATER USER GROUP – CITY OF EULESS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**60,820**	**60,820**	**60,820**	**60,820**	**60,820**	**60,820**
Projected Water Demand						
Municipal Demand	9,840	9,801	9,801	9,801	9,801	9,801
Total Projected Demand	***9,840***	***9,801***	***9,801***	***9,801***	***9,801***	***9,801***
Currently Available Water Supplies						
Fort Worth	368	368	368	368	368	368
Trinity Aquifer	2,106	2,106	2,106	2,106	2,106	2,106
TRWD (through TRA)	6,354	5,567	5,171	4,713	4,367	4,100
Total Current Supplies	***8,828***	***8,041***	***7,645***	***7,187***	***6,841***	***6,574***
Need (Demand - Current Supply)	***1,012***	***1,760***	***2,156***	***2,614***	***2,960***	***3,227***
Water Management Strategies						
Water Conservation	437	513	546	579	611	644
Additional Water from TRWD through TRA	685	1,376	1,748	2,181	2,503	2,746
Total Water Management Strategies	***1,122***	***1,889***	***2,294***	***2,760***	***3,114***	***3,390***
Euless Reserve (Shortage)	***110***	***129***	***138***	***146***	***154***	***163***
Alternate Water Management Strategy						
Additional Water from TRWD through TRA to replace groundwater	2,106	2,106	2,106	2,106	2,106	2,106

Everman

Everman is located in southern Tarrant County. The city's water supply is groundwater from the Trinity aquifer. The only recommended water management strategy for Everman is conservation. **Table 5E.366** shows the projected population and demand, the current supplies, and the water management strategies for Everman.

TABLE 5E.366 SUMMARY OF WATER USER GROUP – CITY OF EVERMAN

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,600**	**6,600**	**6,600**	**6,600**	**6,600**	**6,600**
Projected Water Demand						
Municipal Demand	544	540	540	540	540	540
Total Projected Demand	***544***	***540***	***540***	***540***	***540***	***540***
Currently Available Water Supplies						
Trinity Aquifer	544	540	540	540	540	540
Total Current Supplies	***544***	***540***	***540***	***540***	***540***	***540***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	9	11	12	14	16	18
Total Water Management Strategies	***9***	***11***	***12***	***14***	***16***	***18***
Everman Reserve (Shortage)	***9***	***11***	***12***	***14***	***16***	***18***

Flower Mound

Flower Mound is located in southern Denton County with a small area in Tarrant County. The water supply for Flower Mound is discussed under Denton County in **Section 5E.4.1**.

Forest Hill

Forest Hill is located in southern Tarrant County. The city's water supply is treated water from Fort Worth, which gets its raw water from Tarrant Regional Water District (TRWD). Water management strategies for Forest Hill include conservation and additional water from Fort Worth. **Table 5E.367** shows the projected population and demand, the current supplies, and the water management strategies for Forest Hill.

TABLE 5E.367 SUMMARY OF WATER USER GROUP – CITY OF FOREST HILL

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**15,535**	**17,189**	**18,556**	**19,624**	**20,798**	**22,093**
Projected Water Demand						
Municipal Demand	1,595	1,755	1,895	2,004	2,124	2,256
Total Projected Demand	***1,595***	***1,755***	***1,895***	***2,004***	***2,124***	***2,256***
Currently Available Water Supplies						
TRWD (through Fort Worth)	1,377	1,333	1,338	1,289	1,266	1,262
Total Current Supplies	***1,377***	***1,333***	***1,338***	***1,289***	***1,266***	***1,262***
Need (Demand - Current Supply)	***218***	***422***	***557***	***715***	***858***	***994***
Water Management Strategies						
Water Conservation	24	35	44	54	126	154
Additional Water from TRWD through Fort Worth	194	387	513	661	732	840
Total Water Management Strategies	***218***	***422***	***557***	***715***	***858***	***994***
Forest Hill Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Fort Worth

Fort Worth is located primarily in Tarrant County, with some population in Denton, Parker, and Wise Counties in Region C and in Johnson County in Region G. Fort Worth is a major wholesale water provider and is discussed in **Chapter 5D**.

Grand Prairie

Grand Prairie is a wholesale water provider in Dallas, Ellis and Tarrant Counties in Region C. Grand Prairie is discussed under Dallas County in **Section 5.3.1**.

Grapevine

Grapevine is located in northeastern Tarrant County and is expected to reach buildout by 2030. The city gets its water supply from multiple sources – Dallas Water Utility (DWU), indirect reuse from Lake Grapevine purchased from Dallas County Park Cities MUD (DCPCMUD), treated water from Trinity River Authority (TRA), and raw water from Lake Grapevine (based on the city's portion of the firm yield). Water management strategies for Grapevine include conservation, additional water from TRA/TRWD, and additional water from DWU. An alternative water management strategy for Grapevine would be to purchase a portion of Dallas County Park Cities MUD's unused supply from Lake Grapevine yield. Grapevine does not require any additional infrastructure to take delivery or to treat their supplies in the future (beyond maintenance of existing facilities). **Table 5E.368** shows the projected population and demand, the current supplies, and the water management strategies for Grapevine.

TABLE 5E.368 SUMMARY OF WATER USER GROUP – CITY OF GRAPEVINE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**54,037**	**54,037**	**54,037**	**54,037**	**54,037**	**54,037**
Projected Water Demand						
Municipal Demand	18,743	18,691	18,691	18,691	18,691	18,691
Irrigation, Tarrant	*1,121*	*1,121*	*1,121*	*1,121*	*1,121*	*1,121*
Total Projected Demand	***19,864***	***19,812***	***19,812***	***19,812***	***19,812***	***19,812***
Currently Available Water Supplies						
Dallas	2,699	2,557	2,449	2,383	2,319	2,272
Dallas County Park Cities MUD	2,234	2,225	2,225	2,225	2,225	2,225
Irrigation, Tarrant	1,121	1,121	1,121	1,121	1,121	1,121
Trinity River Authority	9,951	8,764	8,140	7,419	6,874	6,453
Lake Grapevine[a]	2,050	2,025	2,000	1,960	1,920	1,880
Total Current Supplies	***18,055***	***16,692***	***15,935***	***15,108***	***14,459***	***13,951***
Need (Demand - Current Supply)	***1,809***	***3,120***	***3,877***	***4,704***	***5,353***	***5,861***
Water Management Strategies						
Water Conservation	835	919	981	1,043	1,106	1,168
Additional Water from TRA/TRWD	1,070	2,204	2,790	3,472	3,978	4,361
Additional Water from DWU	95	206	328	422	514	588
Total Water Management Strategies	***2,000***	***3,329***	***4,099***	***4,937***	***5,598***	***6,117***
Grapevine Reserve (Shortage)	***191***	***209***	***222***	***233***	***245***	***256***
Alternate Water Management Strategy						
Purchase unused Lake Grapevine yield from DCPCMUD	5,000	5,000	5,000	5,000	4,909	4,709

[a]Lake Grapevine supply is based on Grapevine's portion of the firm yield as calculated by TCEQ WAM. It is significantly less than Grapevine's water right amount.

Haltom City

Haltom City is located in central Tarrant County. The city purchases treated water from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD). Haltom City's water management strategies include conservation and additional water from Fort Worth. **Table 5E.369** shows the projected population and demand, the current supplies, and the water management strategies for Haltom City.

TABLE 5E.369 SUMMARY OF WATER USER GROUP – HALTOM CITY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population (In City Only)	**50,000**	**50,000**	**50,000**	**50,000**	**50,000**	**50,000**
Projected Water Demand						
Municipal Demand	5,335	5,303	5,303	5,303	5,303	5,303
Total Projected Demand	***5,335***	***5,303***	***5,303***	***5,303***	***5,303***	***5,303***
Currently Available Water Supplies						
TRWD (through Fort Worth)	4,602	4,029	3,742	3,411	3,160	2,967
Total Current Supplies	***4,602***	***4,029***	***3,742***	***3,411***	***3,160***	***2,967***
Need (Demand - Current Supply)	***733***	***1,274***	***1,561***	***1,892***	***2,143***	***2,336***
Water Management Strategies						
Water Conservation	72	89	107	125	142	160
Additional Supplies from TRWD through Fort Worth	661	1,185	1,454	1,767	2,001	2,176
Total Water Management Strategies	***733***	***1,274***	***1,561***	***1,892***	***2,143***	***2,336***
Haltom City Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Haslet

Haslet is located in northern Tarrant County. The city's water supply is treated water from Fort Worth, which gets its raw water from Tarrant Regional Water District (TRWD). Water management strategies for Haslet include conservation and additional water from Fort Worth. **Table 5E.370** shows the projected population and demand, the current supplies, and the water management strategies for Haslet.

TABLE 5E.370 SUMMARY OF WATER USER GROUP – CITY OF HASLET

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,540**	**8,959**	**11,803**	**12,845**	**14,000**	**14,000**
Projected Water Demand						
Municipal Demand	2,574	3,513	4,629	5,037	5,490	5,490
Total Projected Demand	***2,574***	***3,513***	***4,629***	***5,037***	***5,490***	***5,490***
Currently Available Water Supplies						
TRWD (through Fort Worth)	2,220	2,669	3,267	3,240	3,272	3,071
Total Current Supplies	***2,220***	***2,669***	***3,267***	***3,240***	***3,272***	***3,071***
Need (Demand - Current Supply)	***354***	***844***	***1,362***	***1,797***	***2,218***	***2,419***
Water Management Strategies						
Water Conservation	66	107	163	201	237	255
Additional Water from TRWD through Fort Worth	288	737	1,199	1,596	1,981	2,164
Total Water Management Strategies	***354***	***844***	***1,362***	***1,797***	***2,218***	***2,419***
Haslet Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Hurst

Hurst is located in northeast Tarrant County. The city gets its water supply from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD), and groundwater from the Trinity aquifer. Hurst's water management strategies include conservation and additional water from Fort Worth. **Table 5E.371** shows the projected population and demand, the current supplies, and the water management strategies for Hurst.

TABLE 5E.371 SUMMARY OF WATER USER GROUP – CITY OF HURST

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**40,912**	**40,821**	**40,900**	**40,962**	**41,053**	**41,053**
Projected Water Demand						
Municipal Demand	6,792	6,748	6,761	6,771	6,787	6,787
Total Projected Demand	***6,792***	***6,748***	***6,761***	***6,771***	***6,787***	***6,787***
Currently Available Water Supplies						
Trinity Aquifer	378	378	378	378	378	378
TRWD (through Fort Worth)	5,859	5,127	4,771	4,356	4,045	3,798
Total Current Supplies	***6,237***	***5,505***	***5,149***	***4,734***	***4,423***	***4,176***
Need (Demand - Current Supply)	***555***	***1,243***	***1,612***	***2,037***	***2,364***	***2,611***
Water Management Strategies						
Water Conservation	303	332	357	379	403	426
Additional Water from TRWD through Fort Worth	630	1,289	1,633	2,036	2,339	2,563
Total Water Management Strategies	***933***	***1,621***	***1,990***	***2,415***	***2,742***	***2,989***
Hurst Reserve (Shortage)	***378***	***378***	***378***	***378***	***378***	***378***

Johnson County Special Utility District

Johnson County SUD has a large service area in Johnson and Hill Counties in the Brazos G region and Tarrant County in Region C. The majority of the population served by the SUD is located in Johnson County. Region C's portion of Johnson County SUD gets its water from Tarrant Regional Water District (TRWD) through Mansfield. The Water management strategy for Region C's portion of the SUD is additional supply from Mansfield. **Table 5E.372** shows the projected demand, the current supplies, and the water management strategies for Johnson County SUD in Region C. See the Region G Plan for the projected demands, current supplies, and strategies for the portion of Johnson County SUD in Region G.

TABLE 5E.372 SUMMARY OF WATER USER GROUP – JOHNSON COUNTY SUD (REGION C ONLY)

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	2,706	3,147	3,266	3,386	3,511	3,642
Projected Water Demand in Region C						
Municipal Demand	360	417	433	449	465	482
Total Projected Region C Demand	360	417	433	449	465	482
Currently Available Water Supplies						
TRWD (through Mansfield)	6,224	6,720	6,241	5,689	5,272	4,948
Total Current Supplies (Region C Only)	***6,224***	***6,720***	***6,241***	***5,689***	***5,272***	***4,948***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Additional Supplies from TRWD through Mansfield	991	2,125	2,604	3,156	3,573	3,897
Total Water Management Strategies (Region C Only)	***991***	***2,125***	***2,604***	***3,156***	***3,573***	***3,897***
Available for Brazos G Region	***6,855***	***8,428***	***8,412***	***8,396***	***8,380***	***8,363***

Keller

Keller is located in northern Tarrant County and is projected to reach buildout by 2030. The city's water supply is treated water from Fort Worth, which gets its raw water from Tarrant Regional Water District (TRWD). Water management strategies for Keller include conservation and additional water from Fort Worth. **Table 5E.373** shows the projected population and demand, the current supplies, and the water management strategies for Keller.

TABLE 5E.373 SUMMARY OF WATER USER GROUP – CITY OF KELLER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**51,130**	**51,974**	**51,974**	**51,974**	**51,974**	**51,974**
Projected Water Demand						
Municipal Demand	12,863	13,043	13,043	13,043	13,043	13,043
Total Projected Demand	***12,863***	***13,043***	***13,043***	***13,043***	***13,043***	***13,043***
Currently Available Water Supplies						
TRWD (through Fort Worth)	11,098	9,910	9,204	8,390	7,773	7,298
Total Current Supplies	***11,098***	***9,910***	***9,204***	***8,390***	***7,773***	***7,298***
Need (Demand - Current Supply)	***1,765***	***3,133***	***3,839***	***4,653***	***5,270***	***5,745***
Water Management Strategies						
Water Conservation	606	892	1,022	1,060	1,101	1,143
Additional Supplies from TRWD through Fort Worth	1,159	2,241	2,817	3,593	4,169	4,602
Total Water Management Strategies	***1,765***	***3,133***	***3,839***	***4,653***	***5,270***	***5,745***
Keller Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Kennedale

Kennedale is located in southern Tarrant County. The city's water supply is from groundwater (Trinity aquifer) and treated water from Arlington and Fort Worth, which both gets its raw water from Tarrant Regional Water District (TRWD). Water management strategies for Kennedale include conservation and additional water from Arlington and Fort Worth (including an increase in delivery infrastructure). **Table 5E.374** shows the projected population and demand, the current supplies, and the water management strategies for Kennedale.

TABLE 5E.374 SUMMARY OF WATER USER GROUP – CITY OF KENNEDALE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**10,713**	**14,532**	**19,028**	**23,760**	**28,592**	**33,035**
Projected Water Demand						
Municipal Demand	1,852	2,503	3,277	4,093	4,925	5,690
Total Projected Demand	***1,852***	***2,503***	***3,277***	***4,093***	***4,925***	***5,690***
Currently Available Water Supplies						
Trinity Aquifer	838	838	838	838	838	838
TRWD (through Fort Worth)	0	413	930	1,372	1,767	2,088
TRWD (through Arlington)	968	852	791	721	669	627
Total Current Supplies	***1,806***	***2,103***	***2,559***	***2,931***	***3,274***	***3,553***
Need (Demand - Current Supply)	***46***	***400***	***718***	***1,162***	***1,651***	***2,137***
Water Management Strategies						
Water Conservation	39	71	104	319	480	554
Additional Supplies from TRWD through Arlington	129	237	294	313	343	385
Additional Supplies from TRWD through Fort Worth	0	116	346	596	910	1,280
Increase Delivery Infrastructure from Ft Worth	*0*	*0*	*0*	*0*	*396*	*1,087*
Total Water Management Strategies	***168***	***424***	***744***	***1,228***	***1,733***	***2,219***
Kennedale Reserve (Shortage)	***122***	***24***	***26***	***66***	***82***	***82***

Lake Worth

Lake Worth is located in western Tarrant County. The city gets its water supply from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD) and groundwater from the Trinity aquifer. Lake Worth's water management strategies include conservation and additional water from Fort Worth. **Table 5E.375** shows the projected population and demand, the current supplies, and the water management strategies for Lake Worth.

TABLE 5E.375 SUMMARY OF WATER USER GROUP – CITY OF LAKE WORTH

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,861**	**6,414**	**6,809**	**7,145**	**7,474**	**7,767**
Projected Water Demand						
Municipal Demand	1,259	1,372	1,457	1,529	1,599	1,662
Total Projected Demand	***1,259***	***1,372***	***1,457***	***1,529***	***1,599***	***1,662***
Currently Available Water Supplies						
Trinity Aquifer	170	170	170	170	170	170
TRWD (through Fort Worth)	940	913	908	875	852	835
Total Current Supplies	***1,110***	***1,083***	***1,078***	***1,045***	***1,022***	***1,005***
Need (Demand - Current Supply)	***149***	***289***	***379***	***484***	***577***	***657***
Water Management Strategies						
Water Conservation	20	28	35	42	50	56
Additional Supplies from TRWD through Fort Worth	132	264	348	447	532	607
Total Water Management Strategies	***152***	***292***	***383***	***489***	***582***	***663***
Lake Worth Reserve (Shortage)	***3***	***3***	***4***	***5***	***5***	***6***

Lakeside

Lakeside is located in western Tarrant County. The city's water supply is groundwater from the Trinity aquifer. The only water management strategy is conservation. **Table 5E.376** shows the projected population and demand, the current supplies, and the water management strategies for Lakeside.

TABLE 5E.376 SUMMARY OF WATER USER GROUP – CITY OF LAKESIDE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,144**	**2,144**	**2,144**	**2,144**	**2,144**	**2,144**
Projected Water Demand						
Municipal Demand	583	582	582	582	582	582
Total Projected Demand	***583***	***582***	***582***	***582***	***582***	***582***
Currently Available Water Supplies						
Trinity Aquifer	583	582	582	582	582	582
Total Current Supplies	***583***	***582***	***582***	***582***	***582***	***582***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	18	24	26	28	30	32
Total Water Management Strategies	***18***	***24***	***26***	***28***	***30***	***32***
Lakeside Reserve (Shortage)	***18***	***24***	***26***	***28***	***30***	***32***

Mansfield

The City of Mansfield is located in Ellis, Johnson and Tarrant Counties. Mansfield is a wholesale water provider (WWP) that currently sells water to Grand Prairie and Johnson County SUD and serves some manufacturing demands within the city. Mountain Peak SUD is included as a potential future customer. Mansfield currently purchases raw water from TRWD, and the supply is limited by Mansfield's treatment plant capacity. The city's water treatment plant has a current peak capacity of 45.5 MGD. Using a peaking factor of 2, Mansfield can treat up to 25,500 acre-feet per year.

The recommended water management strategies for Mansfield include implementing water conservation measures, purchasing additional raw water from the TRWD, and expanding water treatment capacity. Mansfield will need to expand their water treatment plant to reach a total treatment capacity of approximately 154 MGD by 2080. A summary of the recommended water plan for Mansfield is shown on **Table 5E.377**.

TABLE 5E.377 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – MANSFIELD

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Mansfield	29,566	31,757	38,727	53,994	54,779	55,659
Grand Prairie	8,615	9,601	10,788	11,095	11,516	11,516
Johnson County SUD	7,215	8,845	8,845	8,845	8,845	8,845
Manufacturing, Tarrant	222	230	239	248	257	266
Potential Future Customers						
Mountain Peak SUD	4,592	7,128	9,939	12,916	16,247	20,016
Total Projected Water Demand	***50,210***	***57,561***	***68,538***	***87,098***	***91,644***	***96,302***
Currently Available Supplies						
Tarrant Regional WD	39,357	38,318	41,349	47,714	44,934	42,680
Total Current Supplies Limited by WTP Capacity (45.5 MGD WTP)	***25,503***	***25,503***	***25,503***	***25,503***	***25,503***	***25,503***
Need (Demand less Supply)	***24,707***	***32,058***	***43,035***	***61,595***	***66,141***	***70,799***
Water Management Strategies						
Conservation (retail)	1,228	1,986	3,156	5,244	4,769	4,648
Conservation (wholesale customers)	844	2,162	3,406	4,133	4,999	5,882
TRWD (Existing Supply Previously Unused due to WTP Constraints)	13,854	12,815	15,846	22,211	19,431	17,177
TRWD (Additional Supplies to meet Demand)	8,781	15,095	20,627	30,007	36,942	43,092
20 MGD WTP Plant Expansion	*11,210*	*11,210*	*11,210*	*11,210*	*11,210*	*11,210*
30 MGD New WTP Plant	*11,425*	*16,700*	*16,815*	*16,815*	*16,815*	*16,815*
30 MGD New WTP Plant Expansion	*0*	*0*	*8,448*	*16,815*	*16,815*	*16,815*
28 MGD New WTP Plant Expansion	*0*	*0*	*0*	*7,378*	*11,533*	*15,429*
Total Supplies from Strategies	***24,707***	***32,058***	***43,035***	***61,595***	***66,141***	***70,799***
Total Supplies	***50,210***	***57,561***	***68,538***	***87,098***	***91,644***	***96,302***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

City of North Richland Hills

North Richland Hills is located in northeast Tarrant County. North Richland Hills is a wholesale water provider (WWP) and sells water to Watauga. The current water supplies for the City of North Richland Hills include water purchased from Tarrant Regional Water District (TRWD) through Trinity River Authority (TRA) and Fort Worth. The proposed water management strategies for North Richland Hills include implementing water conservation measures, additional water from TRWD (through TRA and Fort Worth) and adding another pipeline to Fort Worth. A summary of the recommended water plan for North Richland Hills is shown in **Table 5E.378**.

TABLE 5E.378 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – NORTH RICHLAND HILLS

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
North Richland Hills	13,934	14,841	15,086	15,280	15,562	15,562
Watauga	2,730	2,716	2,716	2,716	2,716	2,716
Total Projected Water Demand	***16,664***	***17,557***	***17,802***	***17,996***	***18,278***	***18,278***
Currently Available Supplies						
TRA (from TRWD)	3,868	3,407	3,164	2,884	2,672	2,509
Fort Worth (from TRWD)	10,508	9,933	9,397	8,691	8,221	7,717
Total Current Supplies	***14,376***	***13,340***	***12,561***	***11,575***	***10,893***	***10,226***
Need (Demand less Supply)	***2,288***	***4,217***	***5,241***	***6,421***	***7,385***	***8,052***
Water Management Strategies						
Conservation (retail)	645	1,020	1,174	1,227	1,302	1,335
Conservation (customers)	150	234	279	288	297	306
Additional TRA (from TRWD)	408	769	971	1,240	1,437	1,590
Additional Fort Worth (from TRWD)	1,085	2,194	2,817	3,666	4,349	4,821
New Pipeline from Fort Worth	*1,085*	*2,194*	*2,817*	*3,666*	*4,349*	*4,821*
Total Supplies from Strategies	***2,288***	***4,217***	***5,241***	***6,421***	***7,385***	***8,052***
Total Supplies	***16,664***	***17,557***	***17,802***	***17,996***	***18,278***	***18,278***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

Pantego

Pantego is located in eastern Tarrant County. The city's water supply is groundwater from the Trinity aquifer. While the city has no needs, it is planning to increase the reliability of its existing supplies by purchasing treated water from Fort Worth and Arlington. Water management strategies for Pantego include conservation and connecting to and purchasing treated water from Fort Worth and Arlington, both of which get raw water from Tarrant Regional Water District (TRWD). **Table 5E.379** shows the projected population and demand, the current supplies, and the water management strategies for Pantego.

TABLE 5E.379 SUMMARY OF WATER USER GROUP – CITY OF PANTEGO

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,653**	**2,653**	**2,653**	**2,653**	**2,653**	**2,653**
Projected Water Demand						
Municipal Demand	673	671	671	671	671	671
Total Projected Demand	***673***	***671***	***671***	***671***	***671***	***671***
Currently Available Water Supplies						
Trinity Aquifer	673	671	671	671	671	671
Total Current Supplies	***673***	***671***	***671***	***671***	***671***	***671***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	15	20	23	25	27	29
Connect to and Purchase Water from Fort Worth (TRWD)	34	34	34	34	34	33
Connect to and Purchase Water from Arlington (TRWD)	33	33	33	33	33	33
Total Water Management Strategies	***82***	***87***	***90***	***92***	***94***	***95***
Pantego Reserve (Shortage)	***82***	***87***	***90***	***92***	***94***	***95***

Pelican Bay

Pelican Bay is located in northwestern Tarrant County. The city's water supply is groundwater from the Trinity aquifer. Water management strategies for Pelican Bay include conservation, connecting to and purchasing water from Azle (which gets its raw water from Tarrant Regional Water District), and additional groundwater wells. **Table 5E.380** shows the projected population and demand, the current supplies, and the water management strategies for Pelican Bay.

TABLE 5E.380 SUMMARY OF WATER USER GROUP – CITY OF PELICAN BAY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,958**	**3,967**	**5,320**	**7,134**	**9,567**	**12,830**
Projected Water Demand						
Municipal Demand	199	267	358	479	643	862
Total Projected Demand	***199***	***267***	***358***	***479***	***643***	***862***
Currently Available Water Supplies						
Trinity Aquifer	199	267	358	479	500	500
Total Current Supplies	***199***	***267***	***358***	***479***	***500***	***500***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***143***	***362***
Water Management Strategies						
Water Conservation	5	8	14	19	28	40
Connect to and Purchase Water from Azle (TRWD)	0	0	0	0	137	345
New Well(s) in Trinity Aquifer	50	50	50	50	50	50
Total Water Management Strategies	***55***	***58***	***64***	***69***	***215***	***435***
Pelican Bay Reserve (Shortage)	***55***	***58***	***64***	***69***	***72***	***73***

Reno

Reno is located in northeastern Parker and northwest Tarrant County. The water supply plans for Reno are discussed under Parker County in **Section 5E.13**.

Richland Hills

Richland Hills is located in central Tarrant County. The city gets its water supply from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD) and groundwater from the Trinity aquifer. Richland Hills' water management strategies include conservation and additional water from Fort Worth. **Table 5E.381** shows the projected population and demand, the current supplies, and the water management strategies for Richland Hills.

TABLE 5E.381 SUMMARY OF WATER USER GROUP – CITY OF RICHLAND HILLS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**9,616**	**10,622**	**11,452**	**12,911**	**14,217**	**15,655**
Projected Water Demand						
Municipal Demand	1,273	1,400	1,509	1,701	1,873	2,063
Total Projected Demand	***1,273***	***1,400***	***1,509***	***1,701***	***1,873***	***2,063***
Currently Available Water Supplies						
Trinity Aquifer	242	242	242	242	242	242
TRWD (through Fort Worth)	889	880	894	939	972	1,019
Total Current Supplies	***1,131***	***1,122***	***1,136***	***1,181***	***1,214***	***1,261***
Need (Demand - Current Supply)	***142***	***278***	***373***	***520***	***659***	***802***
Water Management Strategies						
Water Conservation	17	27	37	47	57	69
Additional Supplies from TRWD through Fort Worth	128	256	342	480	609	741
Total Water Management Strategies	***145***	***283***	***379***	***527***	***666***	***810***
Richland Hills Reserve (Shortage)	***3***	***5***	***6***	***7***	***7***	***8***

River Oaks

River Oaks is located in western Tarrant County. The city operates its own water treatment plant and gets raw water from Tarrant Regional Water District (TRWD). Water management strategies for River Oaks include conservation and purchasing additional water from TRWD. **Table 5E.382** shows the projected population and demand, the current supplies, and the water management strategies for River Oaks.

TABLE 5E.382 SUMMARY OF WATER USER GROUP – CITY OF RIVER OAKS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**8,077**	**8,053**	**8,106**	**8,149**	**8,210**	**8,210**
Projected Water Demand						
Municipal Demand	882	874	880	885	891	891
Total Projected Demand	***882***	***874***	***880***	***885***	***891***	***891***
Currently Available Water Supplies						
Tarrant Regional WD	761	665	621	569	531	498
Total Current Supplies	***761***	***665***	***621***	***569***	***531***	***498***
Need (Demand - Current Supply)	***121***	***209***	***259***	***316***	***360***	***393***
Water Management Strategies						
Water Conservation	21	28	32	35	38	41
Additional Supplies from TRWD	100	181	227	281	322	352
Total Water Management Strategies	***121***	***209***	***259***	***316***	***360***	***393***
River Oaks Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Saginaw

Saginaw is located in northern Tarrant County. The city's water supply is treated water from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD). Water management strategies for Saginaw include conservation and additional treated water from Fort Worth. **Table 5E.383** shows the projected population and demand, the current supplies, and the water management strategies for Saginaw.

TABLE 5E.383 SUMMARY OF WATER USER GROUP – CITY OF SAGINAW

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**29,916**	**32,879**	**33,167**	**33,395**	**33,727**	**33,727**
Projected Water Demand						
Municipal Demand	3,974	4,344	4,382	4,412	4,456	4,456
Total Projected Demand	***3,974***	***4,344***	***4,382***	***4,412***	***4,456***	***4,456***
Currently Available Water Supplies						
TRWD (through Fort Worth)	3,429	3,300	3,092	2,838	2,656	2,493
Total Current Supplies	***3,429***	***3,300***	***3,092***	***2,838***	***2,656***	***2,493***
Need (Demand - Current Supply)	***545***	***1,044***	***1,290***	***1,574***	***1,800***	***1,963***
Water Management Strategies						
Water Conservation	177	235	243	254	270	281
Additional Supplies from TRWD through Fort Worth	368	809	1,047	1,320	1,530	1,682
Total Water Management Strategies	***545***	***1,044***	***1,290***	***1,574***	***1,800***	***1,963***
Saginaw Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Sansom Park Village

Sansom Park Village is located in western Tarrant County. The city gets its water supply from groundwater from the Trinity aquifer and treated water from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD). Sansom Park Village's water management strategies include conservation and additional water from Fort Worth. **Table 5E.384** shows the projected population and demand, the current supplies, and the water management strategies for Sansom Park Village.

TABLE 5E.384 SUMMARY OF WATER USER GROUP – SANSOM PARK VILLAGE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**6,087**	**6,736**	**7,272**	**7,690**	**8,152**	**8,659**
Projected Water Demand						
Municipal Demand	646	711	767	811	860	914
Total Projected Demand	***646***	***711***	***767***	***811***	***860***	***914***
Currently Available Water Supplies						
Trinity Aquifer	646	711	767	811	860	914
TRWD (through Fort Worth)	0	0	0	0	0	0
Total Current Supplies	***646***	***711***	***767***	***811***	***860***	***914***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	16	24	28	32	36	43
Additional Supplies from TRWD through Fort Worth	0	0	0	0	0	0
Total Water Management Strategies	***16***	***24***	***28***	***32***	***36***	***43***
Sansom Park Reserve (Shortage)	***16***	***24***	***28***	***32***	***36***	***43***

Southlake

Southlake is located in northwestern Tarrant County, with some area in southern Denton County. The city's water supply is treated water from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD). Water management strategies for Southlake include conservation and additional treated water from Fort Worth, which requires additional delivery infrastructure from Fort Worth. **Table 5E.385** shows the projected population and demand, the current supplies, and the water management strategies for Southlake.

TABLE 5E.385 SUMMARY OF WATER USER GROUP – CITY OF SOUTHLAKE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**35,816**	**40,119**	**42,781**	**45,144**	**47,511**	**49,732**
Projected Water Demand						
Municipal Demand	14,668	16,402	17,491	18,457	19,425	20,332
Total Projected Demand	***14,668***	***16,402***	***17,491***	***18,457***	***19,425***	***20,332***
Currently Available Water Supplies						
TRWD (through Fort Worth)	12,655	12,462	12,342	11,872	11,577	11,376
Total Current Supplies	***12,655***	***12,462***	***12,342***	***11,872***	***11,577***	***11,376***
Need (Demand - Current Supply)	***2,013***	***3,940***	***5,149***	***6,585***	***7,848***	***8,956***
Water Management Strategies						
Water Conservation	645	1,148	1,391	1,516	1,649	1,778
Additional Supplies from TRWD through Fort Worth	1,368	2,792	3,758	5,069	6,199	7,178
Increase Delivery Infrastructure from Ft Worth	*1,692*	*2,923*	*3,769*	*4,610*	*5,445*	*6,223*
Total Water Management Strategies	***2,013***	***3,940***	***5,149***	***6,585***	***7,848***	***8,956***
Southlake Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Tarrant County Irrigation

The Texas Water Development Board classifies the use of potable water for golf course irrigation as a part of municipal use. The use of raw water or reuse of treated wastewater effluent for golf course irrigation is classified as irrigation use.

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. The vast majority of irrigation use in Tarrant County is for golf course irrigation. The current supplies are groundwater (Trinity and Woodbine aquifers) and local surface water supplies (Trinity run-of-river). Tarrant County Irrigation also gets supplies from indirect reuse through Grapevine, direct reuse from Azle and Fort Worth, supplies from TRWD (direct and through Arlington), and Fort Worth reuse through Arlington. Water management strategies for Tarrant County Irrigation includes conservation and water from TRWD (both direct and through Arlington). **Table 5E.386** shows the projected demand, the current supplies, and the water management strategies for Tarrant County Irrigation.

TABLE 5E.386 SUMMARY OF WATER USER GROUP – TARRANT COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***4,964***	***4,964***	***4,964***	***4,964***	***4,964***	***4,964***
Currently Available Water Supplies						
Trinity Aquifer	250	250	250	250	250	250
Woodbine Aquifer	250	250	250	250	250	250
Grapevine	1,121	1,121	1,121	1,121	1,121	1,121
Azle	300	300	300	300	300	300
Tarrant Regional WD	865	762	707	645	598	561
Arlington	267	256	251	244	239	236
Fort Worth	2,000	2,000	2,000	2,000	2,000	2,000
Trinity Run-of-River	513	513	513	513	513	513
Total Current Supplies	***5,566***	***5,452***	***5,392***	***5,323***	***5,271***	***5,231***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	9	153	295	369	438	508
Additional Supplies from TRWD	136	210	236	283	316	339
Additional Supplies from TRWD through Arlington	14	22	24	29	33	34
Total Water Management Strategies	***159***	***385***	***555***	***681***	***787***	***881***
Irrigation, Tarrant Reserve (Shortage)	***761***	***873***	***983***	***1,040***	***1,094***	***1,148***

Tarrant County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. The current supplies are local surface water supplies and groundwater from the Trinity aquifer. The supply is sufficient to meet future demands, and there are no water management strategies for this water user group. **Table 5E.387** shows the projected demand, current supplies, and water management strategies for Tarrant County Livestock.

TABLE 5E.387 SUMMARY OF WATER USER GROUP – TARRANT COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***341***	***341***	***341***	***341***	***341***	***341***
Currently Available Water Supplies						
Trinity Aquifer	50	50	50	50	50	50
Trinity Livestock Local Supply	351	351	351	351	351	351
Total Current Supplies	***401***	***401***	***401***	***401***	***401***	***401***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Tarrant Reserve (Shortage)	***60***	***60***	***60***	***60***	***60***	***60***

Tarrant County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. Current supplies include water from the Tarrant Regional Water District (TRWD) through numerous water suppliers in the county, and groundwater from the Trinity aquifer. The water management strategies for this water user group are additional water from TRWD (through various water suppliers). Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG. **Table 5E.388** shows the projected demand, current supplies, and water management strategies for Tarrant County Manufacturing.

TABLE 5E.388 SUMMARY OF WATER USER GROUP – TARRANT COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***12,339***	***12,796***	***13,269***	***13,760***	***14,269***	***14,797***
Currently Available Water Supplies						
Trinity Aquifer	256	256	256	256	256	256
TRWD (through Arlington)	1,746	1,595	1,536	1,451	1,395	1,358
TRWD (through Fort Worth)	8,475	7,748	7,469	7,066	6,795	6,621
TRWD (through Grand Prairie)	13	12	12	11	11	11
TRWD (through Mansfield)	192	175	168	159	153	149
Total Current Supplies	***10,682***	***9,786***	***9,441***	***8,943***	***8,610***	***8,395***
Need (Demand - Current Supply)	***1,657***	***3,010***	***3,828***	***4,817***	***5,659***	***6,402***
Water Management Strategies						
Additional Supplies from TRWD through Arlington	278	504	640	806	945	1,069
Additional Supplies from TRWD through Fort Worth	1,348	2,449	3,115	3,919	4,607	5,212
Additional Supplies from TRWD through Grand Prairie	1	2	2	3	3	4
Additional Supplies from TRWD through Mansfield	30	55	71	89	104	117
Total Water Management Strategies	***1,657***	***3,010***	***3,828***	***4,817***	***5,659***	***6,402***
Manufacturing, Tarrant Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Tarrant County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Tarrant County Mining is supplied from local supplies, water from Tarrant Regional Water District (TRWD) through Arlington, and the Trinity aquifer. With demands projected to decrease, the supply is sufficient to meet future demands, and there are no water management strategies for this water user group. **Table 5E.389** shows the projected demand, the current supplies, and the water management strategies for Tarrant County Mining. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple companies, industries, facilities, and types of processes that make up this WUG.

TABLE 5E.389 SUMMARY OF WATER USER GROUP – TARRANT COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***525***	***106***	***115***	***121***	***129***	***136***
Currently Available Water Supplies						
Trinity Other Local Supply	400	100	100	100	100	100
TRWD (through Arlington)	90	80	74	67	62	59
Trinity Aquifer	100	50	50	50	50	50
Total Current Supplies	***590***	***230***	***224***	***217***	***212***	***209***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Mining, Tarrant Reserve (Shortage)	***65***	***124***	***109***	***96***	***83***	***73***

Tarrant County Other

Tarrant County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups (including the Dallas-Fort Worth International Airport). The Tarrant County Other supply comes from groundwater (Trinity aquifer), Dallas Water Utilities (DWU), and Fort Worth (supplies from Tarrant Regional Water District (TRWD) and reuse). The cities of Dallas and Fort Worth both serve the Dallas-Fort Worth International Airport. Water management strategies for these entities include conservation, additional water from TRWD (direct and through Fort Worth), and additional water from DWU. An alternative future strategy would be to get water from the City of Euless in place of a portion of the supply from Fort Worth. **Table 5E.390** shows the projected population and demand, the current supplies, and the water management strategies for Tarrant County Other.

TABLE 5E.390 SUMMARY OF WATER USER GROUP – TARRANT COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**30,000**	**44,000**	**58,000**	**72,000**	**86,000**	**100,000**
Projected Water Demand						
Municipal Demand	6,760	9,888	13,034	16,180	19,326	22,472
Total Projected Water Demand	***6,760***	***9,888***	***13,034***	***16,180***	***19,326***	***22,472***
Currently Available Water Supplies						
Trinity Aquifer	768	768	768	768	768	768
Dallas	1,229	1,172	1,113	1,069	1,027	994
Fort Worth (TRWD and reuse)	3,987	3,133	5,301	6,621	8,729	8,776
Total Current Supplies	***5,984***	***5,073***	***7,182***	***8,458***	***10,524***	***10,538***
Need (Demand - Current Supply)	***776***	***4,815***	***5,852***	***7,722***	***8,802***	***11,934***
Water Management Strategies						
Water Conservation	70	136	223	332	460	608
Additional Supplies from TRWD	1,381	4,975	4,734	5,095	3,917	5,971
Additional Supplies from Fort Worth	564	889	2,024	3,383	5,473	6,374
Additional Supplies from DWU	92	145	199	239	276	305
Total Water Management Strategies	***2,107***	***6,145***	***7,180***	***9,049***	***10,126***	***13,258***
County-Other, Tarrant Reserve (Shortage)	***1,331***	***1,330***	***1,328***	***1,327***	***1,324***	***1,324***
Alternate Water Management Strategy						
Water from Euless (TRA/TRWD) to DFW Airport (in lieu of portion of Ft Worth supply)	0	1,000	1,000	2,000	2,000	2,000

Tarrant County Steam Electric Power

Steam electric power demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. Tarrant County's Steam Electric Power demand is attributed to Luminant Generation Company LLC. Tarrant County SEP is supplied from run-of-the-river supplies and raw water from Tarrant Regional Water District (TRWD). The water management strategy for Tarrant County SEP is additional water from TRWD. Conservation was considered for this water user group, but it is not recommended because the steam electric demand projections themselves included assumed future efficiency programs. **Table 5E.391** shows the projected demand, the current supplies, and the water management strategies for Tarrant County SEP.

TABLE 5E.391 SUMMARY OF WATER USER GROUP – TARRANT COUNTY SEP

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,157***	***4,249***	***4,249***	***4,249***	***4,249***	***4,249***
Currently Available Water Supplies						
Trinity Run-of-River	1,079	1,079	1,079	1,079	1,079	1,079
Tarrant Regional WD	68	2,409	2,237	2,039	1,889	1,774
Total Current Supplies	***1,147***	***3,488***	***3,316***	***3,118***	***2,968***	***2,853***
Need (Demand - Current Supply)	***10***	***761***	***933***	***1,131***	***1,281***	***1,396***
Water Management Strategies						
Additional Supplies from TRWD	10	761	933	1,131	1,281	1,396
Total Water Management Strategies	***10***	***761***	***933***	***1,131***	***1,281***	***1,396***
Steam-Electric Power, Tarrant Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Watauga

Watauga is located in northern Tarrant County. The city's water supply is treated water from North Richland Hills (which in turn buys treated water from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD)). Water management strategies for Watauga include conservation and additional treated water from North Richland Hills. **Table 5E.392** shows the projected population and demand, the current supplies, and the water management strategies for Watauga.

TABLE 5E.392 SUMMARY OF WATER USER GROUP – CITY OF WATAUGA

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**24,525**	**24,525**	**24,525**	**24,525**	**24,525**	**24,525**
Projected Water Demand						
Municipal Demand	2,730	2,716	2,716	2,716	2,716	2,716
Total Projected Demand	***2,730***	***2,716***	***2,716***	***2,716***	***2,716***	***2,716***
Currently Available Water Supplies						
TRWD (through North Richland Hills)	2,355	2,064	1,916	1,747	1,619	1,519
Total Current Supplies	***2,355***	***2,064***	***1,916***	***1,747***	***1,619***	***1,519***
Need (Demand - Current Supply)	***375***	***652***	***800***	***969***	***1,097***	***1,197***
Water Management Strategies						
Water Conservation	150	234	279	288	297	306
Additional Supplies from TRWD through Fort Worth through North Richland Hills	225	418	521	681	800	891
Total Water Management Strategies	***375***	***652***	***800***	***969***	***1,097***	***1,197***
Watauga Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Westlake

Westlake is located in northern Tarrant County and southern Denton County. The city's water supply is treated water from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD). Water management strategies for Westlake include conservation and additional treated water from Fort Worth. **Table 5E.393** shows the projected population and demand, the current supplies, and the water management strategies for Westlake.

TABLE 5E.393 SUMMARY OF WATER USER GROUP – CITY OF WESTLAKE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,052**	**4,001**	**4,791**	**5,441**	**6,152**	**6,933**
Projected Water Demand						
Municipal Demand	3,519	4,611	5,521	6,271	7,090	7,990
Total Projected Demand	***3,519***	***4,611***	***5,521***	***6,271***	***7,090***	***7,990***
Currently Available Water Supplies						
TRWD (through Fort Worth)	3,036	3,503	3,896	4,033	4,225	4,470
Total Current Supplies	***3,036***	***3,503***	***3,896***	***4,033***	***4,225***	***4,470***
Need (Demand - Current Supply)	***483***	***1,108***	***1,625***	***2,238***	***2,865***	***3,520***
Water Management Strategies						
Water Conservation	95	146	193	240	294	360
Additional Supplies from TRWD through Fort Worth	388	962	1,432	1,998	2,571	3,160
Total Water Management Strategies	***483***	***1,108***	***1,625***	***2,238***	***2,865***	***3,520***
Westlake Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Westover Hills

Westover Hills is located in western Tarrant County. The city purchases treated water from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD). Westover Hills' water management strategies include conservation and additional water from Fort Worth. **Table 5E.394** shows the projected population and demand, the current supplies, and the water management strategies for Westover Hills.

TABLE 5E.394 SUMMARY OF WATER USER GROUP – CITY OF WESTOVER HILLS

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**676**	**674**	**677**	**679**	**682**	**682**
Projected Water Demand						
Municipal Demand	919	916	920	922	927	927
Total Projected Demand	***919***	***916***	***920***	***922***	***927***	***927***
Currently Available Water Supplies						
TRWD (through Fort Worth)	793	696	650	593	552	519
Total Current Supplies	***793***	***696***	***650***	***593***	***552***	***519***
Need (Demand - Current Supply)	***126***	***220***	***270***	***329***	***375***	***408***
Water Management Strategies						
Water Conservation	30	34	37	40	43	47
Additional Supplies from TRWD through Fort Worth	96	186	233	289	332	361
Total Water Management Strategies	***126***	***220***	***270***	***329***	***375***	***408***
Westover Hills Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Westworth Village

Westworth Village is located in western Tarrant County. The city's water supply is treated water from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD). Water management strategies for Westworth Village include conservation and treated water from Fort Worth. **Table 5E.395** shows the projected population and demand, the current supplies, and the water management strategies for Westworth Village.

TABLE 5E.395 SUMMARY OF WATER USER GROUP – WESTWORTH VILLAGE

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,129**	**3,203**	**3,406**	**3,582**	**3,755**	**3,912**
Projected Water Demand						
Municipal Demand	442	451	479	504	528	550
Total Projected Demand	***442***	***451***	***479***	***504***	***528***	***550***
Currently Available Water Supplies						
TRWD (through Fort Worth)	381	343	338	324	315	307
Total Current Supplies	***381***	***343***	***338***	***324***	***315***	***307***
Need (Demand - Current Supply)	***61***	***108***	***141***	***180***	***213***	***243***
Water Management Strategies						
Water Conservation	7	9	12	16	18	20
Additional Supplies from TRWD through Fort Worth	54	99	129	164	195	223
Total Water Management Strategies	***61***	***108***	***141***	***180***	***213***	***243***
Westworth Village Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

White Settlement

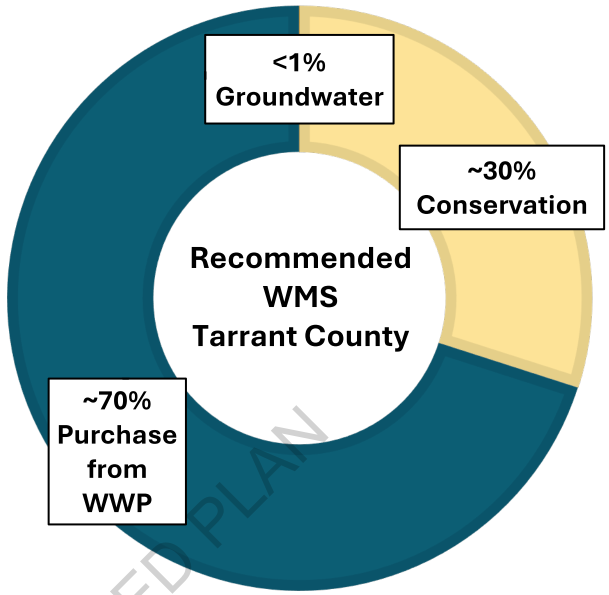
White Settlement is located in western Tarrant County. The city's water supply is treated water from Fort Worth, which gets raw water from Tarrant Regional Water District (TRWD) and groundwater from the Trinity aquifer. Water management strategies for White Settlement include conservation and additional treated water from Fort Worth. **Table 5E.396** shows the projected population and demand, the current supplies, and the water management strategies for White Settlement.

TABLE 5E.396 SUMMARY OF WATER USER GROUP – CITY OF WHITE SETTLEMENT

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**20,351**	**22,469**	**24,218**	**25,582**	**27,083**	**28,738**
Projected Water Demand						
Municipal Demand	2,400	2,636	2,841	3,001	3,177	3,371
Total Projected Demand	***2,400***	***2,636***	***2,841***	***3,001***	***3,177***	***3,371***
Currently Available Water Supplies						
Trinity Aquifer	610	610	610	610	610	610
TRWD (through Fort Worth)	1,544	1,539	1,575	1,538	1,530	1,545
Total Current Supplies	***2,154***	***2,149***	***2,185***	***2,148***	***2,140***	***2,155***
Need (Demand - Current Supply)	***246***	***487***	***656***	***853***	***1,037***	***1,216***
Water Management Strategies						
Water Conservation	143	296	389	422	456	495
Additional Supplies from TRWD through Fort Worth	139	259	351	517	669	811
Total Water Management Strategies	***282***	***555***	***740***	***939***	***1,125***	***1,306***
White Settlement Reserve (Shortage)	***36***	***68***	***84***	***86***	***88***	***90***

5E.15.2 Summary of Costs for Tarrant County

Table 5E.397 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Tarrant County. Total quantities from **Table 5E.397** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Tarrant County are projected to come through purchases from wholesale water providers. Other strategies include conservation and groundwater.

Table 5E.398 summarizes the recommended water management strategies within Tarrant County for individual WUGs and WWPs. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.397 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR TARRANT COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	60,831	$3,082,371
Purchase from WWP	142,234	$0
Additional Infrastructure	*167,934*	*$697,070,600*
Groundwater	50	$2,731,000
Total	***203,115***	***$702,883,971***

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.398 COSTS FOR RECOMMENDED AND ALTERNATIVE WATER MANAGEMENT STRATEGIES FOR TARRANT COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Arlington	Conservation (retail)	2030	7,776	$150,000	$1.29	$0.40
	Conservation (wholesale)	2030	Included with WUGs.			
	TRWD	2030	40,346	$0	$1.50	$1.50
	8 MGD WTP Expansion	*2070*	*3,477*	*$34,750,000*	*$2.46*	*$1.16*
	Parallel Raw Water Pipeline	*2030*	*40,346*	*$17,614,000*	*N/A*	*N/A*
Mansfield	Conservation (retail)	2030	5,244	$138,000	$1.57	$0.33
	Conservation (wholesale customers)	2030	Included with WUGs.			
	TRWD	2030	22,211	$0	$1.50	$1.50
	TRWD (Additional Supplies to meet Demand)	*2030*	*43,097*	*$0*	*$1.50*	*$1.50*
	20 MGD WTP Plant Expansion	*2030*	*11,210*	*$68,774,000*	*$1.94*	*$0.87*
	30 MGD New WTP Plant	*2030*	*16,815*	*$218,335,000*	*$4.10*	*$1.94*
	30 MGD New WTP Plant Expansion	*2050*	*16,815*	*$95,968,000*	*$1.80*	*$0.85*
	28 MGD New WTP Plant Expansion	*2060*	*15,434*	*$90,527,000*	*$1.85*	*$0.85*
North Richland Hills	Conservation (retail)	2030	1,335	$150,000	$3.64	$0.71
	Conservation (customers)	2030	Included with WUGs.			
	Additional Fort Worth (from TRWD)	2030	1,590	$0	$4.00	$4.00
	TRWD through Fort Worth	2030	4,821	$0	$4.00	$4.00
	New Pipeline from Fort Worth	*2030*	*4,821*	*$12,150,000*	*$0.50*	*$0.08*
WUGs						
Azle[a]	Conservation	2030	372	$150,000	$2.97	$1.18
	TRWD	2030	2,214	$0	$1.50	$1.50
	4 MGD WTP Expansion	*2030*	*2,214*	*$54,940,000*	*$8.33*	*$4.24*

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
Bedford	Conservation	2030	684	$150,000	$0.54	$0.34
	TRWD through TRA	2030	4,060	$0	$4.00	$4.00
Benbrook	Conservation	2030	1,062	$150,000	$1.38	$0.70
	TRWD	2030	2,452	$0	$1.50	$1.50
	3 MGD WTP Expansion	*2050*	*1,682*	*$17,668,000*	*$3.42*	*$1.67*
Bethesda WSC[a]	Conservation	See 2026 Region G Plan.				
	Arlington					
	Fort Worth					
Blue Mound	Conservation	2030	13	$0	$5.03	$3.53
Burleson[a]	Conservation	See 2026 Region G Plan.				
	TRWD through Fort Worth					
	Additional delivery infrastructure from Fort Worth					
Colleyville	Conservation	2030	946	$150,000	$1.60	$0.39
	TRWD through TRA	2030	3,794	$0	$4.00	$4.00
Community WSC	Conservation	2030	234	$0	$2.07	$1.46
	TRWD	2030	166	$0	$1.50	$1.50
Crowley	Conservation	2030	436	$148,500	$0.75	$0.39
	Fort Worth	2030	2,077	$0	$4.00	$4.00
	Additional delivery infrastructure from Fort Worth	*2030*	*3,026*	$7,990,000	$0.58	$0.14
Dalworthington Gardens	Conservation	2030	33	$8,560	$1.05	$0.52
	Arlington	2030	149	$0	$4.00	$4.00
	Fort Worth	2030	222	$0	$4.00	$4.00
Edgecliff Village	Conservation	2030	22	$8,560	$2.62	$0.99
	Fort Worth	2030	257	$0	$4.00	$4.00
Euless	Conservation	2030	644	$150,000	$1.28	$0.40
	TRWD through TRA	2030	2,746	$0	$4.00	$4.00
	ALTERNATIVE TRWD through TRA (to replace groundwater)	*2030*	*2,106*	*$0*	*$4.00*	*$4.00*
Everman	Conservation	2030	18	$0	$2.73	$1.54
Flower Mound	Conservation	See Denton County.				
	DWU					
	UTRWD					
Forest Hill	Conservation	2030	154	$150,000	$2.97	$1.65

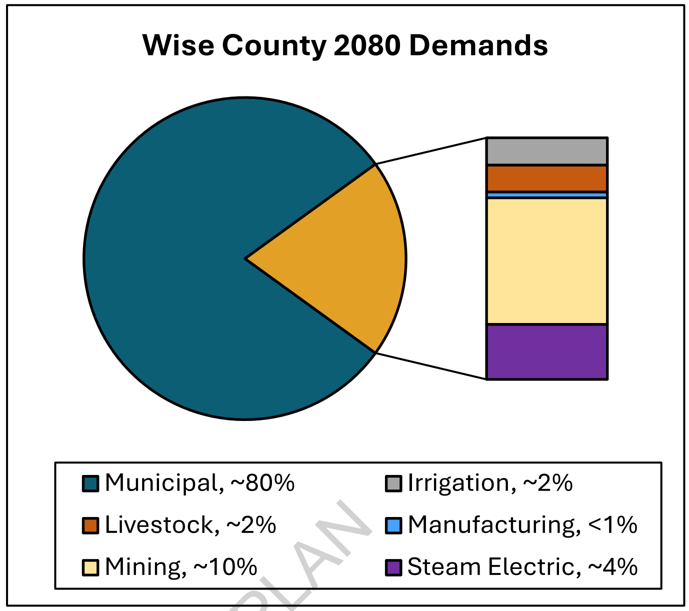
WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL) WITH DEBT SERVICE	UNIT COST ($/1000 GAL) AFTER DEBT SERVICE
	TRWD through Fort Worth	2030	840	$0	$4.00	$4.00
Fort Worth[a]	Conservation	2030	33,439	$150,000	$2.27	$0.71
Fort Worth[a]	Other WMSs	See Fort Worth in **Chapter 5D**.				
Grand Prairie[a]	Conservation	See Dallas County.				
Grand Prairie[a]	Other WMSs					
Grapevine	Conservation	2030	1,168	$150,000	$0.88	$0.44
Grapevine	TRWD through TRA	2030	4,361	$0	$4.00	$4.00
Grapevine	DWU	2030	588	$0	$4.00	$4.00
Grapevine	*ALTERNATIVE Purchase unused Lake Grapevine yield from DCPCMUD*	*2030*	*5,000*	*$0*	*$1.50*	*$1.50*
Haltom City	Conservation	2030	160	$150,000	$2.81	$0.95
Haltom City	TRWD through Fort Worth	2030	2,176	$0	$4.00	$4.00
Haslet	Conservation	2030	255	$8,560	$5.88	$0.39
Haslet	TRWD through Fort Worth	2030	2,164	$0	$4.00	$4.00
Hurst	Conservation	2030	426	$150,000	$1.44	$0.71
Hurst	TRWD through Fort Worth	2030	2,563	$0	$4.00	$4.00
Johnson County SUD[a]	Conservation	See 2026 Region G Plan.				
Johnson County SUD[a]	TRWD through Mansfield					
Keller	Conservation	2030	1,143	$150,000	$3.50	$0.79
Keller	TRWD through Fort Worth	2030	4,602	$0	$4.00	$4.00
Kennedale	Conservation	2030	554	$158,560	$1.46	$0.77
Kennedale	Arlington	2030	385	$0	$4.00	$4.00
Kennedale	*Increase Delivery Infrastructure from Arlington*	*2030*	*385*	*$7,278,000*	*$3.79*	*$0.64*
Kennedale	Fort Worth	2040	1,280	$0	$4.00	$4.00
Kennedale	*Increase Delivery Infrastructure from Ft Worth*	*2070*	*1,087*	*$16,017,000*	*$2.95*	*$0.49*
Lake Worth	Conservation	2030	56	$8,560	$1.58	$0.81
Lake Worth	TRWD through Fort Worth	2030	607	$0	$4.00	$4.00

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
Lakeside	Conservation	2030	32	$8,560	$2.15	$0.92
Pantego	Conservation	2030	29	$0	$1.96	$1.12
	Arlington	2030	33	$0	$4.00	$4.00
	Connect to Arlington	*2030*	*33*	*$3,805,000*	*$21.94*	*$2.70*
	Fort Worth	2030	34	$0	$4.00	$4.00
	Connect to Fort Worth	*2030*	*34*	*$6,265,000*	*$35.11*	*$4.33*
Pelican Bay	Conservation	2030	40	$0	$5.83	$3.82
	TRWD through Azle	2070	345	$0	$4.00	$4.00
	Connect to Azle (TRWD)	*2070*	*345*	*$15,622,600*	*$8.91*	*$1.36*
	New Well(s) in Trinity Aquifer	2030	50	$2,731,000	$10.68	$1.60
Reno	Conservation	See Parker County.				
	Walnut Creek SUD					
Richland Hills	Conservation	2030	69	$0	$2.07	$1.00
	TRWD through Fort Worth	2030	741	$0	$4.00	$4.00
River Oaks	Conservation	2030	41	$0	$3.89	$2.31
	TRWD through Fort Worth	2030	352	$0	$4.00	$4.00
Saginaw	Conservation	2030	281	$150,000	$2.87	$0.77
	TRWD through Fort Worth	2030	1,682	$0	$4.00	$4.00
Sansom Park	Conservation	2030	43	$8,560	$4.57	$2.62
Southlake[a]	Conservation	2030	1,778	$150,000	$5.30	$0.56
	TRWD through Fort Worth	2030	7,178	$0	$4.00	$4.00
	Additional Delivery Infrastructure from Ft Worth	*2030*	*6,223*	*$27,121,000*	*$0.86*	*$0.18*
Watauga	Conservation	2030	306	$150,000	$2.54	$0.97
	North Richland Hills	2030	891	$0	$4.00	$4.00
	Additional delivery infrastructure North Richland Hills/Fort Worth	*2030*	*891*	*$2,246,000*	*$0.50*	*$0.08*
Westlake[a]	Conservation	2030	360	$8,560	$0.35	$0.21
	TRWD through Fort Worth	2030	3,160	$0	$4.00	$4.00
Westover Hills	Conservation	2030	47	$8,560	$0.37	$0.20

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL) WITH DEBT SERVICE	UNIT COST ($/1000 GAL) AFTER DEBT SERVICE
	TRWD through Fort Worth	2030	361	$0	$4.00	$4.00
Westworth Village	Conservation	2030	20	$8,560	$2.27	$1.06
	TRWD through Fort Worth	2030	223	$0	$4.00	$4.00
White Settlement	Conservation	2030	495	$150,000	$1.25	$0.93
	TRWD through Fort Worth	2030	811	$0	$4.00	$4.00
County Other and Non-Municipal						
County Other, Tarrant	Conservation	2030	608	$10,271	$5.34	$0.83
	TRWD	2030	5,971	$0	$1.50	$1.50
	Fort Worth	2030	6,374	$0	$4.00	$4.00
	DWU	2030	305	$0	$4.00	$4.00
	ALTERNATIVE Water from Euless (TRA/TRWD) to DFW Airport (in lieu of portion of Ft Worth supply)	*2040*	*2,000*	*$15,496,000*	*$4.60*	*$3.30*
Irrigation, Tarrant	Conservation	2030	508	$0	$0.94	$0.94
	Arlington	2030	34	$0	$4.00	$4.00
	TRWD	2030	339	$0	$1.50	$1.50
Livestock, Tarrant	None	None				
Manufacturing, Tarrant	TRWD	2030	5,333	$0	$1.50	$1.50
Mining, Tarrant	None	None				
Steam Electric Power, Tarrant	TRWD	2030	1,396	$0	$1.50	$1.50

[a]Water User Groups extend into more than one county.
[b]Quantities listed are for the WUG only. They do not include the WUG's customers.
[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.16 Wise County



Wise County is located in the northwest portion of Region C. **Figure 5E.32** shows the service areas for water user groups in Wise County.

The population of Wise County is projected to more than triple between 2030 and 2080. Wise County is a rural county, with Decatur and Bridgeport being its largest cities.

Demands for the County are predominately municipal at over 80% of the total county demand. The second largest demand is mining. The county has relatively minimal livestock, irrigation, manufacturing, and steam electric demands, accounting for less than 10% of the county's total demands.

An overall summary of the county's projections are shown in **Table 5E.399** and water management strategies for individual WWPs and WUGs are discussed on the following pages.

Wise County Quick Facts

2020 Population: 68,632

Projected 2080 Population: 369,816

Projected 2080 Demand: 57 MGD

County Seat: Decatur

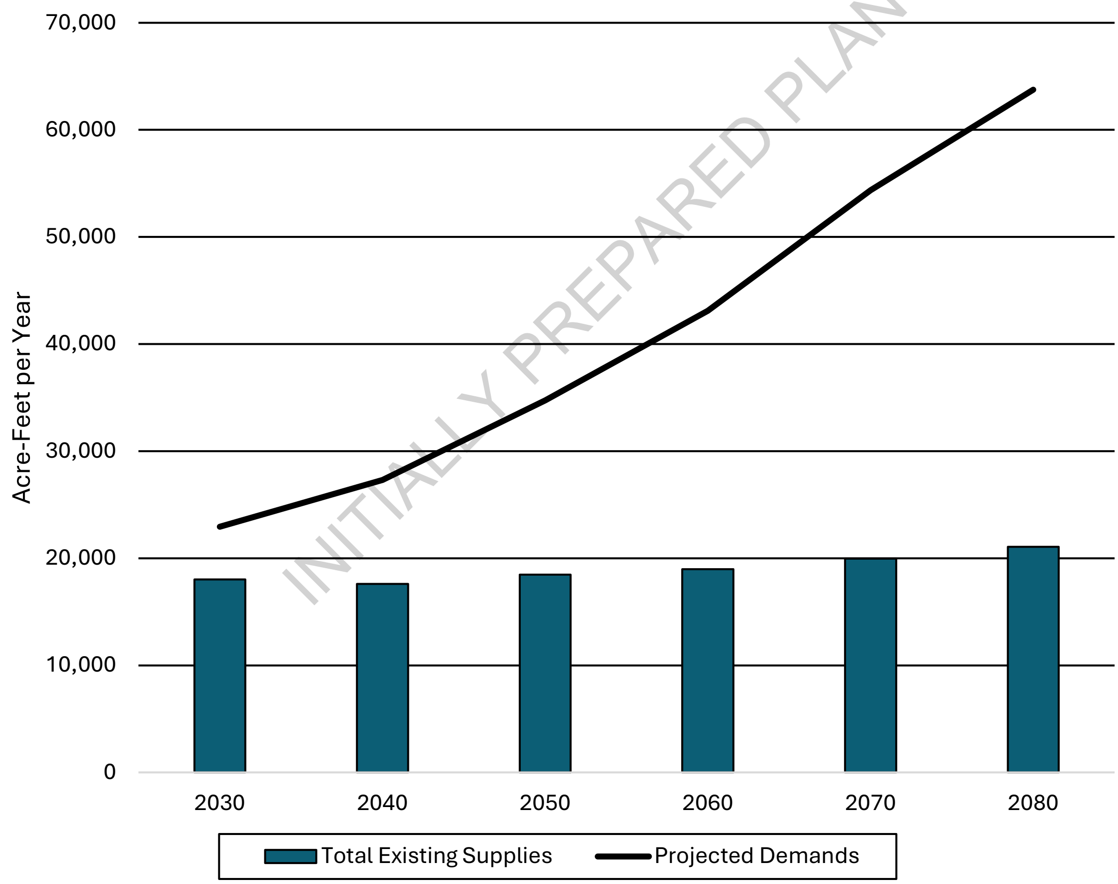
Economy: Petroleum; sand and gravel; agribusiness

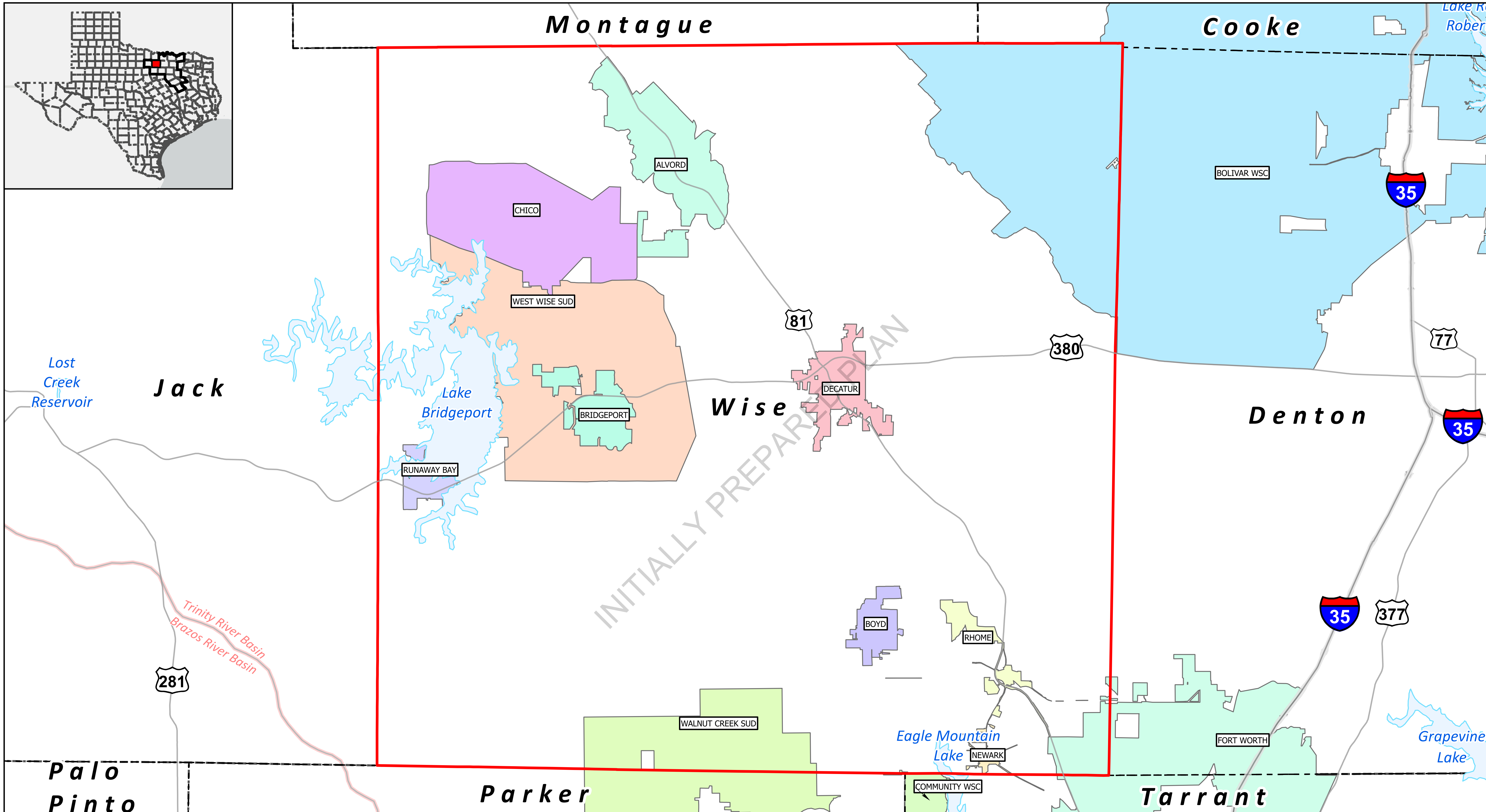
River Basins: Trinity (100%)

TABLE 5E.399 SUMMARY OF WISE COUNTY

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Population	**92,085**	**125,921**	**176,629**	**234,863**	**311,934**	**369,816**
Projected Demands	**22,940**	**27,319**	**34,750**	**43,114**	**54,362**	**63,752**
Municipal	13,853	18,233	25,078	32,836	43,127	51,036
Irrigation	1,440	1,440	1,440	1,440	1,440	1,440
Livestock	1,415	1,415	1,415	1,415	1,415	1,415
Manufacturing	254	263	273	283	293	304
Mining	3,084	3,074	3,650	4,246	5,193	6,663
Steam Electric	2,894	2,894	2,894	2,894	2,894	2,894
Total Existing Supplies	***18,011***	***17,612***	***18,464***	***18,960***	***19,970***	***21,056***
Need (Demand - Supply)	***4,929***	***9,707***	***16,286***	***24,154***	***34,392***	***42,696***

FIGURE 5E.31 SUMMARY OF WISE COUNTY





REGION C
Water Planning for North Texas

Wise County, Texas
Figure 5E.32

Data Source(s): ESRI, TWDB, TxDOT

TRA21862: H:\WR_PLANNING\1_Working\5E - County Maps\5E - County Maps\5E - County Maps.aprx

5E.16.1 Wholesale Water Providers and Water User Groups

Water management strategies for Wise County wholesale water providers (WWPs) and water user groups (WUGs) are discussed below (in alphabetical order). The costs and a summary for Wise County are presented in **Section 5E.16.2.**

Alvord

Alvord is located in northern Wise County. The city's water supply is groundwater from the Trinity aquifer. Water management strategies for Alvord include implementing conservation measures and connecting to and purchasing treated water from West Wise SUD. **Table 5E.400** shows the projected population and demand, the current supplies, and the water management strategies for Alvord.

TABLE 5E.400 SUMMARY OF WATER USER GROUP – CITY OF ALVORD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**3,020**	**3,736**	**4,375**	**4,888**	**5,453**	**6,073**
Projected Water Demand						
Municipal Demand	412	509	596	666	742	827
Total Projected Water Demand	***412***	***509***	***596***	***666***	***742***	***827***
Currently Available Water Supplies						
Trinity Aquifer	228	228	228	228	228	228
Total Current Supplies	***228***	***228***	***228***	***228***	***228***	***228***
Need (Demand - Current Supply)	***184***	***281***	***368***	***438***	***514***	***599***
Water Management Strategies						
Water Conservation	9	16	21	25	31	38
Supplies from TRWD through West Wise SUD	180	272	355	422	493	571
Connect to West Wise SUD	*180*	*272*	*355*	*422*	*493*	*571*
Total Water Management Strategies	***189***	***288***	***376***	***447***	***524***	***609***
Alvord Reserve (Shortage)	**5**	**7**	**8**	**9**	**10**	**10**

Bolivar Water Supply Corporation

Bolivar WSC serves wholesale and retail customers in southern Cooke County and in Denton and Wise Counties. Plans for Bolivar WSC are covered under Denton County in **Section 5E.4**.

Boyd

Boyd is located in southeastern Wise County. The city's water supply is groundwater from the Trinity aquifer and treated water from Walnut Creek SUD, which gets its raw water from Tarrant Regional Water District (TRWD). Water management strategies for Boyd include conservation and additional treated water from Walnut Creek SUD. **Table 5E.401** shows the projected population and demand, the current supplies, and the water management strategies for Boyd.

TABLE 5E.401 SUMMARY OF WATER USER GROUP – CITY OF BOYD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,477**	**1,879**	**2,574**	**3,202**	**3,800**	**4,200**
Projected Water Demand						
Municipal Demand	240	305	417	519	616	681
Total Projected Demand	***240***	***305***	***417***	***519***	***616***	***681***
Currently Available Water Supplies						
Trinity Aquifer	153	153	153	153	153	153
TRWD (through Walnut Creek SUD)	70	70	70	70	70	70
Total Current Supplies	***223***	***223***	***223***	***223***	***223***	***223***
Need (Demand - Current Supply)	***17***	***82***	***194***	***296***	***393***	***458***
Water Management Strategies						
Water Conservation	6	10	14	20	25	31
Additional Supplies from TRWD through Walnut Creek SUD	15	77	185	282	374	434
Total Water Management Strategies	***21***	***87***	***199***	***302***	***399***	***465***
Boyd Reserve (Shortage)	**4**	**5**	**5**	**6**	**6**	**7**

Bridgeport

Bridgeport is located in western Wise County. The city buys raw water from Tarrant Regional Water District (TRWD) from Lake Bridgeport and operates its own water treatment plant. Water management strategies for Bridgeport include conservation and additional raw water from TRWD. **Table 5E.402** shows the projected population and demand, the current supplies, and the water management strategies for Bridgeport.

TABLE 5E.402 SUMMARY OF WATER USER GROUP – CITY OF BRIDGEPORT

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**5,814**	**5,958**	**6,093**	**6,165**	**6,246**	**6,337**
Projected Water Demand						
Municipal Demand	986	1,006	1,029	1,041	1,055	1,070
Total Projected Demand	***986***	***1,006***	***1,029***	***1,041***	***1,055***	***1,070***
Currently Available Water Supplies						
Tarrant Regional WD	850	765	726	670	629	599
Total Current Supplies	***850***	***765***	***726***	***670***	***629***	***599***
Need (Demand - Current Supply)	***136***	***241***	***303***	***371***	***426***	***471***
Water Management Strategies						
Water Conservation	23	32	36	40	44	47
Additional Raw Water Needed from TRWD Beyond Current Contract	113	209	267	331	382	424
Total Water Management Strategies	***136***	***241***	***303***	***371***	***426***	***471***
Bridgeport Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Chico

Chico is located in western Wise County. The city's water supply is groundwater from the Trinity aquifer and treated water from West Wise SUD, which gets raw water from Tarrant Regional Water District (TRWD). Water management strategies for Chico include conservation and additional treated water from West Wise SUD with increased delivery infrastructure from West Wise SUD. **Table 5E.403** shows the projected population and demand, the current supplies, and the water management strategies for Chico.

TABLE 5E.403 SUMMARY OF WATER USER GROUP – CITY OF CHICO

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,054**	**2,054**	**2,054**	**2,054**	**2,054**	**2,054**
Projected Water Demand						
Municipal Demand	396	395	395	395	395	395
Total Projected Demand	***396***	***395***	***395***	***395***	***395***	***395***
Currently Available Water Supplies						
Trinity Aquifer	194	194	194	194	194	194
TRWD (through West Wise SUD)	174	153	141	130	120	112
Total Current Supplies	***368***	***347***	***335***	***324***	***314***	***306***
Need (Demand - Current Supply)	***28***	***48***	***60***	***71***	***81***	***89***
Water Management Strategies						
Water Conservation	9	13	14	15	17	18
Additional Supplies from TRWD through West Wise SUD	23	41	53	63	72	80
Increase Delivery Infrastructure from West Wise SUD	*23*	*41*	*53*	*63*	*72*	*80*
Total Water Management Strategies	***32***	***54***	***67***	***78***	***89***	***98***
Chico Reserve (Shortage)	***4***	***6***	***7***	***7***	***8***	***9***

Decatur

Decatur is located in central Wise County. The city's water supply is treated water from the Wise County WSD, which gets its raw water from Tarrant Regional Water District (TRWD). Water management strategies for Decatur include conservation, additional treated water from Wise County WSD and infrastructure improvements. **Table 5E.404** shows the projected population and demand, the current supplies, and the water management strategies for Decatur.

TABLE 5E.404 SUMMARY OF WATER USER GROUP – CITY OF DECATUR

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**10,796**	**12,824**	**17,299**	**21,328**	**27,000**	**31,300**
Projected Water Demand						
Municipal Demand	2,890	3,426	4,621	5,697	7,212	8,361
Total Projected Water Demand	***2,890***	***3,426***	***4,621***	***5,697***	***7,212***	***8,361***
Currently Available Water Supplies						
TRWD (through Wise County WSD)	2,494	2,603	3,261	3,664	4,298	4,678
Total Current Supplies	***2,494***	***2,603***	***3,261***	***3,664***	***4,298***	***4,678***
Need (Demand - Current Supply)	***396***	***823***	***1,360***	***2,033***	***2,914***	***3,683***
Water Management Strategies						
Water Conservation	71	118	173	429	647	758
Additional Supplies from TRWD through Wise County WSD	325	705	1,187	1,604	2,267	2,925
Infrastructure Improvements	*841*	*841*	*841*	*841*	*841*	*841*
Total Water Management Strategies	***396***	***823***	***1,360***	***2,033***	***2,914***	***3,683***
Decatur Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Newark

Newark is located in southeastern Wise County. The city gets its water supply from the Trinity aquifer. Water management strategies for Newark include conservation and the purchase of treated water from Rhome (which gets treated water from Walnut Creek SUD which in turn uses Tarrant Regional Water District (TRWD) raw water). **Table 5E.405** shows the projected population and demand, the current supplies, and the water management strategies for Newark.

TABLE 5E.405 SUMMARY OF WATER USER GROUP – CITY OF NEWARK

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,238**	**1,571**	**2,274**	**3,323**	**4,941**	**6,310**
Projected Water Demand						
Municipal Demand	131	166	240	351	522	666
Total Projected Demand	***131***	***166***	***240***	***351***	***522***	***666***
Currently Available Water Supplies						
Trinity Aquifer	125	125	125	125	125	125
Total Current Supplies	***125***	***125***	***125***	***125***	***125***	***125***
Need (Demand - Current Supply)	***6***	***41***	***115***	***226***	***397***	***541***
Water Management Strategies						
Water Conservation	3	5	8	14	22	29
Connect to and Purchase Water from Rhome (from Walnut Creek SUD from TRWD)	6	40	111	217	380	517
Total Water Management Strategies	***9***	***45***	***119***	***231***	***402***	***546***
Newark Reserve (Shortage)	***3***	***4***	***4***	***5***	***5***	***5***

Rhome

Rhome is located in southeastern Wise County. The city provides water to Wise County and will potentially provide water to the City of Newark in the future. Rhome's water supply is treated water from Walnut Creek SUD, which gets its raw water from Tarrant Regional Water District (TRWD), and groundwater from the Trinity aquifer. Water management strategies for Rhome include conservation and additional treated water from Walnut Creek SUD. Alternatively, Rhome may receive TRWD water through a new Regional Water District in Wise County. **Table 5E.406** shows the projected population and demand, the current supplies, and the water management strategies for Rhome.

TABLE 5E.406 SUMMARY OF WATER USER GROUP – CITY OF RHOME

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**2,290**	**2,958**	**4,367**	**6,339**	**9,332**	**12,443**
Projected Water Demand						
Municipal Demand	385	495	731	1,061	1,562	2,083
County-Other, Wise	*100*	*100*	*100*	*100*	*100*	*100*
Total Projected Demand	***485***	***595***	***831***	***1,161***	***1,662***	***2,183***
Currently Available Water Supplies						
Trinity Aquifer	169	169	169	169	169	169
TRWD (through Walnut Creek SUD)	173	173	173	173	173	173
County-Other, Wise	80	76	71	64	60	56
Total Current Supplies	***422***	***418***	***413***	***406***	***402***	***398***
Need (Demand - Current Supply)	***63***	***177***	***418***	***755***	***1,260***	***1,785***
Water Management Strategies						
Water Conservation	9	15	26	41	66	98
Additional Supplies from TRWD through Walnut Creek SUD	38	143	369	685	1,161	1,651
County-Other, Wise	*38*	*46*	*54*	*68*	*76*	*82*
Total Water Management Strategies	***85***	***204***	***449***	***794***	***1,303***	***1,831***
Rhome Reserve (Shortage)	***22***	***27***	***31***	***39***	***43***	***46***

Runaway Bay

Runaway Bay is located in western Wise County. The city buys raw water from Tarrant Regional Water District (TRWD) and operates its own water treatment plant. Water management strategies for Runaway Bay include conservation, additional raw water from TRWD, water treatment plant expansion, and increasing the capacity of the lake intake. **Table 5E.407** shows the projected population and demand, the current supplies, and the water management strategies for Runaway Bay.

TABLE 5E.407 SUMMARY OF WATER USER GROUP – CITY OF RUNAWAY BAY

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**1,878**	**2,304**	**2,826**	**3,467**	**4,253**	**5,217**
Projected Water Demand						
Municipal Demand	676	829	1,016	1,247	1,529	1,876
County-Other, Wise	*50*	*50*	*50*	*50*	*50*	*50*
Total Projected Demand	***726***	***879***	***1,066***	***1,297***	***1,579***	***1,926***
Currently Available Water Supplies						
Tarrant Regional WD	583	630	717	802	911	1,050
County-Other, Wise	*43*	*38*	*35*	*32*	*30*	*28*
Total Current Supplies	***626***	***668***	***752***	***834***	***941***	***1,078***
Need (Demand - Current Supply)	***100***	***211***	***314***	***463***	***638***	***848***
Water Management Strategies						
Water Conservation	16	29	37	51	67	89
County-Other, Wise	*0*	*1*	*1*	*1*	*1*	*1*
Additional Supplies from TRWD	84	181	276	411	570	758
Treatment Plant & Infrastructure needed to treat and deliver TRWD water as below:						
2 MGD WTP Expansion	*84*	*181*	*276*	*411*	*570*	*758*
Increase capacity of Lake Intake	*84*	*181*	*276*	*411*	*570*	*758*
Total Water Management Strategies	***100***	***211***	***314***	***463***	***638***	***848***
Runaway Bay Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Walnut Creek Special Utility District

Walnut Creek SUD is a wholesale water provider that offers wholesale and retail service in parts of Parker and Wise Counties. The plan for the SUD is described under Parker County in **Section 5E.1.1**.

West Wise Special Utility District

West Wise SUD serves western Wise County and provides water to Chico. The SUD buys water from Tarrant Regional Water District (TRWD) directly as well as through Walnut Creek SUD. Water management strategies for West Wise SUD include conservation and additional raw water from TRWD, including water treatment plant expansion. **Table 5E.408** shows the projected population and demand, the current supplies, and the water management strategies for West Wise SUD.

TABLE 5E.408 SUMMARY OF WATER USER GROUP – WEST WISE SUD

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**4,047**	**4,438**	**4,789**	**5,056**	**5,349**	**5,672**
Projected Water Demand						
Municipal Demand	481	525	566	598	632	670
Customer Demand for Chico	*202*	*201*	*201*	*201*	*201*	*201*
Total Projected Demand	***683***	***726***	***767***	***799***	***833***	***871***
Currently Available Water Supplies						
TRWD	394	380	379	365	357	356
Chico	174	153	141	130	120	112
TRWD (through Walnut Creek SUD)	19	19	19	19	19	19
Total Current Supplies	***587***	***552***	***539***	***514***	***496***	***487***
Need (Demand - Current Supply)	***96***	***174***	***228***	***285***	***337***	***384***
Water Management Strategies						
Water Conservation	11	18	20	23	27	29
Water Conservation for Chico	*9*	*13*	*14*	*15*	*17*	*18*
Additional Supplies from TRWD with infrastructure below:	80	149	201	254	301	346
1 MGD WTP Expansion	*80*	*149*	*201*	*254*	*301*	*346*
Total Water Management Strategies	***100***	***180***	***235***	***292***	***345***	***393***
West Wise SUD Reserve (Shortage)	***4***	***6***	***7***	***7***	***8***	***9***

Wise County Irrigation

Irrigation demand projections include the water necessary for irrigation activities, including field crops, orchards, pasture, turf grass, vineyards, golf courses irrigated by raw water, and limited aquaculture operations. The current supplies are local surface water supplies (Trinity run-of-river), groundwater from the Trinity aquifer, and water from the Tarrant Regional Water District (TRWD). The recommended water management strategies for Wise County Irrigation are conservation and additional supplies from TRWD. **Table 5E.409** shows the projected demand, the current supplies, and the water management strategies for Wise County Irrigation.

TABLE 5E.409 SUMMARY OF WATER USER GROUP – WISE COUNTY IRRIGATION

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,440***	***1,440***	***1,440***	***1,440***	***1,440***	***1,440***
Currently Available Water Supplies						
Trinity Run-of-River	0	0	0	0	0	0
Trinity Aquifer	1,276	1,276	1,276	1,276	1,276	1,276
Tarrant Regional WD	141	125	116	106	97	92
Total Current Supplies	***1,417***	***1,401***	***1,392***	***1,382***	***1,373***	***1,368***
Need (Demand - Current Supply)	***23***	***39***	***48***	***58***	***67***	***72***
Water Management Strategies						
Water Conservation	0	1	2	2	3	3
Additional Supplies from TRWD	23	39	48	58	67	72
Total Water Management Strategies	***23***	***40***	***50***	***60***	***70***	***75***
Irrigation, Wise Reserve (Shortage)	***0***	***1***	***2***	***2***	***3***	***3***

Wise County Livestock

Livestock water use is defined as water used in the production of livestock, both for consumption and for cleaning and environmental purposes. The current supplies are local surface water supplies and groundwater from the Trinity aquifer. These sources are sufficient to meet projected demands, and there are no water management strategies for this water user group. **Table 5E.410** shows the projected demand, current supplies, and water management strategies for Wise County Livestock.

TABLE 5E.410 SUMMARY OF WATER USER GROUP – WISE COUNTY LIVESTOCK

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***1,415***	***1,415***	***1,415***	***1,415***	***1,415***	***1,415***
Currently Available Water Supplies						
Trinity Aquifer	298	298	298	298	298	298
Trinity Livestock Local Supply	1,210	1,210	1,210	1,210	1,210	1,210
Total Current Supplies	***1,508***	***1,508***	***1,508***	***1,508***	***1,508***	***1,508***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
None						
Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
Livestock, Wise Reserve (Shortage)	***93***	***93***	***93***	***93***	***93***	***93***

Wise County Manufacturing

Manufacturing water use is defined as water used to produce manufactured goods. Current supplies include water from the Tarrant Regional Water District (TRWD) through Wise County WSD and groundwater (Trinity aquifer). The water management strategies for this water user group include additional water from TRWD. Conservation was considered for this water user group, but it is not recommended because of the uncertainty in the ability to implement conservation measures given the multiple entities, facilities, and various manufacturing processes that make up this WUG. **Table 5E.411** shows the projected demand and current supplies for Wise County Manufacturing.

TABLE 5E.411 SUMMARY OF WATER USER GROUP – WISE COUNTY MANUFACTURING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***254***	***263***	***273***	***283***	***293***	***304***
Currently Available Water Supplies						
Trinity Aquifer	204	213	223	233	243	254
TRWD (through Wise County WSD)	43	38	35	32	30	28
Total Current Supplies	***247***	***251***	***258***	***265***	***273***	***282***
Need (Demand - Current Supply)	***7***	***12***	***15***	***18***	***20***	***22***
Water Management Strategies						
Water Conservation	0	0	0	0	0	0
Additional Supplies from TRWD	7	12	15	18	20	22
Total Water Management Strategies	***7***	***12***	***15***	***18***	***20***	***22***
Manufacturing, Wise Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Wise County Mining

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Wise County Mining is supplied from run-of-river water from the Trinity River, water from Tarrant Regional Water District (TRWD), and the Trinity aquifer. The recommended water management strategies are conservation and additional water from TRWD. **Table 5E.412** shows the projected demand, the current supplies, and the water management strategies for Wise County Mining.

TABLE 5E.412 SUMMARY OF WATER USER GROUP – WISE COUNTY MINING

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***3,084***	***3,074***	***3,650***	***4,246***	***5,193***	***6,663***
Currently Available Water Supplies						
Trinity Aquifer	2,155	2,155	2,155	2,155	2,155	2,155
Tarrant Regional WD	767	669	1,028	1,320	1,788	2,500
Trinity Run-of-River	39	39	39	39	39	39
Total Current Supplies	***2,961***	***2,863***	***3,222***	***3,514***	***3,982***	***4,694***
Need (Demand - Current Supply)	***123***	***211***	***428***	***732***	***1,211***	***1,969***
Water Management Strategies						
Water Conservation	123	211	428	732	1,211	1,969
Additional Supplies from TRWD	0	0	0	0	0	0
Total Water Management Strategies	***123***	***211***	***428***	***732***	***1,211***	***1,969***
Mining, Wise Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Wise County Other

Wise County Other includes individual domestic supplies and water suppliers too small to be classified as water user groups. Wise County Other supplies come from the Trinity Aquifer and the Tarrant Regional Water District (TRWD) through Runaway Bay and Walnut Creek SUD (direct and through Rhome). Water management strategies for Wise County Other include implementing conservation measures and constructing additional groundwater wells in the Trinity aquifer. Other water management strategies include purchasing additional supplies from TRWD through Runaway Bay, Walnut Creek SUD (direct and through Rhome), and a new Wise County Regional Water District.

Several entities in Wise County are currently seeking to form a regional water district that would initially serve southeastern Wise County and expand to other parts of the county. Some of these entities have current contracts with TRWD, which would be the primary source of water for the regional water district. See **Chapter 5C** and **Appendix G** for more information on the new Wise County Regional Water District.

A study is currently underway to determine the feasibility and amount of treated water that might be available from Upper Trinity Regional Water District (UTRWD) to New Fairview through Justin. New Fairview is too small to be classified as a water user group and is considered under Wise County Other. Additional supplies from UTRWD through Justin to New Fairview are included as an alternative water management strategy.

Table 5E.413 shows the projected population and demand, the current supplies, and the water management strategies for Wise County Other.

TABLE 5E.413 SUMMARY OF WATER USER GROUP – WISE COUNTY OTHER

(VALUES IN AC-FT/YR)	PROJECTED POPULATION AND DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Population	**52,332**	**80,325**	**120,420**	**166,350**	**227,000**	**270,000**
Projected Water Demand						
Municipal Demand	6,075	9,274	13,903	19,206	26,208	31,172
Total Projected Water Demand	***6,075***	***9,274***	***13,903***	***19,206***	***26,208***	***31,172***
Currently Available Water Supplies						
Trinity Aquifer	2,584	2,584	2,584	2,584	2,584	2,584
TRWD (through Runaway Bay)	43	38	35	32	30	28
TRWD (through Rhome through Walnut Creek SUD)	80	76	71	64	60	56
TRWD (through Walnut Creek SUD)	80	76	71	64	60	56
Total Current Supplies	***2,787***	***2,774***	***2,761***	***2,744***	***2,734***	***2,724***
Need (Demand - Current Supply)	***3,288***	***6,500***	***11,142***	***16,462***	***23,474***	***28,448***
Water Management Strategies						
Water Conservation	59	122	231	382	609	828
Additional Supplies from TRWD through Runaway Bay	7	11	14	17	19	21
Additional Supplies from TRWD through Walnut Creek SUD	38	46	54	68	76	82
Additional well(s) in Trinity Aquifer	3,400	3,400	3,400	3,000	3,000	3,000
New Regional Water District (Supplies from TRWD)	0	2,961	7,867	14,702	21,489	26,283
Total Water Management Strategies	***3,504***	***6,540***	***11,566***	***18,169***	***25,193***	***30,214***
County-Other, Wise Reserve (Shortage)	***216***	***40***	***424***	***1,707***	***1,719***	***1,766***
Alternate Water Management Strategy						
Additional Supplies from UTRWD through Justin (New Fairview)[a]	0	1,500	1,500	1,500	1,500	1,500

[a] A study is underway to determine the feasibility and amount of treated water that might be available to New Fairview through Justin.

Wise County Steam Electric Power

Steam electric power demands do not include water that is used in cogeneration facilities (which is included in manufacturing projections), facilities which do not require water for production, or hydro-electric generation facilities. Wise County Steam Electric Power is supplied by raw water from Tarrant Regional Water District (TRWD). The only water management strategy for Wise County SEP is additional water from TRWD. Conservation was considered for this water user group, but it is not recommended because the steam electric demand projections themselves considered future efficiency programs. **Table 5E.414** shows the projected demand, the current supplies, and the water management strategies for Wise County SEP.

TABLE 5E.414 SUMMARY OF WATER USER GROUP – WISE COUNTY SEP

(VALUES IN AC-FT/YR)	PROJECTED DEMAND					
	2030	2040	2050	2060	2070	2080
Projected Water Demand	***2,894***	***2,894***	***2,894***	***2,894***	***2,894***	***2,894***
Currently Available Water Supplies						
Tarrant Regional WD	2,497	2,199	2,042	1,861	1,724	1,619
Total Current Supplies	***2,497***	***2,199***	***2,042***	***1,861***	***1,724***	***1,619***
Need (Demand - Current Supply)	***397***	***695***	***852***	***1,033***	***1,170***	***1,275***
Water Management Strategies						
Additional Supplies from TRWD	397	695	852	1,033	1,170	1,275
Total Water Management Strategies	***397***	***695***	***852***	***1,033***	***1,170***	***1,275***
Steam-Electric Power, Wise Reserve (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***

Wise County Water Supply District

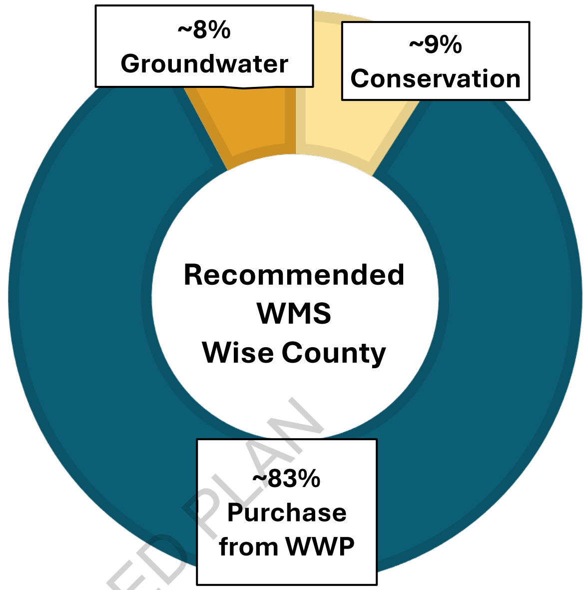
Wise County WSD is a wholesale water provider (WWP) that supplies water to Decatur and Wise County Manufacturing. Wise County WSD is expected to continue serving these customers in the future. The current water supply for Wise County WSD is water purchased from the Tarrant Regional Water District (TRWD). The recommended strategies for Wise County WSD include implementing water conservation measures, purchasing additional water from TRWD (increasing contract amounts as needed in the future), and expanding water treatment capacity. **Table 5E.415** shows the recommended water management strategies for the Wise County WSD.

TABLE 5E.415 SUMMARY OF WHOLESALE WATER PROVIDER AND CUSTOMERS – WISE COUNTY WSD

(VALUES IN AC-FT/YR)	2030	2040	2050	2060	2070	2080
Projected Demands						
Decatur	2,890	3,426	4,621	5,697	7,212	8,361
Manufacturing, Wise	50	50	50	50	50	50
Total Projected Water Demand	***2,940***	***3,476***	***4,671***	***5,747***	***7,262***	***8,411***
Currently Available Supplies						
TRWD	2,537	2,641	3,296	3,696	4,328	4,706
Total Current Supplies	***2,537***	***2,641***	***3,296***	***3,696***	***4,328***	***4,706***
Need (Demand less Supply)	***403***	***835***	***1,375***	***2,051***	***2,934***	***3,705***
Water Management Strategies						
Conservation	71	118	173	429	647	758
Additional TRWD with Treatment Plants as Follows:	332	717	1,202	1,622	2,287	2,947
6 MGD WTP Expansion	*332*	*717*	*1,202*	*1,622*	*2,287*	*2,947*
Total Supplies from Strategies	***403***	***835***	***1,375***	***2,051***	***2,934***	***3,705***
Total Supplies	***2,940***	***3,476***	***4,671***	***5,747***	***7,262***	***8,411***
Surplus or (Shortage)	***0***	***0***	***0***	***0***	***0***	***0***
Management Supply Factor	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

5E.16.2 Summary of Costs for Wise County

Table 5E.416 summarizes the costs of the water management strategies recommended for the WUGs and WWPs who have the majority of their demand located in Wise County. Total quantities from **Table 5E.416** will not necessarily match total county demands. This is due mainly to water users whose sum of strategies results in a reserve as well as due to water users located in multiple counties (or wholesale water providers who develop strategies and then sell water to users in other counties). Quantities from infrastructure projects needed to deliver and/or treat water (shown in *gray italics*) are not included since the supplies are associated with other strategies. To avoid double-counting quantities of supplies, the quantities in gray italics are **not** included in the total.



The majority of the future supplies needed to meet demands within Wise County are projected to come through purchases from wholesale water providers. Other strategies include conservation and groundwater.

Table 5E.417 summarizes the recommended water management strategies within Wise County for individual WUGs and WWPs. Alternative strategies are also included. More detailed cost estimates are located in **Appendix H.**

TABLE 5E.416 SUMMARY OF RECOMMENDED WATER MANAGEMENT STRATEGIES FOR WISE COUNTY

TYPE OF STRATEGY	QUANTITY (AC-FT/YR)	CAPITAL COSTS
Conservation[a]	3,937	$167,119
Purchase from WWP	38,408	$544,916,358
Additional Infrastructure	*6,818*	*$214,016,000*
Groundwater	3,400	$18,838,000
Total	**45,745**	**$777,937,477**

[a]The conservation quantities represent the sum of the individual water user groups who have the majority of their service areas located in the county, not the total conservation in the county.

TABLE 5E.417 COSTS FOR RECOMMENDED AND ALTERNATIVE WATER MANAGEMENT STRATEGIES FOR WISE COUNTY

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
WWPs						
Wise County WSD (Decatur)	Conservation	2030	Included with WUGs.			
	TRWD	2030	2,947	$0	$1.50	$1.50
	6 MGD WTP Expansion	*2030*	*2,947*	*$71,112,000*	*$7.72*	*$3.70*
WUGs						
Alvord	Conservation	2030	38	$0	$8.66	$1.91
	TRWD through West Wise SUD	2030	571	$0	$4.00	$4.00
	Connect to West Wise SUD	*2030*	*571*	*$22,943,000*	*$7.97*	*$1.27*
Bolivar WSC[a]	Conservation	See Denton County.				
	New Well(s) in Trinity Aquifer					
	UTRWD					
	Connect to Gainesville					
Boyd	Conservation	2030	31	$0	$2.71	$1.72
	Walnut Creek SUD	2030	434	$0	$4.00	$4.00
Bridgeport	Conservation	2030	47	$0	$2.41	$1.56
	TRWD	2040	424	$0	$1.50	$1.50
Chico	Conservation	2030	18	$0	$2.52	$1.42
	West Wise SUD	2030	80	$0	$4.00	$4.00
	Additional Delivery Infrastructure from West Wise SUD	*2030*	*80*	*$8,886,000*	*$21.25*	*$2.72*
Decatur	Conservation	2030	758	$150,000	$2.61	$0.98
	Wise County WSD	2030	2,925	$0	$4.00	$4.00
	Infrastructure Improvements	*2030*	*841*	*$46,823,000*	*$13.62*	*$4.33*
Fort Worth[a]	Conservation	See Fort Worth in **Chapter 5D**.				
	Other WMS					
Newark	Conservation	2030	29	$0	$4.69	$2.56
	Rhome	2030	517	$0	$4.00	$4.00
	Additional Delivery Infrastructure	*2030*	*517*	*$5,937,000*	*$2.21*	*$0.30*
Rhome	Conservation	2030	98	$0	$3.38	$1.59

WWP OR WUG	STRATEGY	ONLINE BY:	QUANTITY (AC-FT/YR)[b]	CAPITAL COSTS[c]	UNIT COST ($/1000 GAL)	
					WITH DEBT SERVICE	AFTER DEBT SERVICE
	Walnut Creek SUD	2030	1,651	$0	$4.00	$4.00
Runaway Bay	Conservation	2030	89	$0	$1.74	$0.87
	TRWD	2030	758	$0	$1.50	$1.50
	2 MGD WTP Expansion	*2030*	*758*	*$38,770,000*	*$11.45*	*$5.68*
	Increase capacity of Lake Intake	*2030*	*758*	*$8,712,000*	*$2.56*	*$0.64*
Walnut Creek SUD[a]	Conservation	See Parker County.				
	Other WMSs					
West Wise SUD	Conservation	2030	29	$0	$7.02	$2.19
	TRWD	2030	346	$0	$1.50	$1.50
	1 MGD WTP Expansion	*2030*	*346*	*$10,833,000*	*$6.51*	*$3.29*
County Other and Non-Municipal						
County-Other, Wise	Conservation	2030	828	$17,119	$6.14	$1.40
	TRWD through Runaway Bay	2030	21	$0	$4.00	$4.00
	TRWD through Walnut Creek SUD	2030	82	$0	$4.00	$4.00
	Additional well(s) in Trinity Aquifer	2030	3,400	$18,838,000	$1.88	$0.68
	New Regional Water Supplier (through TRWD)	2040	26,283	$544,916,358	$6.92	$2.79
	ALTERNATIVE TRWD through Justin (New Fairview)	2040	1,500	*$15,506,000*	*$1.98*	*$0.25*
Irrigation, Wise	Conservation	2040	3	$0	$0.94	$0.94
	TRWD	2030	72	$0	$1.50	$1.50
Livestock, Wise	None	None				
Manufacturing, Wise	TRWD	2030	22	$0	$1.50	$1.50
Mining, Wise	Conservation	2030	1,969	$0	$0.61	$0.61
Steam-Electric Power, Wise	TRWD	2030	1,275	$0	$1.50	$1.50

[a]Water User Groups extend into more than one county.
[b]Quantities listed are for the WUG only. They do not include the WUG's customers.
[c]Purchases from wholesale water providers that require no new infrastructure have no capital costs. The unit costs shown in the table represent the cost to purchase water from the WWP.

5E.17 Chapter 5E List of References

(1) R.W. Harden and Associates, Inc., HDR Engineering, Inc., LBG-Guyton Associates, Freese and Nichols, Inc., United States Geological Survey, and Dr. Joe Yelderman: *Northern Trinity/Woodbine Aquifer Groundwater Availability Model*, prepared for the Texas Water Development Board, Austin, August 31, 2004.

(2) Freese and Nichols, Inc., Alan Plummer Associates, Inc., Chiang, Patel & Yerby, Inc., and Cooksey Communications, Inc.: *2006 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, January 2006.

(3) Mid-East Texas Groundwater Conservation District created by the Texas Legislature, Chapter 1507, Art. 4 (HB 1784) and Ch. 966, Art. 3, Part 15, (SB 1), 77th Leg., September 2001, confirmed November 2002.

(4) Lesikar, B., R. Kaiser, V. Silvy, *Questions about Groundwater Conservation Districts in Texas*, published by the Texas Cooperative Extension, College Station, June 2002.

(5) Neches and Trinity Valleys Groundwater Conservation District created by the Texas Legislature, Ch. 1387, 77th Leg., September 2001 (SB 1821), confirmed November 2001.

5F CHAPTER 5 SUMMARY

CHAPTER OUTLINE	
Section 5F.1	Chapter 5 Summary
Section 5F.1.2	Documentation of Implementation Status and Anticipated Timeline for Certain Types of Recommended Water Management Strategies
Section 5F.3	Texas Water Development Board Required Tables

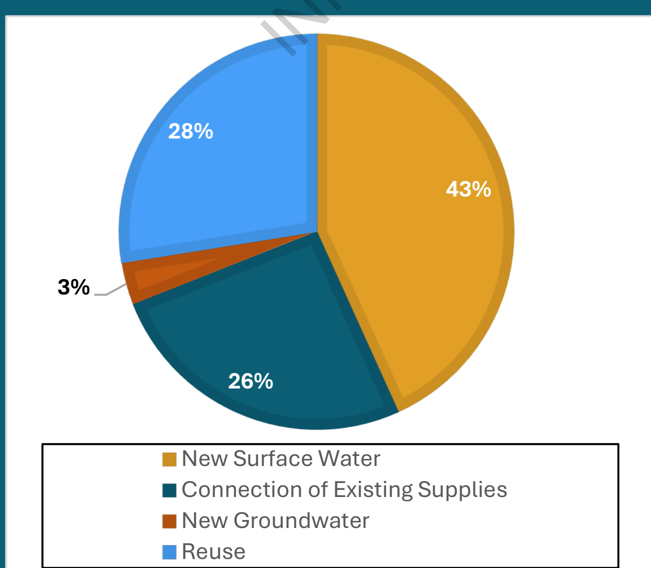
5F.1 Chapter 5 Summary

Chapter 5 presents the water management strategies (WMS) that were evaluated to meet the identified water needs in Region C for the *2026 Regional Water Plan*. Municipal demands make up most of the Region C demands and most of the recommended WMS meet the increased municipal demands associated with the projected population growth in the coming decades.

Conservation and reuse are extremely important in Region C. The region has already made great strides in reducing water demands and expects to further reduce demands in the future. In addition to previous conservation savings and projected savings included in demand projections, conservation strategies will reduce demand by over 297,000 acre-feet per year by 2080. However, these demand reductions are not enough to meet the water needs caused by the region's growing population. Development of new supplies will be required, and infrastructure projects are needed to connect to existing and future water sources.

Most of the additional supplies for Region C will be developed by the Region's major water providers (DWU, NTMWD, TRWD, UTRWD, TRA, and Fort Worth), and major water management strategies (generally, strategies that provide 30,000 acre-feet per year or more) account for about 80% percent of the total additional supplies for the region.

FIGURE 5F.1 RECOMMENDED MAJOR WMS



Recommended Major Water Management Strategies

- 7 New Surface Water
- 7 Connection of Existing Supplies
- 2 New Groundwater
- 7 Reuse Strategies

There are over 170 recommended and 38 alternative strategies and projects for Region C providers. These include projects that are solely for treatment and distribution. **Figure 5F.2** shows the breakdown of recommended water management strategies by type in 2080. The greatest amount of new supplies for Region C will be developed from new surface water (33%), reuse (29%), and connecting to existing sources (18%). In total, by 2080 Region C is expected to conserve over 297,000 acre-feet per year and develop over 1.89 million acre-feet per year of new supplies. **Table 5F.1** shows the recommended strategy volumes by strategy type for the region. **Table 5F.2** shows the capital cost of strategies. The total cost of implementing all the recommended water management strategies in the plan is approximately $49 billion.

FIGURE 5F.2 ALL RECOMMENDED STRATEGIES IN 2080

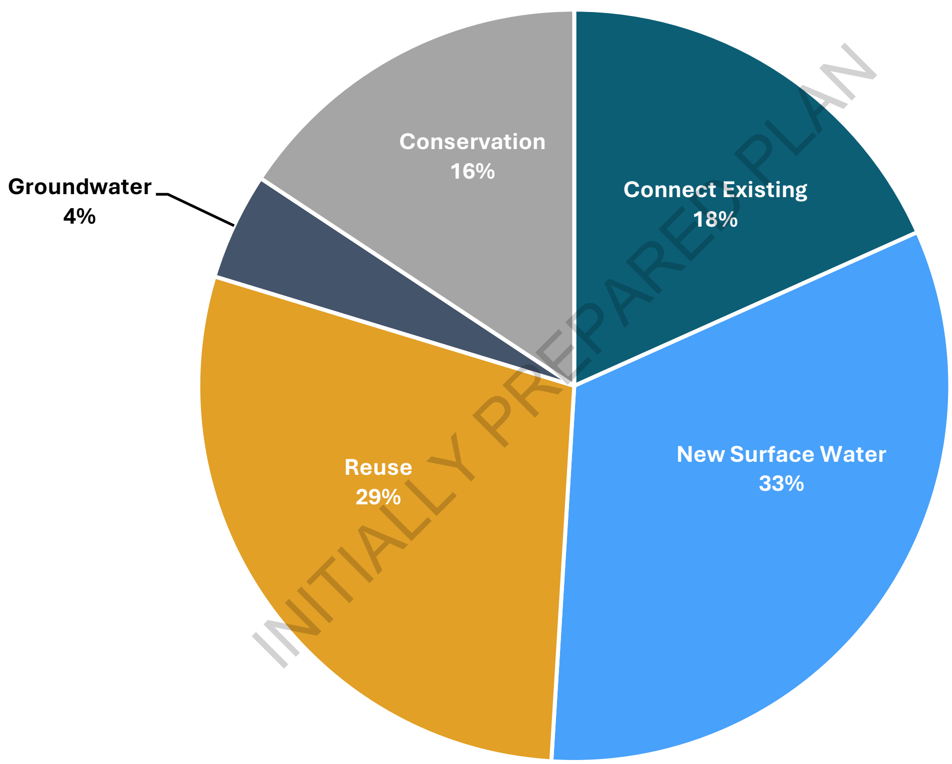


TABLE 5F.1 RECOMMENDED STRATEGY VOLUMES BY STRATEGY TYPE

VALUES IN ACRE FEET PER YEAR					
WWP OR RWP	CONNECT EXISTING SUPPLIES	NEW SURFACE WATER	REUSE	GROUND WATER	CONSERVATION
DWU	90,673	127,794	169,417	25,000	67,631
Fort Worth			16,560		43,252
NTMWD	185,087	211,105	89,503		78,621
TRWD		233,435	194,084	31,800	80,253
TRA					3,190
UTRWD	34,928	23,050	35,157		21,845
GTUA	7,055	23,800		7,095	3,887
Corsicana	11,210				1,029
Counties[a]	17,980		39,772	23,360	297,584
TOTALS	***346,933***	***619,184***	***544,493***	***87,255***	***297,584***

aCounties include all wholesale water providers or water user groups that are not major or regional water providers.

TABLE 5F.2 RECOMMENDED STRATEGIES CAPITAL COSTS

WWP OR WUG	CAPITAL COST INCLUDING CONSERVATION	CAPITAL COST WITHOUT CONSERVATION
DWU	$10,016,163,000	$10,016,013,000
Fort Worth	$2,300,057,000	$2,299,907,000
NTWMD	$12,798,053,500	$12,798,053,500
TRWD	$11,737,773,500	$11,737,773,500
TRA	$0	$0
UTRWD	$3,903,609,000	$3,903,609,000
GTUA	$1,804,533,000	$1,804,533,000
Corsicana	$156,761,000	$156,611,000
Subtotal	**$42,716,950,000**	**$42,716,500,000**
Counties[a]	$6,678,412,646	$6,661,021,958
Totals	***$49,394,912,646***	***$49,377,521,958***

[a]Counties include all wholesale water providers or water user groups that are not major or regional water providers.

5F.1.1 Unmet Water Needs

Region C worked closely with water providers to meet the projected needs identified in this Plan, and the RCWPG considered all potentially feasible water management strategies to meet the needs of Region C WUGs, as discussed in **Chapter 5A**. However, there were some instances in which the projected needs could not be met. There are three municipal WUGs and six non-municipal WUGs with unmet needs in Region C, as shown in **Table 5F.3**. Unmet needs total approximately 20,000 acre-feet per year in 2030, growing to over 24,000 acre-feet per year by 2080. Considerations for unmet needs in Region C are discussed in detail in **Chapter 6** of this plan.

TABLE 5F.3 UNMET NEEDS

WUGS	UNMET NEEDS (VALUES IN ACRE FEET PER YEAR)					
	2030	2040	2050	2060	2070	2080
Municipal						
Celina	2,368	0	0	0	0	0
County-Other, Parker						
Trinity Basin	*0*	*833*	*0*	*0*	*0*	*0*
Brazos Basin	*49*	*1,428*	*3,220*	*4,964*	*7,232*	*8,848*
Irving	10,936	9,353	3,596	4,527	5,443	6,308
Subtotal - Municipal	**13,353**	**11,614**	**6,816**	**9,491**	**12,675**	**15,156**
Non-Municipal						
Irrigation, Ellis	553	537	521	512	504	496
Irrigation, Fannin	4,436	4,417	4,398	4,388	4,378	4,369
Irrigation, Parker	131	80	39	11	0	0
Manufacturing, Ellis	850	796	948	1,106	1,269	1,439
Manufacturing, Henderson	829	876	931	988	1,044	1,100
Steam-Electric Power, Freestone	0	1,384	1,617	1,822	2,027	2,232
Subtotal - Non-Municipal	**6,799**	**8,090**	**8,454**	**8,827**	**9,222**	**9,636**
Total Region C Unmet Needs	***20,152***	***19,704***	***15,270***	***18,318***	***21,897***	***24,792***

5F.1.2 Water Management Strategies with Flood Mitigation Benefits

TWDB contract requirements for regional water planning require identification of feasible strategies with flood mitigation benefits. TWDB contract Exhibit C, Section 2.5.1 includes the following language:

Identify those potentially feasible WMSs, if any, that, in addition to providing water supply, could potentially provide non-trivial flood mitigation benefits or that might be the best potential candidates for exploring ways that they might be combined with flood mitigation features to leverage planning efforts to achieve potential cost savings or other combined water supply and flood mitigation benefits. The work required to identify these WMSs will be based entirely on a high-

level, qualitative assessment and should not require modeling or other additional technical analyses.

Generally, strategies that provide flood benefits are those that provide storage or detention of flood waters. Strategy types that are considered under this requirement include new reservoirs, conjunctive use and aquifer storage and recovery (ASR) strategies that utilize excess surface water.

Projects with dual purpose water supply and flood mitigation benefits can present challenges. In the case of surface water reservoirs, operations for water supply benefits aim to maintain a full storage pool as much as possible to provide yield during periods of lower inflows. In contrast, detention and retention basins for flood control are kept empty or mostly empty to maintain available storage in the case of large rainfall events. While numerous reservoirs in Texas have dedicated pools for both water supply and flood control storage, these pools are separate and each contribute to the overall footprint of the reservoir. For any new reservoir strategies that are recommended for water supply to also provide flood mitigation benefits, the overall footprint of the reservoir would likely have to be increased. Alternatively, a portion of the proposed footprint can be dedicated to flood control, which would reduce the water supply pool, thus reducing the yield and meeting fewer water needs. In the 2026 Region C Water Plan, four new reservoirs are recommended strategies, one of which is an off-channel reservoir proposed as part of a conjunctive use strategy. Another is an off-channel reservoir solely for storing reuse water. Both off-channel reservoirs offer little in flood mitigation benefits since they both have small natural drainage areas. At this time, the RCWPG does not recommend modifying any proposed reservoir strategies to allow for dedicated flood control storage.

In addition to surface water reservoirs, the RCWPG evaluated ASR options as water management strategies in the 2026 Plan. While ASR projects often utilize excess surface water, the flow rates at which surface water can be injected into the aquifer are typically limited by aquifer conditions and may not be able to provide meaningful reduction in flows during a flood event. Furthermore, injection water must be treated to a high quality to avoid adverse impacts on the aquifer. Rapid treatment of peak flows during a flood event would require a treatment plant to be sized for much larger than average flows, which would substantially increase the expense of an ASR project. Based on these limitations, no ASR projects in the Region C Plan were identified as potentially providing meaningful flood mitigation benefits.

In 2023, TWDB approved the first Regional Flood Plans (RFPs) for the state of Texas. The Region C Water Planning Area overlaps five flood planning regions, and the Region 3 Trinity Flood Planning Region overlaps at least a portion of every county in Region C. The 2023 Amended Region 3 Trinity RFP evaluated potential impacts of the RFP on water supply development and determined that none of the Region 3 recommended flood management strategies or projects impact the operation of the existing reservoirs in Region C.

5F.2 Documentation of Implementation Status and Anticipated Timeline for Certain Types of Recommended Water Management Strategies

This section documents the implementation status of certain recommended WMSs. The implementation status must be provided for the following types of recommended WMSs with any online decade:

- All reservoir strategies
- All seawater desalination strategies
- Direct potable reuse strategies that provide greater than 5,000 acre-feet per year of supply
- Brackish groundwater strategies that provide greater than 10,000 acre-feet per year of supply
- Aquifer storage and recovery strategies that provide greater than 10,000 acre-feet per year
- All water transfers from out of state
- Any other innovative technology project the RCWPG deems appropriate

Considering these criteria, there are five recommended WMSs that require the development of an implementation schedule. These include two new major reservoirs strategies, Marvin Nichols Reservoir and Lake Tehuacana, one major reallocation strategy, Lake Wright Patman, one off-channel reservoir in the Sabine Basin, and DWU's reuse strategy, Mainstem Balancing Reservoir. There are no direct potable reuse strategies greater than 5,000 acre-feet per year, nor recommended ASR strategies greater than 10,000 acre-feet per year or brackish groundwater strategies.

The implementation timelines developed for the new reservoirs are based on recent timelines for both Bois d'Arc Reservoir and Lake Ralph Hall. The schedules were adjusted to account for the different scales of the project. For permitting, it was assumed that the state and federal permits would be pursued at the same time. However, the two processes (federal and state) proceed independently of each other and permits may be issued at different times. Some uncertainty is included in the timelines, but they do not account for lengthy challenges to the projects through the legal system. Nor do the timelines account for potential unknown delays, such as archeological finds.

The implementation status of these strategies is discussed below and documented in the TWDB-required table in **Appendix N**.

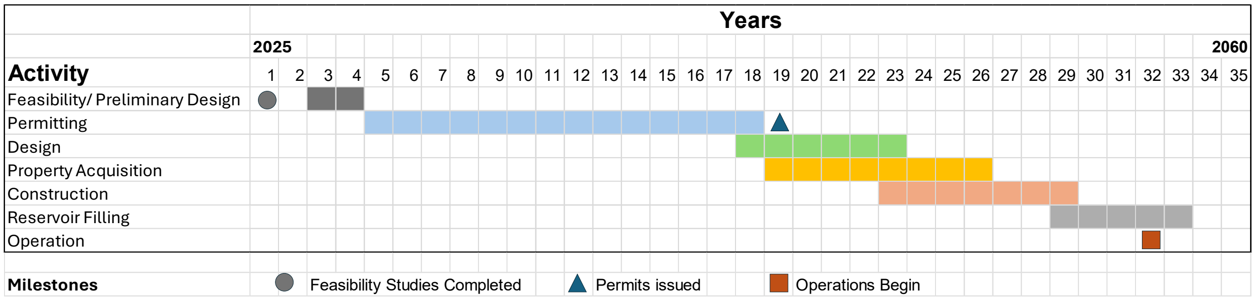
5F.2.1 Marvin Nichols Reservoir

The Marvin Nichols Reservoir is recommended for TRWD, NTMWD and UTRWD. It is an alternative strategy for DWU and Irving. The planning online decade is 2060. The five sponsors have authorized multiple studies to date, including the most recent flood modeling, dam and cost estimate update. This study was completed in 2024[10]. The sponsors continue to evaluate this project through on-going studies and the partnership of the five sponsors and SRBA. In addition, DWU, TRWD and

NTMWD have recently completed or are currently developing individual Long-Range Water Supply Plans that consider Marvin Nichols Reservoir as a potential future water supply.

The recommended implementation decade of 2060 is reasonable and attainable.

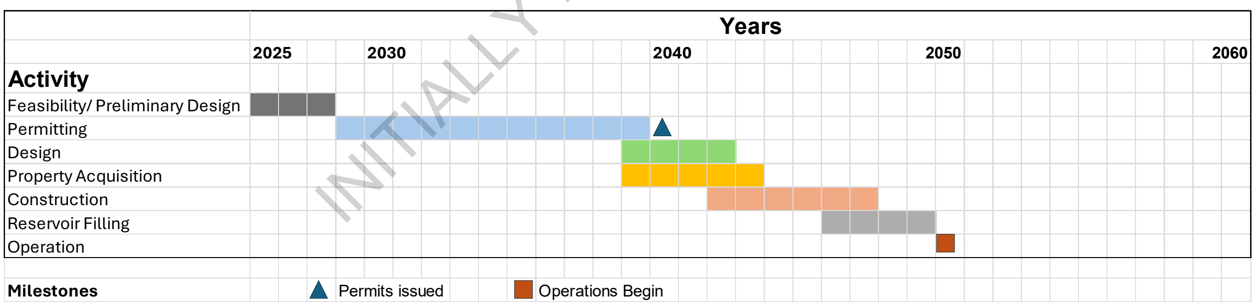
FIGURE 5F.3 IMPLEMENTATION TIMELINE FOR MARVIN NICHOLS RESERVOIR



5F.2.2 Lake Tehuacana

Lake Tehuacana is a recommended strategy for TRWD. This reservoir has been considered a future water source for TRWD since the design and construction of Richland-Chambers Reservoir in the early 1980s. It was conceived as an extension of Richland-Chambers that would be operated jointly. TRWD has continued to study this potential new reservoir, and it is part of TRWD's Long-Range Water Supply Plan. The recommended implementation timeline for Lake Tehuacana is feasible and reasonable.

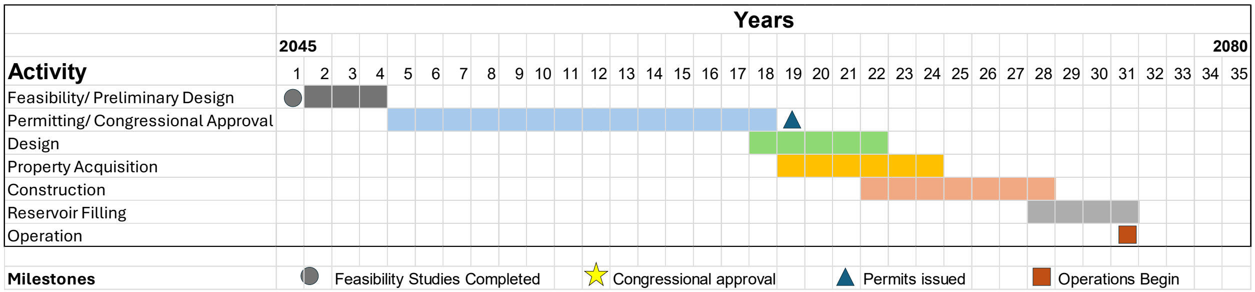
FIGURE 5F.4 IMPLEMENTATION TIMELINE FOR LAKE TEHUACANA



5F.2.3 Wright Patman Reallocation

Wright-Patman Reallocation is a long-term strategy recommended for NTMWD and TRWD. The concept of reallocating flood storage in Wright Patman for water supply was most recently studied by the USACE in 2013. This study, co-sponsored by multiple providers in the Metroplex and the USACE evaluated the viability of a significant reallocation. Based on the findings of the study, the USACE recommended the Wright Patman water supply storage be reallocated to elevation 235 feet MSL. This strategy is recommended to be online by 2080. To meet this timeframe, detailed studies and initiation of permitting are not needed for another 20 years. However, the sponsors of the project continue to evaluate this project as part of their long-range water planning. Figure 5F.5 shows the implementation schedule.

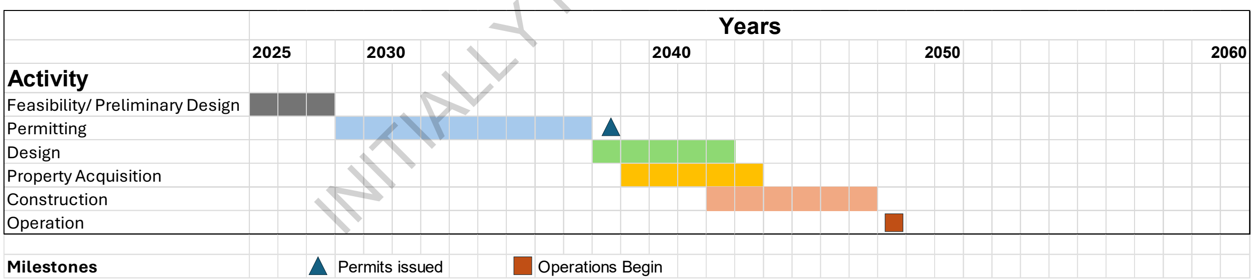
FIGURE 5F.5 IMPLEMENTATION TIMELINE FOR WRIGHT PATMAN REALLOCATION



5F.2.4 Main Stem Balancing Reservoir

The Main Stem Balancing Reservoir is a recommended strategy for DWU. This project will allow DWU to fully utilize its reuse water supplies. It includes a large off-channel reservoir to divert and store the wastewater that flows down the Trinity River and then the water is piped to Dallas for treatment. This project is a major component of Dallas' future water supplies. It was most recently studied and updated for the 2024 Long-Range Water Plan. This project is shown to be online by 2050. DWU already has the reuse permits for the water but would need to seek a water right to store the reuse water and a Section 404 permit from the USACE to construct the balancing reservoir. The timeframe outlined below is reasonable and attainable to have the supply online by 2050.

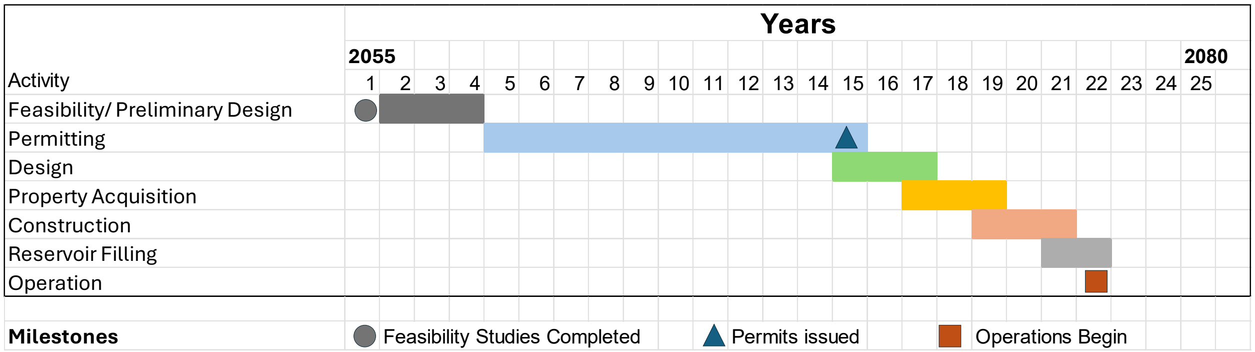
FIGURE 5F.6 IMPLEMENTATION TIMELINE FOR MAIN STEM BALANCING RESERVOIR



5F.2.5 Sabine Basin Off-Channel Reservoir

The Sabine Basin Off-Channel Reservoir is the second part of DWU's recommended Sabine Basin Conjunctive Use Strategy. This off-channel reservoir would have a surface area of only 800 acres and be used to store run-of-the-river diversions within the Sabine Basin. Dallas anticipates using existing Sabine Basin infrastructure to transport the water to its service area. The project would require a storage and diversion permit from TCEQ and an interbasin transfer permit to use the water in the Trinity River Basin. A Section 404 permit would likely be required for the river diversion and construction of the off-channel reservoir. The project is expected to be online by 2080.

FIGURE 5F.7 IMPLEMENTATION TIMELINE FOR SABINE BASIN OFF-CHANNEL RESERVOIR



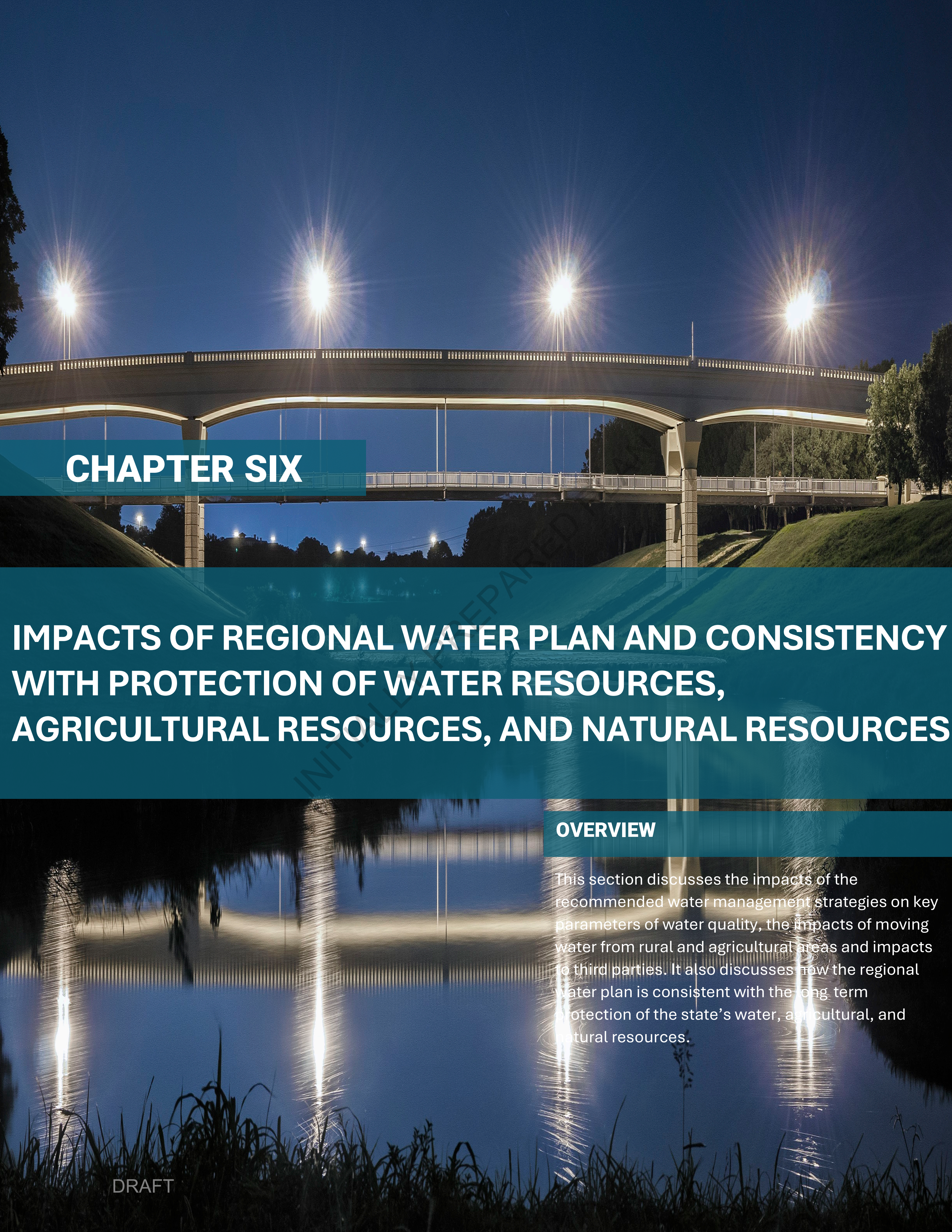
5F.3 Texas Water Development Board Required Database Reports

The Texas Water Development Board (TWDB) hosts a statewide database, known as DB27, which houses all the data and information from each of the 16 Regional Water Plans across the state. TWDB uses this data to assist in the development of the State Water Plan. To facilitate statewide data collection, there are specific requirements in how the data must be entered and reflected in DB27. In some cases, the aggregation and reporting of this data from the database differs from how the data is aggregated and reported in the written Regional Water Plan. The Regional Water Plan aims to present the data in a format that is easily understandable to stakeholders and the public. Divergence between the numbers in tables in the Plan and the DB27 reports do not necessarily represent errors. Instructions on how to access Region C's required DB27 reports can be found in **Appendix D** of this report. The DB27 reports that pertain to water management strategies are listed below.

REPORT
Report 10 – Recommended WUG Water Management Strategies
Report 11 – Recommended Projects Associated with Water Management Strategies
Report 12 – Alternative WUG Water Management Strategies
Report 13 – Alternative Projects Associated with Water Management Strategies
Report 14 – WUG Management Supply Factor
Report 15 – Recommended water Management Strategy Supply Associated with a new or amended IBT Permit
Report 16 – WUG Recommended WMS Supply Associated with a new or amended IBT Permit and Total Recommended conservation WMS Supply
Report 17 – Sponsored Recommended WMS Supplies Unallocated to WUGs
Report 19 – MWP WMS Summary

References

(1) Freese and Nichols, 2024. MNR study



CHAPTER SIX

IMPACTS OF REGIONAL WATER PLAN AND CONSISTENCY WITH PROTECTION OF WATER RESOURCES, AGRICULTURAL RESOURCES, AND NATURAL RESOURCES

OVERVIEW

This section discusses the impacts of the recommended water management strategies on key parameters of water quality, the impacts of moving water from rural and agricultural areas and impacts to third parties. It also discusses how the regional water plan is consistent with the long term protection of the state's water, agricultural, and natural resources.

6 IMPACTS OF REGIONAL WATER PLAN AND CONSISTENCY WITH PROTECTION OF WATER RESOURCES, AGRICULTURAL RESOURCES, AND NATURAL RESOURCES

CHAPTER OUTLINE	
Section 6.1	Impacts of Recommended Water Management Strategies on Key Water Quality Parameters
Section 6.2	Impacts of Recommended Water Management Strategies on Moving Water from Rural and Agricultural Areas and Impacts to Third Parties
Section 6.3	Invasive and Harmful Species
Section 6.4	Description of How the Regional Water Plan is Consistent with Long-Term Protection of the State's Water Resources, Agricultural Resources, and Natural Resources
Section 6.5	Impacts of Not Meeting Water Needs
Section 6.6	Consistency with State Water Planning Guidelines
RELATED APPENDICES	
Appendix A	Consistency with Water Planning Rules
Appendix G	Water Management Strategy Evaluation
Appendix J	Updated Quantitative Analysis of the Proposed Marvin Nichols Reservoir
Appendix K	Key Water Quality Parameters
Appendix L	Socio-Economic Impacts (To be provided in Final Plan)

The previous sections presented a set of recommended water management strategies for Region C wholesale water providers and water user groups. This section discusses the impacts of the recommended water management strategies on key parameters of water quality, moving water from rural and agricultural areas, and impacts to third parties. It also discusses how the regional water plan is consistent with the long-term protection of the state's water, agricultural, and natural resources.

6.1 Impacts on Key Water Quality Parameters

For a given water resource, the impact of water management strategies on key water quality parameters is evaluated by comparing current water quality conditions with anticipated water quality conditions when water management strategies are in place. Some of the recommended water management strategies involve diverting water from one water body and transferring this water to another water body. For these strategies, the difference in the quality of the two waters, the quantity of water transferred, and the effectiveness of any mitigation are used to project the impact on the receiving water. Other strategies include releases of discharges (such as wastewater effluent) to surface water sources. Impacts to the receiving streams (reservoirs) are considered in the individual strategy evaluation. A general discussion of these types of impacts is included in this chapter. Selection of the key water quality parameters used for this comparison is based on the importance of these parameters to the use of the water resource.

The recommended water management strategies can be grouped into the following strategy types:

- Existing surface water sources
- New surface water sources
- Existing groundwater sources
- New groundwater sources
- Direct and Indirect Reuse
- Conservation
- Desalination
- Aquifer Storage and Recovery
- Other

In general, each strategy within a strategy type is anticipated to have a similar qualitative impact on key water quality parameters in the receiving water. Exceptions to this generalization are addressed where appropriate. The strategy type defined as "other" includes strategies that do not involve transfer from one source to another and, therefore, have no impact on water quality in the receiving water. Examples of strategies in this category include increased pipeline capacity to a particular water user group or connection of a water user group to a wholesale provider.

The following sections define the parameters selected as key water quality parameters and the evaluation of impacts of recommended water management strategies on these key parameters.

6.1.1 Selection of Key Water Quality Parameters

The selection of key water quality parameters involved a two-stage approach. First, a list of candidate water quality parameters was compiled from several sources. Then, key water quality parameters were selected from the list of potential parameters based on the general guidelines described below.

Candidate water quality parameters were identified using the following sources:

- Parameters regulated by the Texas Commission on Environmental Quality (TCEQ) in the Texas Surface Water Quality Standards (TSWQS)[(1)]
- Parameters considered for the TCEQ Water Quality Inventory in evaluation of whether water body uses are supported, not supported, or have water quality concerns. The designated water body uses included in the Water Quality Inventory are:
    - Aquatic life use
    - Contact recreation use
    - General use
    - Fish consumption use
    - Public water supply use

- Parameters that may impact suitability of water for irrigation
- Parameters that may impact treatability of water for municipal or industrial supply

To develop a manageable and meaningful list of key water quality parameters, the following general guidelines were established for parameter selection:

- Selected parameters should be representative of water quality conditions that may be impacted on a regional scale and that are likely to be impacted by multiple water management strategies within the region. Water quality issues associated with localized conditions (such as elevated levels of a toxic material within one water body) will be addressed as necessary within the environmental impact evaluations of the individual water management strategies for each water user group.
- Sufficient data must be available for a parameter to be included as a key water quality parameter. If meaningful statistical summaries cannot be carried out on the parameter, it should not be designated as a key water quality parameter.

Since the 2021 Region C Water Plan, the Environmental Protection Agency has issued a final rule on the maximum contaminant levels (MCL) for per- and polyfluoroalkyl substances (PFAS) in drinking water. Full implementation of these regulations will take several years as water providers monitor their systems for these compounds. There is some uncertainty regarding these regulations and the timeline for implementation. PFAs contamination is an issue that should continue to be monitored. In addition to the TCEQ Surface Water Quality Standards, dissolved oxygen (DO) concentrations are protected during wastewater discharge permitting, and any agency that proposes to discharge biochemical oxygen demand (BOD) as part of a water management strategy would have to show that the discharge would meet local DO standards to obtain a discharge permit.

For the *2026 Region C Water Plan*, the Region C RWPG is using the same key water quality parameters that were used in the 2021 Region C Water Plan. PFAS is not considered a key water quality parameter because there is limited data on baseline levels of these compounds in the different water sources. A detailed discussion of the selection of key water quality parameters and definitions of baseline conditions for these parameters is included in **Appendix K**.

The key water quality parameters selected by the Region C Water Planning Group include:

- Surface Water
  - Ammonia Nitrogen
  - Nitrate Nitrogen
  - Total Phosphorus
  - Chlorophyll-a
  - Total Dissolved Solids (TDS)
  - Chloride
  - Sulfate
- Groundwater

- Total Dissolved Solids (TDS)
- Chloride
- Sulfate

6.1.2 Evaluation of Water Quality Impacts

Impacts of recommended water management strategies on key water quality parameters were assessed by comparing the water quality of the source water for a given strategy with that of the receiving water. This comparison included an evaluation of historical median concentrations of key parameters, together with consideration of data quality, relative quantities of water, and planned mitigation measures (e.g., treatment, blending, or other operational strategies that serve to mitigate water quality impacts). Each recommended strategy was assigned one of the following five anticipated impact ratings: low, medium low, medium, medium high, and high. (The quantitative impacts on key water quality parameters are discussed in more detail in **Appendix K**.) No recommended or alternative water management strategy is anticipated to have more than a "medium" impact on key water quality parameters. A "medium" impact is considered to be an impact that results in some changes in water quality but does not result in impairment of the designated uses of the water body. The following sections present a discussion of the anticipated water quality impacts for each strategy type. **Table 6.1** summarizes the range of anticipated water quality impacts within these strategy types.

TABLE 6.1 RANGE OF ANTICIPATED IMPACTS ON KEY WATER QUALITY PARAMETERS BY STRATEGY TYPE

STRATEGY TYPE	RANGE OF ANTICIPATED IMPACTS ON KEY WATER QUALITY PARAMETERS	COMMENTS
Existing Surface Water Sources	Low to Medium	Varies depending on water sources. Generally, mitigation is included for water sources with elevated TDS, chlorides and sulphates.
Existing Groundwater Sources	Low to Medium Low	Will vary depending upon the water quality of the groundwater.
New Surface Water Sources	Low to Medium	Water quality in new sources is difficult to predict.
New Groundwater Sources	Medium Low to Medium	Brackish groundwater strategies may have similar impacts to desalination.
Direct Reuse	Low/Positive	Potential positive impact resulting from reduced nutrient and TDS loadings to surface waters.
Indirect Reuse	Medium	Assumes mitigation to control impacts on nutrients, TDS, chloride and sulfate, if necessary.
Desalination	Medium Low to Medium	There is potential impact to receiving waters from brine discharges. However, any discharges must comply with Texas discharge permit and not exceed water quality standards for receiving water body.
Aquifer Storage and Recovery	Low	Impacts are expected to be low because injected water must meet or exceed the water quality of the receiving aquifer.

STRATEGY TYPE	RANGE OF ANTICIPATED IMPACTS ON KEY WATER QUALITY PARAMETERS	COMMENTS
Conservation	Low	Expect small reductions in wastewater discharges since most of conservation is from reducing outdoor water use that is not treated at WWTP.
Other	Low	Includes strategies not involving blending of two water sources (e.g. direct pipeline to a treatment plant).

6.1.3 Existing Surface Water Sources

For strategies utilizing existing surface water sources, impacts on key water quality parameters vary depending on a number of factors, including the location of the source and the intended destination of the water transfer. For strategies that involve pumping existing surface water directly to a water treatment plant, no impact on water quality is anticipated (resulting in a rating of "low"). However, when water is pumped from one source to another, the impacts will depend on the existing water quality of the two sources, as well as the quantities to be transferred and any mitigation that may be applied.

Several of the recommended and alternative strategies call for increased use of water from East Texas reservoirs. In general, reservoirs in East Texas have higher concentrations of nutrients (i.e., nitrogen and phosphorus) than many of the Region C reservoirs. The ultimate impact of importing water with higher nutrient concentrations to Region C reservoirs is difficult to predict due to the complex kinetic relationships between nutrients and chlorophyll-a.

Strategies that involve importing water from East Texas reservoirs to Region C reservoirs may result in increases in ammonia, nitrate, total phosphorus, and/or chlorophyll-a, but are not likely to lead to impacts that would impair the designated uses of the Region C water bodies. In general, the dissolved solids (TDS, chloride and sulfate) concentrations in East Texas reservoirs are lower than in Region C reservoirs. Therefore, in nearly all cases, transfer of East Texas water to Region C reservoirs will decrease dissolved solids concentrations in the receiving water bodies. All of the recommended water management strategies involving importation of East Texas water to Region C are anticipated to have a "low" or "medium low" impact on key water quality parameters.

In addition to strategies that include transfers from East Texas reservoirs to Region C reservoirs, several recommended and alternative strategies include intermediate transfers between reservoirs outside of Region C. These include transfers from Wright Patman Lake to Lake Fork Reservoir and Chapman Lake and from Toledo Bend Reservoir to the IPL, which discharges to Benbrook Lake and Joe Pool Lake. Although there are some minor variations in water quality among these reservoirs, these strategies are all anticipated to have no more than a "medium-low" impact on the key water quality parameters.

Lake Texoma is included in the recommended and alternative strategies for multiple entities. The water will be transported directly to a water treatment plant, and dissolved solids from Lake Texoma will not directly impact any reservoirs in Region C. For Texoma strategies that desalinate the brackish water, the brine discharge may impact the receiving source water. For blended strategies, much of the dissolved solids from Lake Texoma will eventually be discharged to Region C reservoirs as wastewater effluent. To project the impact of strategies involving use of Lake Texoma water, it has been assumed that mitigation measures will be used to maintain water quality in the receiving water body at levels that do not violate the Texas Surface Water Quality Standard. Based on these issues, the recommended strategy involving importation of Lake Texoma water to Region C is anticipated to have no more than a “medium” impact on key water quality parameters.

6.1.4 New Surface Water Sources

In general, the impact of the development of new surface water sources on key water quality parameters will be similar to that of existing reservoir sources. All of the proposed reservoir sites or run-of-river diversions identified as potential Region C sources are located in the Red, Trinity, Sulphur, or Neches River Basins. As such, the impacts on key water quality parameters of importing water from new reservoirs are likely to be similar to the impacts of importing water from existing East Texas sources to the Trinity River Basin. (The proposed off-channel reservoir in the Red River Basin for DWU is located in a reach of the Red River with lower TDS than Texoma.) All strategies involving the importation of water from new reservoirs to Trinity River Basin reservoirs are anticipated to have no more than a “medium” impact on key water quality parameters.

6.1.5 New Groundwater Sources

There are three new large groundwater water management strategies recommended for Region C and one alternative strategy. These include:

- Carrizo-Wilcox Aquifer groundwater in Anderson County;
- Carrizo-Wilcox Aquifer groundwater in Wood, Upshur, and Smith Counties;
- Carrizo-Wilcox Aquifer groundwater in Anderson and Freestone Counties; and
- Brackish groundwater in Grayson County.

Additional information on these projects is found in **Chapter 5C** and **Appendix G** of this report.

The alternative groundwater strategy for NTMWD (Anderson County) proposes to transport the groundwater directly to the Tawakoni WTP and would not affect any other water source. As a result, this strategy is anticipated to have no impact on key water quality parameters.

DWU proposes to transport the groundwater from Wood, Upshur, and Smith Counties to the Lake Fork intake and pump station and blend the water in the pipeline and/or at the water treatment plant. DWU does not propose to discharge the groundwater directly to Lake Fork. The Carrizo-Wilcox aquifer in these counties has a median TDS concentration that is higher than that in Lake Fork Reservoir and may have higher nitrate concentrations. The compatibility of these sources will be evaluated for treatability, but the strategy will not have an impact on key water quality parameters.

TRWD's potential Carrizo-Wilcox groundwater would be transported to the existing Integrated Pipeline and further transported to TRWD's service area in Tarrant County. The groundwater would be mixed with surface water in the IPL and can either be delivered directly to a water treatment plant or to Lake Benbrook. Carrizo-Wilcox groundwater from Anderson and Freestone counties has a median TDS concentration that is somewhat greater than that in Lake Benbrook. However, blending of the water with water from TRWD's East Texas reservoirs (Richland-Chambers and Cedar Creek) would mitigate the differences in water quality of the water that is discharged to Lake Benbrook. As a result, this strategy is anticipated to have a low to medium low impact on key water quality parameters.

6.1.6 Direct Reuse

Direct reuse involves the transfer of treated wastewater effluent directly to a point of use and not into another water body. As such, the impact on key water quality parameters for all direct reuse strategies is anticipated to be low. In some cases, there may be a positive impact. By reducing the quantity of effluent discharged into a stream or reservoir segment, the nutrient and TDS loads to that segment will also be reduced, thereby potentially improving downstream water quality.

6.1.7 Indirect Reuse

Indirect reuse is a recommended strategy for multiple entities within Region C. This strategy involves the discharge of treated wastewater effluent into a body of water used for water supply. Treated wastewater can contain nutrient and dissolved solids concentrations that are high in comparison to the receiving water. However, for most of the recommended strategies that include indirect reuse, some form of mitigation (e.g., advanced wastewater treatment, constructed wetlands, blending, etc.) is planned to address potential water quality impacts associated with nutrients and dissolved solids. For the purposes of this evaluation, it is assumed that some form of mitigation for potential water quality impacts associated with the key parameters will be implemented, if necessary, such that the designated uses of the water body will not be impaired. For this reason, recommended indirect reuse strategies are anticipated to have no more than a medium impact on key water quality parameters.

6.1.8 Conservation

Conservation is a recommended strategy for all municipal water user groups in Region C, including those without shortages. Water conservation is the development of water resources and practices to reduce the consumption or loss of water, increase the recycling and reuse of water, and improve the efficiency in the use of water. Water conservation plans are designed to implement practices to conserve water and quantitatively project water savings. The water conservation measures recommended in Region C are not expected to affect water quality adversely. The results should generally be beneficial because the demand on surface and groundwater resources will decrease. Quantifying such positive impacts could be very difficult. **Chapter 5B** contains additional discussion of water conservation.

6.1.9 Desalination

There are several strategies that include desalination of the source water for municipal purposes. These strategies generally include desalination of water Texoma, including Texoma water to Denison, Sherman and GTUA. GTUA also proposes to desalinate brackish groundwater at the same treatment plant used for Texoma water. While the brackish water is delivered directly to a water treatment plant, the desalination process produces a brine discharge that is discharged to local streams and/or directly to Lake Texoma.

6.1.10 Aquifer Storage and Recovery

Several water providers are considering implementing ASR projects. Each of these projects would include pretreatment of the source water prior to injection in the aquifer to ensure the water quality does not affect the in-situ groundwater quality. The recovered water is not anticipated to be discharged to another water source. Therefore, these projects will not have an impact on key water quality parameters.

6.1.11 Summary

The recommended water management strategies in this plan were developed based on the principle that designated water quality and related water uses as shown in the state water quality management plan shall be improved or maintained. Based on the projected impacts of recommended water management strategies on key water quality parameters, some strategies may require mitigation or advanced treatment to obtain the permits necessary for implementation.

6.2 Impacts on Moving Water from Rural and Agricultural Areas and Impacts to Third Parties

This section discusses the potential impacts of the *2026 Region C Water Plan* on rural and agricultural activities and possible impacts to third party entities. This section specifically focuses on the impacts associated with moving water from rural and agricultural areas. It also discusses the considerations given during the development of the plan to protect rural and agricultural activities.

6.2.1 Impact on Agricultural Resources

The *2026 Region C Water Plan* includes several recommended strategies that move water from rural areas to urban centers. These strategies fall into three general categories:

- New connections to existing water sources: Lake O' the Pines to NTMWD, Lake Palestine to DWU, Texoma to NTMWD and GTUA, and others.
- New reservoirs: Marvin Nichols and Lake Tehuacana.
- New groundwater: new groundwater is recommended for several MWPs, including DWU, TRWD and NTMWD.

Several alternative strategies also may move large quantities of water from rural to urban areas. These include new reservoirs, Toledo Bend Reservoir, and Out-of-State water.

The impacts from the recommended water management strategies will vary depending on the location of the project, current use of the water, and the quantity of water that is being transferred. The types of impacts that may occur include:

- Transfer of water rights from agricultural use to other uses
- Removal of agriculture through inundation from new reservoirs
- Changes in stream flow immediately downstream of a new reservoir
- Increased water level fluctuations at existing lakes as more water is used

The recommended water plan considered many different factors as strategies were developed and recommended for inclusion. One consideration is the development of a plan that minimizes the potential impacts to rural and agricultural areas through utilization of existing sources with a strong emphasis on conservation and reuse. The existing and recommended water conservation and reuse strategies, including those that are assumed in the demands, will meet approximately 1.28 million acre-feet per year of the pre-conservation demand. The emphasis on conservation and reuse reduces the number of strategies and amount of water needed from other sources, including transfers of water from rural and agricultural areas.

Other protections for agricultural and rural uses were incorporated in the process of evaluating and allocating water supplies. Specifically, these include:

- Existing and proposed surface water supplies were evaluated under the prior appropriation doctrine that governs surface water rights and protects senior water rights. In the final *2026 Region C Water Plan*, there are no transfers of irrigation water rights to urban uses.
- The amount of available supplies from existing surface sources was limited to firm yield or less. Existing uses from these sources were protected through the allocation process and only the amount of water that is currently permitted (up to the firm yield) was considered for transfer to Region C. This includes transfers from Lake O' the Pines, Lake Palestine, and Lake Texoma. Each of these transfers either has an existing permit to use the water or would negotiate contracts to buy the water from existing permit holders.
- The two recommended reallocation strategies (Wright Patman and Texoma) would produce new water and would not impact current agricultural or rural activities.
- Supplies from new reservoirs considered instream flow releases in accordance with the planning guidelines set forth by the TWDB. These releases protect recreational and non-consumptive water needs downstream of the proposed reservoir sites.
- Transfers of groundwater are limited by the MAG and do not use existing water allocated to irrigation or rural users.

In Region C there is little irrigated agriculture, with irrigated cropland making up less than 2 percent of harvested cropland. Most of the irrigation water demand is associated with golf course irrigation in and near urban areas, and much of this water need will be met through reuse. There are no recommended transfers of needed irrigation water to other uses.

The potential impacts to agricultural and rural areas are limited to the loss of land from inundation of new reservoirs. The total acreage that would be flooded if both recommended reservoirs in the *2026 Region C Water Plan* were implemented is approximately 81,000 acres, with most of the inundated area being from the proposed Marvin Nichols Reservoir. More detailed information about the impacts of this reservoir on agricultural land is included in **Appendix J.** Impacts from new reservoirs will be mitigated as part of the permitting process. Also, new reservoirs can stimulate the rural economy through new recreational business and local improvements. The new reservoirs will provide a new water source for rural activities.

6.2.2 Third Party Impacts of Moving Water from Rural and Agricultural Areas

Possible third-party impacts include loss of land and timber, impacts to existing recreational business on existing lakes due to lower lake levels, and impacts to recreational stream activities. Economic studies have been conducted for the Marvin Nichols Reservoir proposed for Region C (**Appendix J**), and this study indicates a significant net economic benefit to the region of origin. Previous economic studies(2) for Bois d'Arc Lake also indicated increased economic activity with the development of the lake. Bois d'Arc Lake has been open to the public since April 2024. From April to December 2024, TPWD has documented that nearly 17,000 anglers have come to Bois d'Arc Lake to fish and spent over $784,000 on local businesses(3). Property values in the county have risen over the past two years, allowing the county to reduce tax rates by nearly 8 percent in 2023 and 5 percent in 2024. It is expected that these positive third-party impacts associated with new reservoir development will continue and increase over time.

6.2.3 Impacts on Groundwater and Surface Water Inter-relationships

Groundwater and surface water inter-relationships are considered to some extent in the state-developed surface Water Availability Models (WAMs) and Groundwater Availability Models (GAMs). Stream flow losses, which include infiltration, are included in the WAMs based on historical flows and other data. Similar inter-relationships are included in the GAMs and are represented as springs or discharges of groundwater. For surface water, the supplies for the Region C Water Plan do not exceed the firm yield of the reservoir as determined by the WAMs. For groundwater, the desired future conditions, as adopted by the GMAs, were honored for both currently developed supplies and potential future strategies. By not exceeding the MAG, long-term effects on groundwater and surface water interrelationships were minimized since these complex relationships are also considered by the GMA when selecting the DFCs. The impacts of recommended and/or alternative water management strategies in Region C on groundwater and surface water relationships are expected to be minimal.

6.2.4 Other Factors

The impacts to recreational activities and recreational businesses at existing lakes are expected to be low. While water levels at local and rural lakes may fluctuate more under the recommended plan, these water level changes are within the design constraints of the reservoirs. Most of the major water transmission strategies have water sources that are in highly prolific rainfall areas. Significant changes in water levels at these sources would be limited to extreme drought conditions. Impacts to recreational stream activities are mitigated through the permitting process and requirements for instream flow releases. New reservoirs offer new recreational opportunities and recreational business growth that could spur the local economies of rural areas.

6.2.5 Interbasin Transfers of Surface Water

Several recommended and alternative water management strategies involve interbasin transfers of surface water to Region C. These strategies propose moving water from the Red, Neches, Sabine, Sulphur and Cypress Basins to the Trinity Basin. There are several requirements for interbasin transfers, including the highest practicable level of conservation achievable by the sponsor of the project and an assessment of the needs of the basin of origin and receiving basin, that are addressed in the evaluation of the strategies. For each project with an interbasin transfer, the sponsor(s) have developed robust conservation plans that represent the highest practicable level of conservation. In addition, the Region C Water Plan recommends water conservation for each municipal WUG. Data presented in Chapter 5B further demonstrates the region's achievements in water conservation.

Water needs in the Trinity River Basin, which is considered the receiving basin for most of the recommended strategies with interbasin transfers, far exceeds the needs in the source basins. The needs, as reported in DB27, for each of these basins of origin and the receiving basin (Trinity) are included in **Table 6.2**.

TABLE 6.2 WATER NEEDS BY BASIN RELATED TO INTERBASIN TRANSFERS (ACRE FEET PER YEAR)

BASIN	2030	2040	2050	2060	2070	2080
Red	129,790	158,927	133,184	110,866	126,577	140,235
Neches	19,884	36,314	54,741	73,362	92,773	112,028
Sabine	21,550	29,163	37,277	44,370	52,297	59,003
Cypress	4,333	5,796	7,225	8,358	9,459	10,355
Sulphur	27,134	28,478	29,883	31,351	32,855	34,459
Trinity	245,701	497,110	738,176	960,830	1,158,027	1,329,508

6.3 Invasive and Harmful Species

The appearance of several invasive and/or harmful species (including zebra mussels, giant salvinia, and golden algae) poses a potential threat to water supplies throughout the state of Texas. Monitoring and management by water suppliers in Region C will be necessary in the coming decades. Invasive species will likely be an ongoing area of interest to Region C, as the appearance of additional invasive species in the future remains a possibility. The issue of invasive and harmful species should be considered as plans for interbasin transfers of water supplies are implemented. A more extensive discussion of these invasive species is found in **Chapter 1** of this report.

6.4 Description of How the Regional Water Plan is Consistent with Long-Term Protection of the State's Water Resources, Agricultural Resources, and Natural Resources

The development of viable strategies to meet the demand for water is the primary focus of regional water planning. However, another important goal of water planning is the long-term protection of resources that contribute to water availability and to the quality of life in the state.

The purpose of this section is to describe how the *2026 Region C Water Plan* is consistent with the long-term protection of the state's water resources, agricultural resources, and natural resources. The requirement to evaluate the consistency of the regional water plan with protection of resources is found in 31 TAC Chapter 357.35(c) and 357.41.

6.4.1 Consistency with the Protection of Water Resources

Five river basins provide surface water for Region C, and six aquifers provide groundwater to the region. The four major river basins within Region C boundaries are the Trinity River Basin, the Red River Basin, the Brazos River Basin, and the Sabine River Basin. Only a small portion of the Sulphur River Basin lies within the Region C boundaries, but this basin provides important surface water supplies for Region C from Chapman Lake and Lake Ralph Hall. The region's groundwater resources include two major aquifers, the Trinity and Carrizo-Wilcox, and three minor aquifers, the Woodbine, the Nacatoch, and the Queen City. The extents of these aquifers within the region are depicted in **Chapter 1**.

The Trinity River Basin provides the largest amount of water supply in Region C. Surface reservoirs in the Trinity Basin in Region C with conservation storage over 50,000 acre-feet include:

- Bridgeport Reservoir
- Eagle Mountain Reservoir
- Benbrook Lake
- Joe Pool Lake
- Grapevine Lake
- Ray Roberts Lake
- Lewisville Lake
- Lavon Lake
- Lake Ray Hubbard
- Lake Fairfield
- Bardwell Lake
- Navarro Mills Lake
- Richland-Chambers Reservoir

- Cedar Creek Reservoir

Other major reservoirs supplying surface water to Region C include the following:

- Lake Texoma and Bois d'Arc Lake in the Red River Basin. Both are located in Region C.
- Only a small portion of the Sabine River Basin lies within Region C; however, Region C receives water from two major water supply reservoirs located in Region D and the Sabine Basin (Lake Tawakoni and Lake Fork Reservoir).
- Only small portions of the Brazos River Basin lie within Region C, and no Brazos River Basin reservoirs with conservation storage over 50,000 acre-feet are located in Region C.
- Two major reservoirs in the Sulphur River Basin provide water to Region C. Chapman Lake is located in Region D and Lake Ralph Hall is in Region C.
- Lake Palestine is located in the Neches River Basin in Region I and is permitted for use in Region C.

Of the groundwater resources in Region C, the Trinity aquifer and the overlying Woodbine aquifer provide most of the region's groundwater. The remaining supply is from the Carrizo-Wilcox, Nacatosh, Queen City, and undesignated aquifers. These quantities are limited in the Region C plan to groundwater amounts specified in the respective MAG, which was determined through the local groundwater districts through the Joint Planning process.

To be consistent with the long-term protection of water resources, the plan must recommend strategies that minimize threats to the region's sources of water over the planning period. The water management strategies identified in **Chapter 5** were evaluated for threats to water resources. The water availability models, WAMs and GAMs, are used to evaluate surface water and groundwater supplies, respectively. The results from these models are used to determine the amount of water supply that could be allocated while still protecting the sustainability of the water resources. The recommended strategies represent a comprehensive plan for meeting the needs of the region while effectively minimizing threats to water resources.

Descriptions of the major strategies and the ways in which they minimize threats include the following:

- Water Conservation. Strategies for water conservation have been recommended that will significantly reduce the demand for water, thereby reducing the impact on the region's groundwater and surface water sources. Not including reuse, water conservation practices are expected to reduce the municipal water use in Region C by 368,620 acre-feet per year by 2080 and reduce non-municipal water use by 10,984 acre-feet per year by 2080, reducing impacts on both groundwater and surface water resources (**Table 5B.11**).
- Reuse Projects. Existing and recommended reuse projects in Region C account for a total water supply of 899,990 acre-feet per year as of 2080 (**Table 5B.8**). The majority of the recommended reuse is for municipal use. The majority of the recommended reuse is for municipal use that is supplied primarily via indirect reuse sources. A portion of the reuse water is for golf course and general irrigation in municipal areas and for steam electric power generation. These strategies will provide an economical and environmentally

desirable source of water for Region C and delay the need for development of new water supplies.

- Conservation and Reuse. The existing and recommended 2080 water conservation and reuse strategies, including those that are assumed in the demands, will meet more than 1.3 million acre-feet per year (or 45 percent) of the pre-conservation demand.
- Full Utilization of Existing Surface Supplies Committed to Region C. A number of recommended strategies for Region C are intended to make full use of existing supplies. Most reservoirs in Region C will be utilized at or near their firm yield capacities but not beyond, thus protecting these reservoirs and allowing the continued water supplies throughout a drought similar to the drought of record. In addition, by fully utilizing the existing water supplies, water providers will delay the need for new supplies.
- Purchase of Existing Supplies Not Currently Committed to Region C. As part of this planning process, the Region C Water Planning Group investigated the cost and availability of existing water supplies that might be made available to Region C.
- Optimal Use of Groundwater. This strategy is recommended for entities with limited alternative sources and sufficient groundwater supplies to meet their needs. Groundwater availability reported in the plan maintains the long-term sustainability of the aquifer and is based on the desired future conditions determined through the Joint Planning process.
- New Surface Reservoirs. Two new surface reservoirs have been recommended as water management strategies. They include: Tehuacana Reservoir in 2040 and Marvin Nichols Reservoir in 2060. Three other potential reservoirs are alternative strategies. These reservoirs will impact the land, homes, and habitat that will be inundated and on the existing stream segments which will be altered. As part of reservoir development, the Corps of Engineers will determine the quantity of land that should be set aside to mitigate for impacts to aquatic and wildlife habitats. Landowners within the reservoir sites will be compensated for their land. These new reservoirs will make releases for environmental water needs in accordance with environmental regulations and permit conditions, which will help sustain aquatic and wildlife habitat downstream from the reservoir. Water right permits for these reservoirs will be granted based on results from the WAMs which will ensure that these new water rights do not interfere with existing prior water rights, thus protecting existing water resources of the state.

6.4.2 Consistency with Protection of Agricultural Resources

Many areas of Region C are heavily urbanized, and the region has comparatively little irrigated agriculture. In the year 2020, 4 percent of the region's total water use was for irrigation and livestock and most of the irrigation shown in that table was used for golf course irrigation rather than agricultural irrigation.

None of the recommended water management strategies involve transferring water rights from agricultural use to another use. Thus, the Region C plan protects current agricultural water use.

The proposed Lake Tehuacana will inundate some agricultural areas, but agricultural use in the reservoir site is limited. During the permitting process, site specific analyses would address this topic in more detail.

The proposed Marvin Nichols Reservoir in the Region C Plan is located outside of Region C. The area of the proposed Marvin Nichols Reservoir site has some agricultural activity, including cattle raising and timber. This area is also known to have some hunting leases for game animals. A quantitative analysis of the impacts of the proposed Marvin Nichols Reservoir on agricultural and natural resources is included in **Appendix J**.

6.4.3 Consistency with Protection of Natural Resources

Region C contains many natural resources that must be considered in water planning. Natural resources include threatened or endangered species; local, state and federal parks and public land; and energy/mineral reserves.

The Region C plan is consistent with the long-term protection of these resources. A brief discussion of consistency of the plan with protection of natural resources follows.

Threatened/Endangered Species. A list of threatened or endangered species located within Region C is contained in **Chapter 1**. Federal and state listed species are summarized utilizing data from the Texas Parks and Wildlife Department's listing and from the U.S. Fish and Wildlife Service.

All recommended strategies in Region C have been evaluated for the possible effects on these threatened and endangered species. These evaluations and discussion of major strategies are included in **Appendix G**. Large-scale strategies that are types most likely to disturb threatened or endangered species habitat. These potential disturbances would be evaluated in more detail during the permitting process. If the project is found to impact threatened and/or endangered species, the permit would include mitigation allowances that set aside additional land for that habitat and provide perpetual protection for the affected species.

Wetland Habitats. The Region C plan includes some projects that would have impacts to existing wetland habitats. The Marvin Nichols Reservoir project would inundate a portion of the state's Priority 1 bottomland hardwoods. These wetlands are considered high value to key waterfowl species and would require comparable mitigation. As discussed in **Section 6.4.1**, state and federal agencies will determine the quantity of land that should be set aside to mitigate for impacts to aquatic and wildlife habitats during reservoir development. The quantity and quality of the mitigation lands will be designed to achieve no net loss of wetlands functions and values. In addition, the development of a lake will create new wetland and aquatic habitats that would be protected from potential future impact.

Parks and Public Lands. The Texas Parks and Wildlife Department operates several state parks in Region C listed below[4]:

- Bonham State Park in Fannin County
- Cedar Hill State Park in Dallas County
- Eisenhower State Park in Grayson County
- Lake Mineral Wells State Park in Parker County
- Fort Richardson & Lost Creek Reservoir State Park in Jack County

- Purtis Creek State Park partially in Henderson County
- Caddo National Grasslands Wildlife Management Area in Fannin County
- Ray Roberts State Park in Cooke, Denton, and Grayson Counties
- Richland Creek Wildlife Management Area in Freestone and Navarro Counties
- Ray Roberts Lake Wildlife Management Area in Cooke, Denton, and Grayson Counties
- Cedar Creek Islands Wildlife Management Area in Henderson County

Federal government natural resource holdings in Region C include the following:

- Parks and other land around all the Corps of Engineers lakes in the region (Texoma, Ray Roberts, Lewisville, Lavon, Grapevine, Benbrook, Joe Pool, Bardwell, and Navarro Mills)
- Hagerman National Wildlife Refuge on the shore of Lake Texoma in Grayson County
- Lyndon B. Johnson National Grasslands in Wise County
- The Caddo National Grasslands in Fannin County

In addition, there are a number of city parks, recreational facilities, and public lands located throughout the region. Increased utilization of some reservoirs may lower the lake levels during a severe drought. This may affect the parks and public lands surrounding these reservoirs, but the strategies recommended in the Region C plan will have no additional impact on these water resources beyond what has already been allowed for in their water right permits. None of the recommended water management strategies evaluated for the Region C plan are expected to adversely impact parks or public lands.

Energy Reserves. Oil and natural gas fields have been important natural resources in portions of Region C. However, over the past decade much of the oil and gas activity has significantly declined. Limited production is on-going in the Barnett Shale and current oil fields in Region C. With reduced activities and improved water recycling techniques, the water use for mining has declined over 90 percent since 2010. None of the recommended water management strategies are expected to impact oil or gas production in the region. Existing oil and gas wells within the proposed reservoir sites can be modified to continue production. This has been done at other reservoir sites across the state. The proposed Tehuacana Reservoir location in Freestone County is underlain, in parts, by lignite coal deposits. In 1982, the US Army Corps of Engineers conducted a feasibility report on the recovery of these resources [(5)]. This report concluded that there was economic impetus to mine this deposit to 150 feet. However, the economic environment for the mining and use of coal for power generation has changed substantially since 1982. One major assumption in the report is that the coal could be used at Luminant's Big Brown Plant near Fairfield, which is only a short distance from the potential mine location near Tehuacana. However, in 2011, Luminant ceased coal production at their three current lignite mines, and in 2018 shut all operations at the Big Brown power plant. Furthermore, in 2015 the EPA Clean Power Plan Rule[(6)] was authorized, which will make coal fired power generation even less attractive. While it is impossible to predict future market changes and conditions, given the current regulatory environment and the trend of closing lignite mines, it is unlikely that the construction of the Tehuacana Reservoir will result in adverse impacts on the coal industry.

6.4.4 Consistency with Protection of Navigation

No commercial navigation activities occur in Region C currently. For the two river segments identified by the Corps of Engineers as "navigable waters" (Trinity River downstream of Fort Worth and the Red River downstream of Warren's Bend in Cooke County), there are no known plans to initiate navigation activities. This plan has no impact on navigation in Region C.

The Region C recommended strategies also do not impact navigation activities in other regions. Analysis of the proposed reuse projects found that there are limited impacts to stream flows from reuse projects, thus protecting potential downstream navigation activities. The recommended reservoirs located in adjacent regions include sufficient releases that would protect instream uses and downstream navigation activities.

6.5 Impacts of Not Meeting Water Needs

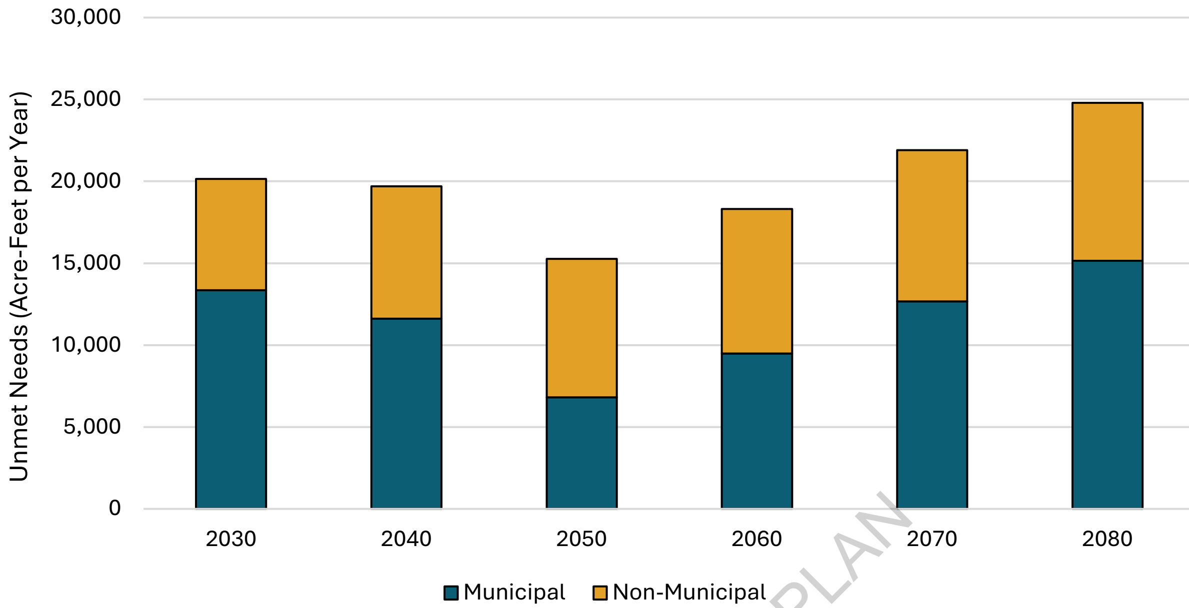
6.5.1 Unmet Needs in Region C

There are three municipal WUGs and six non-municipal WUGs with unmet needs in Region C as shown in **Table 6.3**. There is approximately 20,000 acre-feet per year of unmet needs in 2030, growing to over 24,000 acre-feet per year by 2080. **Figure 6.1** shows the unmet needs in Region C by category. Region C considered all potentially feasible water management strategies to meet the needs of Region C WUGs which is discussed in **Chapter 5A**. The unmet needs for each WUG are discussed individually below.

TABLE 6.3 UNMET NEEDS IN REGION C

WUGS	UNMET NEEDS (VALUES IN ACRE FEET PER YEAR)					
	2030	2040	2050	2060	2070	2080
Municipal						
Celina	2,368	0	0	0	0	0
County-Other, Parker						
Trinity Basin	*0*	*833*	*0*	*0*	*0*	*0*
Brazos Basin	*49*	*1,428*	*3,220*	*4,964*	*7,232*	*8,848*
Irving	10,936	9,353	3,596	4,527	5,443	6,308
Subtotal - Municipal	**13,353**	**11,614**	**6,816**	**9,491**	**12,675**	**15,156**
Non-Municipal						
Irrigation, Ellis	553	537	521	512	504	496
Irrigation, Fannin	4,436	4,417	4,398	4,388	4,378	4,369
Irrigation, Parker	131	80	39	11	0	0
Manufacturing, Ellis	850	796	948	1,106	1,269	1,439
Manufacturing, Henderson	829	876	931	988	1,044	1,100
Steam-Electric Power, Freestone	0	1,384	1,617	1,822	2,027	2,232
Subtotal - Non-Municipal	**6,799**	**8,090**	**8,454**	**8,827**	**9,222**	**9,636**
Total Region C Unmet Needs	***20,152***	***19,704***	***15,270***	***18,318***	***21,897***	***24,792***

FIGURE 6.1 UNMET NEEDS IN REGION C BY CATEGORY



Unmet Municipal Water Needs

The total unmet municipal water need in Region C is over 13,000 acre-feet per year in 2030, increasing to over 15,000 acre-feet per year by 2080. Region C considered and recommended water conservation for all municipal WUGs, but conservation is not sufficient to meet these needs. Drought contingency is not a recommended strategy in Region C because it is reserved for emergency situations and if a drought worse than the drought of record occurs. That does not mean drought contingency measures are not used. It is simply not relied upon to meet long-term water needs.

Region C is showing unmet near-term municipal needs for Celina due to the rapid growth in the area and the lack of readily available water. Celina has reached out to multiple water providers for additional supplies, but new water cannot be developed until 2040. After 2030, Celina can meet its demands assuming the recommended strategies are online as planned. If a drought occurs before 2040, Celina may need to implement drought contingency measures. It is assumed that Celina has sufficient supplies for health and safety of its customers.

Parker County-Other also shows unmet needs over the planning horizon. The county is experiencing rapid growth and groundwater is insufficient to meet this demand. This need is greater in the Brazos Basin part of the county because there are limited groundwater supplies and little to no water from other providers to serve these areas. The County is trying to address these concerns by creating a county-wide water district. However, the source of water for this district in the Brazos Basin has not been identified and the unmet need in the Brazos Basin part of the county grows to nearly 9,000 acre-feet per year. Until a reliable source of water is secured, the County may need to take measures to promote growth and water use in a more sustainable manner and continue to work with local water providers to develop new sources of water supplies. It is uncertain whether the County has the authority to implement water restrictions on individual property owners with private wells.

The Trinity River Basin portion of Parker County (eastern part) shows an unmet need only in 2040. TRWD has committed to providing water to customers within the Trinity River portion of Parker County to the extent it has water supplies. Currently, supplies in the western part of TRWD's system are limited until additional water management strategies are constructed. Due to the timing of these new supplies, TRWD is unable to fully meet the projected needs in Trinity River Basin portion of the county in 2040. While these new water supplies are being developed, the County may need to take measures to promote growth and water use in a more sustainable manner. The County could also work with the Upper Trinity GCD to secure limited groundwater supplies above the MAG with the understanding that these supplies would be temporary and discontinued when the new surface water becomes available.

For Parker County-Other, if growth continues as projected, the County may need to take emergency measures to ensure the health and safety of its residents.

The city of Irving also shows an unmet need in the Region C Water Plan. Irving has purchased 25,000 acre-feet per year of reuse water from TRA, however, the City has not reached agreements with other providers to treat the water. The City continues to negotiate with multiple water providers on options to utilize this source. As a result, the reuse water is not shown as a recommended strategy for Irving. Irving has reached an agreement with DWU to provide some additional treated water over the planning period. Irving believes this additional supply should meet most, if not all, of its projected water needs because Irving's internal demand projections are less than projected by Region C. There are sufficient supplies for Irving to meet the health and safety of its customers. Irving also fully intends to develop the reuse water from TRA. Further study and agreements are necessary for this supply.

Unmet Non-Municipal Water Needs

There are unmet non-municipal water needs in Region C for irrigation, manufacturing and steam electric power. These needs total nearly 6,800 acre-feet per year in 2030 and increase to approximately 9,700 acre-feet per year by 2080. Generally, unmet non-municipal water needs do not pose a health and safety concern for the region, but they do affect the economic growth within the region.

There are three counties showing irrigation water needs. In Region C much of the irrigation water is used for irrigation of golf courses and not agricultural production. As such, Region C recommends rebates for irrigation for the golf course that receive water from municipalities or other water providers. For the three counties showing unmet water needs, Ellis, Fannin and Parker counties, much of this irrigation use is for agricultural production and would not benefit from a rebate program. Other types of irrigation conservation were not considered because there was insufficient data on crop type and irrigation equipment used to develop irrigation conservation measures for these counties. Conversion to dryland farming is an option for areas with insufficient rainfall, however, this would have economic impacts on the producers and counties and is not recommended in the Region C Water Plan. The current water source for irrigation in these counties is groundwater. Other sources of water are not economically feasible for irrigation, and there is not enough MAG supply to allocate to these WUGs to fully meet their needs. Over time, individual producers will adjust their irrigation practices and irrigated acreages as needed.

There are two counties with unmet manufacturing water needs, Ellis and Henderson counties. Most of the manufacturing demand in Ellis county is served by the cities of Ennis and Waxahachie. Both cities have additional supplies to serve the growing manufacturing water needs in the county but have not committed to increasing existing contracts. If the manufacturing growth occurs in or near these respective cities, it is likely this water need will be met through supplies from one or both cities. However, future contracts would be negotiated between the buyer and seller.

The manufacturing water demand in Henderson County is split between Region C and Region I. Nearly all the manufacturing water used in Region C is from groundwater, which is limited by the MAG. A small amount of manufacturing water is supplied through the City of Athens. There may be some additional supply in the later decades, but Athens has not committed to provide additional water to manufacturing.

Future manufacturers will locate in areas that will provide sufficient water supplies. That may occur in Ellis and Henderson counties, or the manufacturers may choose to locate in different areas of the region or state. The ability to self-supply water in Ellis and Henderson counties from groundwater is limited by the MAGs. Additional water will need to be secured from other providers, which will be negotiated between the buyer and seller.

There is one unmet need for steam electric power in Region C. This is in Freestone County. The projected water demands for Freestone County include the water right (CA-5040) for the Big Brown Power Plant that was retired in 2017. The source of the water for this right is Lake Fairfield, which has since been sold to a private developer. At the time the demands were developed, this sale was not completed. With the completion of the transfer of the water and water right, it is unlikely that the water will be used for steam electric power. Therefore, this unmet need may never be realized because there will be no demand for the water supply.

Summary of Unmet Water Needs

The Region C Water Plan identified a range of potentially feasible water management strategies for all WUGs with a projected water need. Nearly all the projected water needs in region are met through recommended strategies, including conservation. However, there are several WUGs with unmet needs. In some cases, it is because there is limited available water to these WUGs. In other cases, there may be available supply, but agreements could not be reached for this plan. Region C will not recommend a strategy unless both parties agree to the strategy. Over time, it is possible that future agreements will be made, and unmet needs will decrease. If these agreements are reached prior to the adoption of the 2031 Region C Water Plan, this plan can be amended to reflect the new recommended water management strategies. However, it is likely that these agreements and strategies can simply be incorporated into the next Region C Water Plan.

6.5.2 Socioeconomic Impacts

The Socioeconomic Impacts analysis is currently being conducted by the TWDB. This section will be completed for the final plan, after Region C receives the report. The TWDB Socioeconomics Impacts Report will be in **Appendix L.**

6.6 Consistency with State Water Planning Guidelines

To be considered consistent with long-term protection of the state's water, agricultural, and natural resources, the Region C plan must be determined to be in compliance with the following regulations:

- 31 TAC Chapter 357.34
- 31 TAC Chapter 357.35
- 31 TAC Chapter 357.40
- 31 TAC Chapter 357.41
- 31 TAC Chapter 358.3

The information, data, evaluation, and recommendations included in the Region C plan collectively comply with these regulations. To assist with demonstrating compliance, Region C has developed a matrix addressing the specific recommendations contained in the above referenced regulations. The matrix is a checklist highlighting each pertinent paragraph of the regulations. The content of the *2026 Region C Water Plan* has been evaluated against this matrix.

Appendix A contains a completed matrix.

Chapter 6 List of References

(1) U.S. Department of Agriculture: 2022 Census of Agriculture, Volume 1, Chapter 2: Texas County Level Data, Table 1, [Online], Available URL: https://www.nass.usda.gov/Publications/AgCensus/2022/Full_Report/Volume_1,_Chapter_2_County_Level/Texas/st48_2_001_001.pdf, February 2024.

(2) Clower, T. L. and B. L. Weinstein: The Economic, Fiscal, and Developmental Impacts of the Proposed Lower Bois d'Arc Reservoir Project, prepared for the North Texas Municipal Water District, Denton, September 2004.

(3) North Texas Municipal Water District, Anglers are Hooked on Bois d'Arc Lake - Bois D'Arc Lake, accessed online January 27, 2025.

(4) Texas Parks and Wildlife Department: State Parks, [Online], Available URL Texas State Parks - TPWD, January 2025.

(5) U.S. Army Corps of Engineers, Feasibility Report Lignite Resource Recovery Richland and Tehuacana Lake Sites Freestone and Navarro Counties, Texas, Fort Worth District, August 1982.

(6) Environmental Protection Agency, Clean Power Plan Rule Fact Sheet [Online], FACT SHEET: Overview of the Clean Power Plan | Clean Power Plan | US EPA, 2025.

CHAPTER SEVEN

DROUGHT RESPONSE

OVERVIEW

This Chapter gives an overall summary of historical droughts in the Region, current drought preparation and responses, recommendations for region-specific drought responses, and region-specific model drought contingency plans.

7 DROUGHT RESPONSE

CHAPTER OUTLINE

RELATED APPENDICES

Drought is a natural and recurring meteorological phenomenon that occurs when precipitation is significantly below "normal" for a period of time. Relatively mild, short-duration droughts are common throughout Texas and typically result in relatively mild impacts. However, extended and severe drought conditions can have serious impacts on water supplies, water suppliers, and water users including:

- Reduction in available water supply leading to shortage conditions;
- Increases in water demand, particularly for seasonal demands such as landscape irrigation;
- Stress on water utility infrastructure due to elevated seasonal peak water demands;
- Deterioration of source water quality;
- Lifestyle and financial impacts to water users associated with restrictions on non-essential water uses (e.g., loss of landscaping); and
- Financial impacts on water suppliers due to reduced revenues from water sales during periods of water demand curtailment.

Due to the potentially devastating effects of drought on communities and the State's economy, it is important that water suppliers and users consider the potential impacts of drought and develop robust plans to address supply or demand management under drought conditions. This chapter presents information concerning historical droughts in the Region, drought uncertainties, current drought preparation and responses, recommendations for region-specific drought responses, and region-specific model drought contingency plans.

7.1 Drought of Record in the Regional Water Planning Area

Section 7.1 describes the drought of record in Region C, two measures that indicate drought severity, and other significant droughts in the region.

7.1.1 Regional Drought of Record

The Drought of Record (DOR) is typically defined as the worst drought to occur for a particular area during the available period of hydrologic record. Due to the variety of ways in which drought may be characterized (deviation from normal precipitation, temperature, agricultural impacts, economic losses, duration, impacts to reservoirs, etc.), defining which drought is the DOR for an area can be a complex issue. For many years, the DOR for much of Texas was generally considered to have occurred from 1950 through 1957. This drought combined severe reductions in rainfall with a multi-year duration, resulting in reduction or cessation of flows for many springs and streams, losses to livestock production and irrigated agriculture, and widespread impacts to vegetation. By the end of the drought in late 1956 or early 1957, nearly all the counties in the State had been declared disaster areas. The more recent severe drought from 2011 through early 2015 was more severe than the 1950-57 drought for parts of the state, and other droughts are the DOR for some supplies.

The 1950 through 1957 drought is the drought of record for most water supplies used in Region C. The two drought periods recently experienced in Region C (2003 through 2006 and 2011 through 2015) caused low inflows and low water levels for many Region C lakes. During these recent droughts, several existing water supply sources in the Red River Basin in Region C recorded new droughts of record that resulted in substantial reductions in firm yields for some sources **(Table 7.1**). Other sources in the Sulphur River Basin (Region D) that are used in Region C also experienced new drought of records. A complete list of the drought of records for surface water reservoirs in Region C is included in **Appendix E**.

TABLE 7.1 RESERVOIRS WITH NEW DROUGHT OF RECORD

RESERVOIR	DOR (YEARS)	FIRM YIELD PRIOR TO DOR (ACRE FEET)	FIRM YIELD AFTER DOR (ACRE FEET)	YIELD REDUCTION (%)
Bois d'Arc Lake	4/2010 to 12/2015	120,200	90,600	25%
Bonham	4/2012 to 5/2015	5,340	3,800	29%
Moss	4/2010 to 5/2015	7,410	4,900	34%

Note: Lake Texoma also recorded a new drought of record, but the reservoir yield was unaffected.

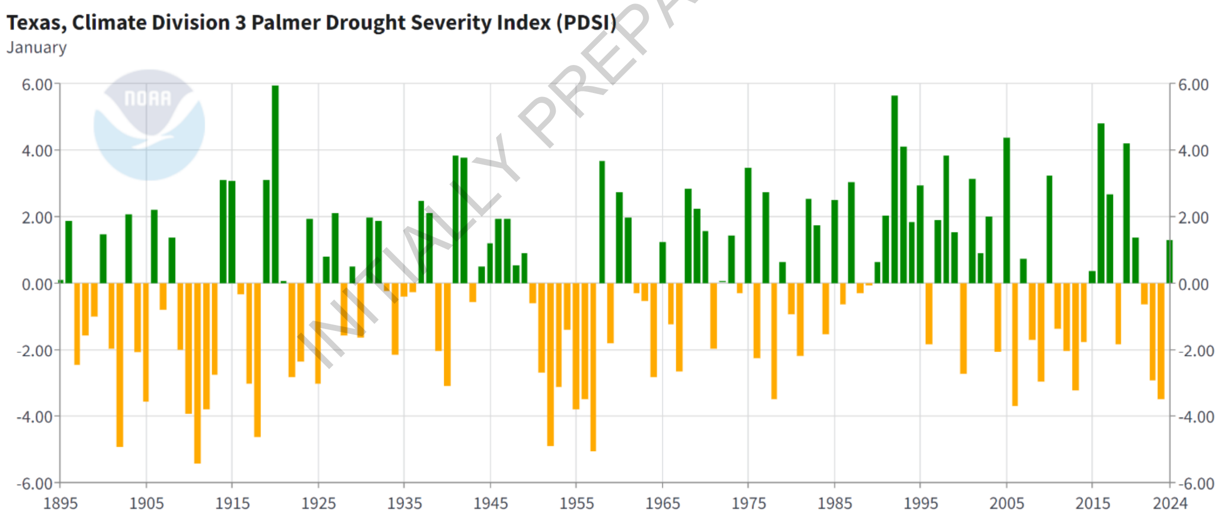
7.1.2 Surface Water Drought Indication

The significance of drought for the Region can be illustrated in several ways. For reservoir supplies, which make up a large portion of the water supply for Region C, the DOR corresponds to the period that reaches the minimum storage in the reservoir under an assumed demand. While many of the major water supply reservoirs serving Region C were not yet constructed during the DOR, their performance under a repeat of historical hydrology including the DOR can be assessed using the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM); this assessment is directly associated with the use of the WAM model to determine firm availability of surface water.

7.1.3 Palmer Drought Severity Index

Another indicator commonly used by federal and state agencies to characterize drought severity is the Palmer Drought Severity Index (PDSI). The PDSI is an estimate of soil moisture conditions calculated based on precipitation and temperature. The PDSI classifies soil moisture on a scale ranging from approximately -6.0 to 6.0, with values of approximately -0.49 to +0.49 reflecting normal conditions, and -4.0 or lower representing extreme drought. The annual PDSI for the North Central Texas area, which includes the majority of the population in Region C, is shown in **Figure 7.1**. As illustrated in the figure, the 1950s drought is among the most severe in terms of PDSI and is also prolonged.

FIGURE 7.1 PALMER DROUGHT SEVERITY INDEX FOR NORTH CENTRAL TEXAS



Source: NOAA, National Centers for Environmental Information, accessed in August 2024. https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/divisional/time-series/4103/pdsi/1/1/1895-2024

7.1.4 Other Regional Droughts

The Region C area, like much of Texas, has experienced a number of droughts in addition to the DOR, including several more recent dry periods. The drought period that began in approximately year 2010-2011 resulted in extremely low rainfall and soil moisture and high temperatures and created a new drought of record in some locations in the state. More recently, years 2022 and 2023 also were very dry years. In Region C, these dry periods, while intense, were not as long as the

1950s drought. Consequently, most water supplies, besides those mentioned in **Section 7.1.1**, were not impacted to the extent that would occur in a repeat of the DOR.

7.2 Uncertainty and Drought(s) Worse Than the Drought of Record

Section 7.2 highlights Region C's approach to addressing uncertainty by preparing for extreme drought conditions and summarizes the measures to enhance resilience against drought(s) worse than the drought of record (DWDOR).

7.2.1 Planning for Uncertainty

New records are often set across the state: population growth, rising temperatures, unprecedented rainfall events, and new droughts of record. Each of these factors contributes to uncertainty in water planning.

In this plan, baseline water demands and available water supply volumes are estimated for DOR conditions. However, as evidenced by the recent DORs described in **Section 7.1**, Region C water supplies or supplies associated with Region C recommended water management strategies could experience a DWDOR. In addition, there are uncertainties in projected water demands and available water supply volumes. Either of these could potentially cause actual water demands greater than the baseline demands and/or reduced actual available supply volumes.

Aspects of the Region C Water Plan that will help mitigate the potential impacts of new droughts of record and uncertainties in planning variables include total supplies that are greater than the water demands, drought and emergency management measures, baseline water demands that have become more conservative, and conservative estimates of available water supply volumes.

7.2.2 Existing Measures for Preparation of the DWDOR

This section outlines four existing measures, discussed in more detail below, that Region C has implemented to prepare the DWDOR: Total Supply Greater Than Water Demand, Drought and Emergency Management Measures, Conservative Estimates of Available Water Supply Volumes, and Baseline Water Demands Becoming More Conservative.

Total Supply Greater Than Water Demand

One method to mitigate planning uncertainties and DWDORs is to plan for a total supply that is greater than the water demand, as represented by a management supply factor greater than one. The management supply factors for the major water providers are discussed in **Chapter 5D**.

Drought and Emergency Management Measures

The region purposefully does not recommend drought management strategies to meet projected water needs, reserving them for water providers to address DWDORs or other emergency water supply needs. Existing and potential drought and emergency management measures that would likely be available to Region C WUGs in the event of a DWDOR are discussed in the remainder of this chapter, beginning in **Section 7.3**.

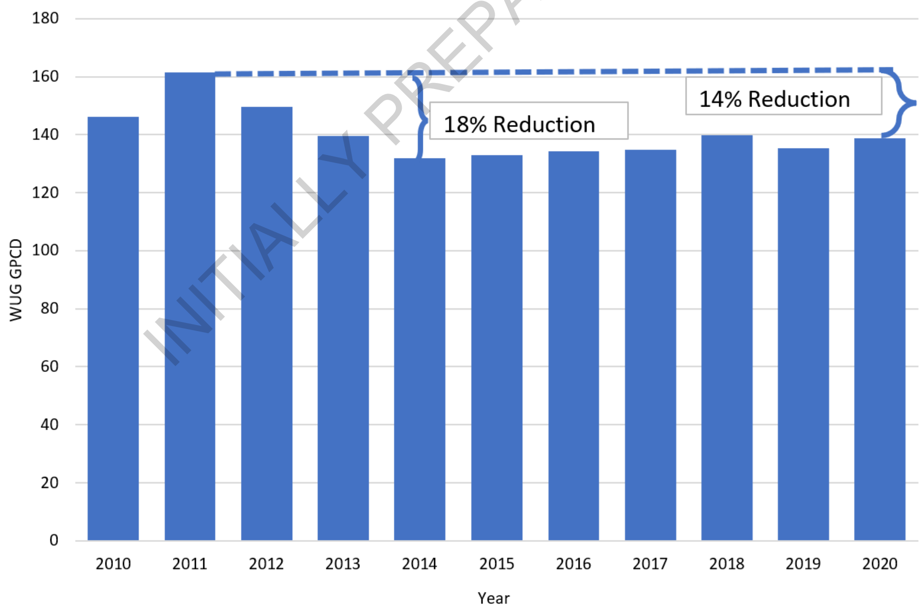
Conservative Estimates of Available Water Supply Volumes

Nearly 90 percent of the municipal water supply in Region C is provided by the MWPs. These providers recognize the intrinsic uncertainty in water planning and are actively planning for DWDORs. Three of the region's Major Water Providers (TRWD, DWU, and NTMWD) use conservative methods to estimate the supplies available from their surface water sources, resulting in supply estimates that are less than the firm yield. TRWD and DWU use a safe yield analysis, while NTMWD uses estimates based on climate modeling to assess resilience of its water sources under future conditions.

Baseline Water Demands Becoming More Conservative

Projected water demands for most WUGs in Region C are based on the per capita water demands experienced in 2011, a very dry year, minus the projected savings from passive water conservation measures. During the 2010s drought (**Figure 7.2**), WUGs in Region C achieved an average 18% reduction in per capita water use from 2011 to 2014, some of which could be attributed to permanent water conservation efforts and the natural replacement of inefficient fixtures. In more recent dry years, such as 2020, the average per capita water demand has been approximately 14 percent less than the 2011 per capita water demand. This suggests that permanent demand reductions may have taken place since 2011, leaving a buffer against increased water demands during a DWDOR or uncertainties in planning variables.

FIGURE 7.2. AVERAGE GPCDS OF REGION C WUGS



Sources: TWDB provided spreadsheet dated March 2022 (CORRECTED - WUG_HistoricalData_2026RWPs.xlsx

7.2.3 Potential Additional Measures for DWDOR Resilience

Water providers in Region C may have other tools to address DWDORs that are not specifically addressed in this plan. For example, water providers with multiple sources may have the potential to gain extra yield from system operations of their supplies. Emergency interconnects and/or interim emergency purchases with other providers provide another potential option for water during a DWDOR.

7.3 Current Preparations for Drought in Region C

Section 7.3 outlines current drought preparation activities, including an overview of drought contingency plans (DCPs) for Region C WUGs, on-going drought-related preparations and coordination efforts, and a summary of counterproductive drought initiatives in the Region C area.

7.3.1 Drought Contingency Planning Overview

The TCEQ requires many wholesale public water suppliers, retail public water suppliers, irrigation districts, and applicants for new or amended water rights to prepare and submit to the TCEQ DCPs meeting the requirements of 30 TAC §288(b) and to update these plans at least every five years. TCEQ administrative rules define a drought contingency plan as "a strategy or combination of strategies for temporary supply management and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies". TCEQ rules and associated guidance for documents for drought contingency planning embody several key principles including:

- Drought and its potential impacts on both water supply and demand, as well as water supply infrastructure, can be expected to occur;
- Drought response measures and implementation procedures can be defined in advance of drought;
- Through timely implementation of drought response measures, it is possible to avoid, minimize, or mitigate the risks and impacts of water shortages and other drought-related water supply emergencies;
- Some water demands are considered essential to public health and safety or to the economy while others can be considered non-essential or discretionary; and
- Drought contingency plans should be tailored to the unique circumstances of each water supplier (e.g., vulnerability of water supply and/or infrastructure to drought, end-users and demand characteristics, objectives, etc.).

Although each water supplier faces unique circumstances, a few elements are found in most drought contingency plans and are consistent with the requirements for municipal DCPs in 30 TAC §288.20. These include:

- Criteria and procedures for determining when to initiate and when to terminate drought response measures. These are typically referred to as drought triggers. Common examples of drought triggers include indicators of supply availability (e.g., quantity of water supply remaining in a source) and demand indicators (e.g., daily demand relative to infrastructure capacity).
- Successive stages of drought response that require the implementation of increasingly stringent measures in response to increasingly severe drought conditions. A typical drought contingency plan will have an initial stage of voluntary measures followed by two or three successive stages of increasing stringent mandatory measures.

- Demand reduction goals or targets for each stage.
- Predetermined drought response measures for each stage that may include supply management, such as the temporary use of an alternative water source, and/or demand management, such as restrictions on non-essential water uses.
- Procedures for plan implementation and enforcement.
- Public information (e.g., notification) and education.

Most drought contingency plans place a heavy emphasis on demand management measures that are designed to reduce water demands by curtailment of certain uses. It is important to note that demand management in this context is distinctly different from water conservation. The objective of water conservation is to achieve lasting, long-term reductions in water use through improved water use efficiency, reduced waste, and reuse and recycling. By contrast, demand curtailment is focused on temporary reductions in water use in response to temporary and potentially recurring water supply shortages or other water supply emergencies (e.g., equipment failures or excessively high peak water demands). Common approaches to water demand curtailment, applied individually or in combination, include:

- Prescriptive restrictions or bans on non-essential water uses and waste. In a municipal setting, such restrictions commonly target landscape irrigation, car washing, ornamental fountains, etc.
- Use of water pricing strategies, such as excess use surcharges, to encourage compliance with water use restrictions or to penalize excessive water use.
- Water rationing, where water is allocated to users on some proportionate or pro rata basis.

7.3.2 Current Drought Preparation

All wholesale public water providers and most municipalities in Region C have made preparation for responding to drought conditions, including the development of individual drought contingency plans to be implemented when necessary.

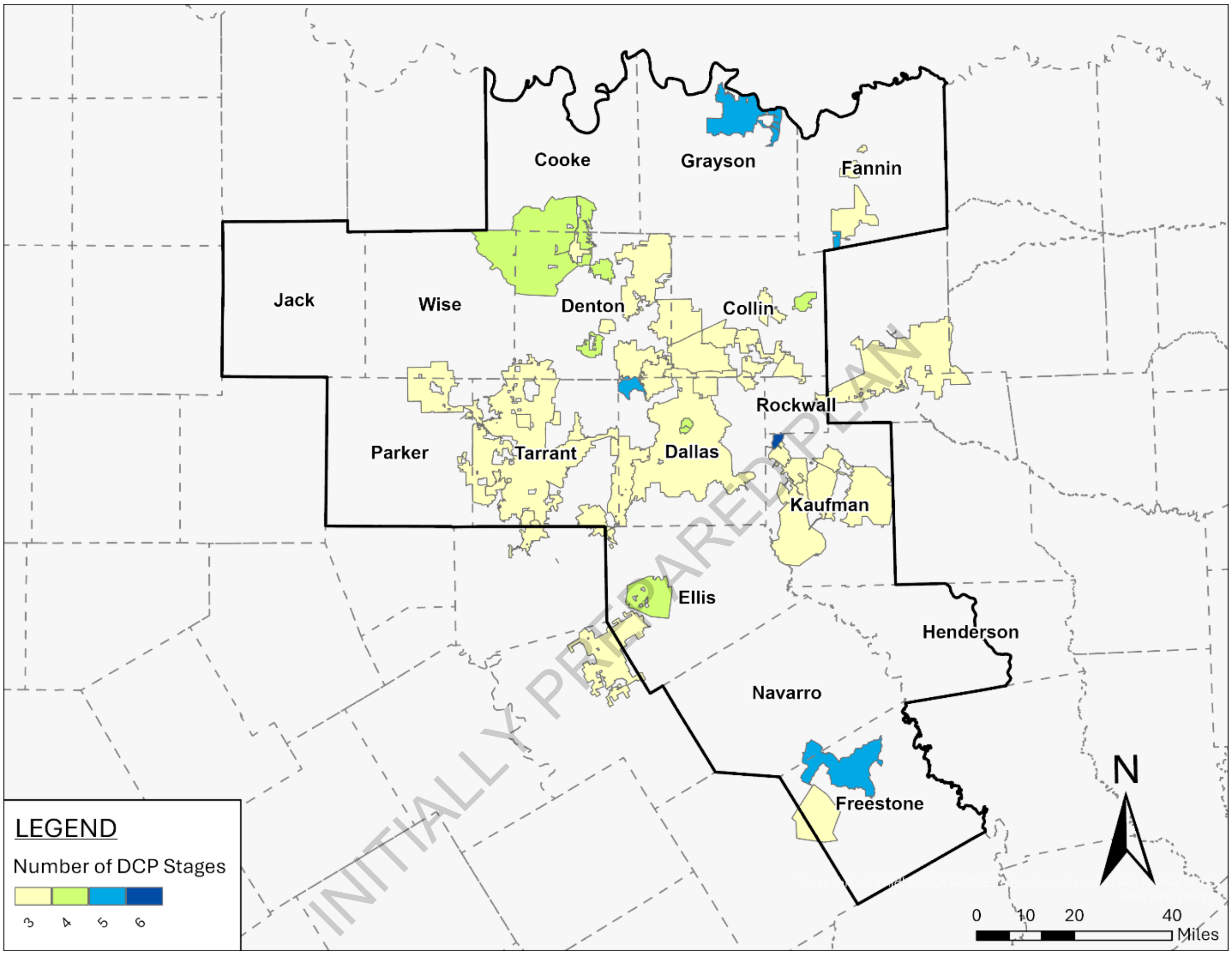
7.3.3 Regional Coordination

Being in the same media market, most of the MWPs (DWU, Fort Worth, NTMWD, TRWD and UTRWD) have coordinated their DCPs to have three stages which include the following irrigation restrictions for the following stages.

- **Stage 1** - Mandatory no more than twice per week watering [1] (except for hand watering, drip irrigation and soaker hoses).
- **Stage 2** - Mandatory no more than once per week watering (except for hand watering, drip irrigation and soaker hoses).
- **Stage 3** - No outdoor irrigation (some exceptions for hand watering, drip irrigation and soaker hoses for trees and foundations).

The MWPs also encouraged their customers to adopt similar DCPs. Consultants to the RWPG reviewed 52 DCPs from Region C WUGs and water providers; of these, 41, or 79%, have Stage 3 as the terminal stage (**Figure 7.3**), and the total number of stages in many plans has been reduced to coordinate with other DCPs in the region.

FIGURE 7.3 TOTAL NUMBER OF DROUGHT STAGES IN THE REVIEWED DCPS



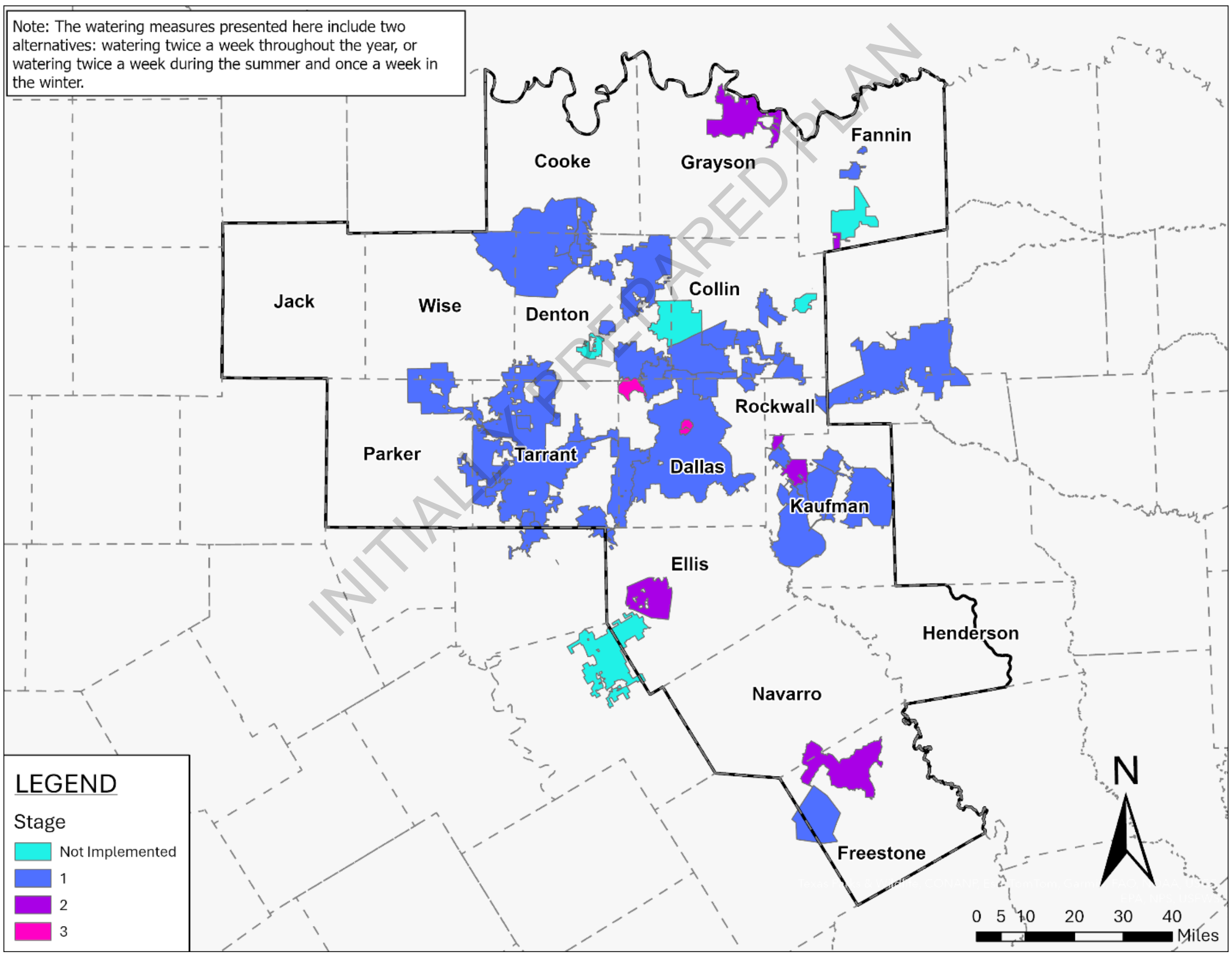
7.3.4 Summary of Existing Triggers and Responses

As part of the effort associated with Task 7 of the RWP, the RCWPG performed an assessment of existing drought triggers and planned responses in the region based on available DCPs. TCEQ rules and 30 TAC §288(b) require that DCPs include documentation of coordination with the RWPGs to ensure consistency with the regional plans. The RCWPG was able to obtain DCPs for 52 entities in the Region, including named water user groups (WUGs) and retail suppliers within the County Other WUGs.

A Region C drought contingency plan database was developed to store information on the available DCPs, including sponsor information, number of stages, and the trigger and response types associated with each stage. Each drought stage was also characterized by the reduction type (percent demand, unit reduction, etc.), and associated reduction quantity value (percentage, MGD, or other). The results of this analysis are summarized in **Appendix M**. The Drought Response summary table in **Appendix M** is organized by WWP since many of the customers' triggers are dependent on the WWP triggers.

The drought management strategies for most suppliers include limitations on outdoor irrigation and other non-irrigation measures. Many of the entities included measures for twice per week, once per week and no outdoor irrigation for the first three stages as limiting outdoor irrigation tends to reach a large customer group with high potential water savings. This resulted from a regional consistency initiative sponsored by the major suppliers. **Figure 7.4** shows the stages when the twice a week watering restriction was initiated in the respective DCPs by the Region C WUGs. While some WUGs implement irrigation restrictions at different stages for various local reasons deemed appropriate by individual Region C WUGs, the majority have adopted the twice-a-week watering restriction starting at Stage 1.

FIGURE 7.4 INITIAL STAGE OF IMPLEMENTING TWICE-A-WEEK WATERING SCHEDULE IN REVIEWED DCPS



Note: Many Region C entities include year-round twice-a-week watering restrictions in their water conservation plans or on their websites. However, this information was not summarized in their DCPs and, therefore, was not included in the figure.

7.3.5 Effectiveness of Drought Response Measures and Challenges in Quantification

The information available to the RWPG through submitted DCP documents does not quantify the historical or potential reductions in water use associated with implementation of the DCPs.

7.3.6 Recent Implementation of Drought Contingency Measures in Region C

TCEQ collects data on Texas public water systems (PWSs) that reported water use restrictions and priority levels due to drought or emergency conditions. The most recent list of Texas PWSs limiting water use is found here: https://www.tceq.texas.gov/drinkingwater/trot/droughtw.html.

Region C RWPG analyzed records available from the TCEQ website to determine which Region C PWSs implemented water restrictions and to what extent the restrictions were implemented **(Table 7.2**). As of November 2024, only five PWSs currently have implemented various stages of the water restriction since January 2024. This number is significantly smaller than the total of 146 PWSs that implemented water restrictions during the 2011 through 2015 drought period, as reported in the 2021 RWP.

TABLE 7.2 REGION C PUBLIC WATER SYSTEMS RESTRICTING OUTDOOR WATER USE DUE TO DROUGHT

PWS ID	PWS NAME	COUNTY	DATE NOTIFIED	TCEQ STAGE
TX2200002	City of Azle	Tarrant	1/23/2024	V
TX2490007	City of Rhome	Wise	7/4/2024	M2
TX1990014	City of Heath	Rockwall	8/5/2024	M1
TX0610002	City of Denton	Denton	8/20/2024	M1
TX1840008	Walnut Creek SUD	Parker	10/22/2024	V

Information above are obtained from the TCEQ website:
https://www.tceq.texas.gov/drinkingwater/trot/droughtw.html

- V - Voluntary Watering Schedule
  - Voluntary restrictions. Customers requested to voluntarily limit water use.
- M1 - Mandatory, Limited Watering Schedule
  - Mild restrictions. Use of water for non-essential uses is restricted (i.e. outdoor watering limited to no more than twice or once a week)
- M2 - Mandatory, Limited to Hand-Held Hose Only
  - Moderate restrictions. All outdoor water usage is prohibited except by hand-held hoses with manual on/off nozzles. Water usage for livestock is exempt from this restriction.
- M3 - Mandatory, No Outside Watering:

- Severe restrictions. All outdoor water usage is prohibited; livestock watering may be exempted by the utility. All consumption may also be limited to each customer in specific ways.

7.3.7 Summary of Unnecessary or Counterproductive Drought Response Efforts

House Bill 807, passed by the 86th Texas Legislature in 2019, amended Section 16.053 of the Texas Water Code to include the requirement that RWPGs "identify unnecessary or counterproductive variations in specific drought response strategies, including outdoor watering restrictions, among user groups in the regional water planning area that may confuse the public or otherwise impede drought response efforts" (TWC §16.053(e)(3)(E)).

The TWDB provided the following guidance to meet this requirement: "consider drought contingency plans from each WUG, as necessary, to inform WMS evaluations and recommendations and to determine which drought response efforts are unnecessary or counterproductive."

In response, the RWPG reviewed the DCPs of Region C customers and presented their findings in two spatial maps (**Figure 7.3 and Figure 7.4**), which illustrate variations in the number of drought stages and outdoor irrigation restrictions. While the RWPG acknowledged the discrepancies in these plans and encouraged Region C entities to review the maps and address inconsistencies, it also recognized that each entity has unique circumstances that influence their chosen stages and water use restrictions in drought measures.

7.4 Regional Water Planning Area Drought Response Triggers & Actions

Region C recommends drought responses for surface water and groundwater sources, as detailed in **Section 7.4.1** and **7.4.2**.

7.4.1 Drought Response Recommendation for Surface Water

The RCWPG acknowledges that the DCPs for surface water suppliers provide the best drought management tools for surface supplies and recommends that the DCPs developed by the operators of these supplies serve as the RCWPG triggers for surface water. The RCWPG also recognizes that these triggers are subject to change as providers periodically reassess their needs and encourages both wholesale providers and other entities using surface water to examine their DCPs regularly.

In particular, reservoirs are a major source of surface water in Region C, and drought triggers for direct providers and direct users of surface water in Region C are typically tied to reservoir levels or storage volume.

7.4.2 Drought Response Recommendation for Groundwater and Other Sources

Region C has historically relied primarily on surface water sources for most of its supply. Only a small percentage of the overall supply in the region comes from groundwater sources. Groundwater production is generally local to points of use, and aquifer properties vary spatially. Likewise, the characteristics of other sources such as reuse are specific to the associated supplier. As such, many providers using these sources have developed their DCPs in the context of their individual supply portfolios. The RCWPG acknowledges that the DCPs for groundwater suppliers are the best drought management tools for groundwater supplies and recommends that the DCPs developed by the operators of these supplies serve as the RCWPG triggers for groundwater. The RCWPG also recognizes that these triggers are subject to change as providers periodically reassess their needs and encourage both wholesale providers and other entities to examine their DCPs regularly.

The RCWPG recommends that water providers regularly review the U.S. Drought Monitor as a tool for tracking drought conditions and in drought planning efforts leading up to drought measure implementation. (https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?TX)

The drought monitor is easily accessible, regularly updated, and does not require entities to directly monitor specific sources to benefit from its information. Its simplicity also facilitates its use in communicating drought conditions to customers and other water users. **Figure 7.4** shows the categories of the U.S. Drought Monitor with corresponding Palmer Drought Severity Index values.

TABLE 7.3 U.S. DROUGHT MONITOR CATEGORIES

CATEGORY	DESCRIPTION	POSSIBLE IMPACTS	PALMER DROUGHT INDEX
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered	-1.0 to -1.9
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested	-2.0 to -2.9
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	-4.0 to -4.9
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less

The RCWPG recommends the following actions based on each of the drought classifications listed:

- **Abnormally Dry.** Entities should begin to review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage is necessary.
- **Moderate Drought.** Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage is necessary.
- **Severe Drought.** Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point if the review indicates current supplies may not be sufficient to meet reduced demands the entity should begin considering alternative supplies.
- **Extreme Drought.** Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point if the review indicates current supplies may not be sufficient to meet reduced demands the entity should consider alternative supplies.
- **Exceptional Drought.** Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point if the review indicates current supplies are not sufficient to meet reduced demands the entity should implement alternative supplies.

7.5 Existing and Potential Emergency Interconnects

In accordance with the requirements of the Texas Water Development Board (TWDB) and the Texas Administrative Code, the RCWPG was required to collect information on existing water infrastructure that may be used for emergency interconnects. Existing emergency interconnect information was obtained from the Texas Commission on Environmental Quality, Texas Drinking Water Watch available at https://dww2.tceq.texas.gov/DWW/ and by soliciting such information from Region C MWPs and WUGs through a number of surveys and outreach conducted in 2023 and 2024 by the Region C consultant team. **Table 7.4** includes a summary list of entities and their respective emergency interconnect providers.

TABLE 7.4 SUMMARY OF EMERGENCY INTERCONNECTS

ENTITY NAME	EMERGENCY INTERCONNECT
Anna	Altoga WSC
Argyle WSC	City of Denton; Cross Timbers WSC
Arledge Ridge WSC	City of Leon
Aubrey	Upper Trinity Regional Water District; Mustang SUD
Balch Springs	City of Dallas
Becker Jiba WSC	City of Kemp
Bedford	City of Colleyville; City of Hurst
Bells	SW Fannin County SUD
Benbrook Water Authority	City of Fort Worth
Blackland WSC	Cash SUD
Bois D Arc MUD	City of Windom
Boyd	Walnut Creek SUD
Buena Vista-Bethel SUD	City of Waxahachie; Emerald Forest
Callisburg WSC	Callisburg ISD
Chatfield WSC	City of Kerens
Colleyville	City of Grapevine; City of North Richland Hills; City of Bedford
Crandall	City of Forney; Gastonia-Scurry SUD; City of Mesquite
Cross Timbers WSC	Argyle WSC; Denton County FWSD 7
Culleoka WSC	City of Princeton
Dallas County Park Cities MUD	City of Dallas
Desoto	City of Dallas
East Cedar Creek FWSD	Payne Springs WSC
Edgecliff	City of Fort Worth
Euless	City of Grapevine
Everman	City of Fort Worth

ENTITY NAME	EMERGENCY INTERCONNECT
Fairfield	Westwood Utility Co
Farmersville	Caddo Basin SUD
Forest Hill	Harris County MUD
Frognot WSC	North Farmersville WSC
Gainesville	Woodbine WSC
Grand Prairie	City of Arlington
Grapevine	City of Colleyville; City of Southlake; DFW Airport;
Gunter	Marilee SUD
Haltom City	City of North Richland Hills
Highland Park	City of Dallas
Honey Grove	Bois d'Arc MUD
Howe	City of Sherman; North Texas Municipal Water District
Hudson Oaks	City of Weatherford
Hurst	Trinity River Authority; City of Colleyville
Josephine	Nevada SUD
Kemp	City of Mabank
Lake Cities Municipal Utility Authority	Harbor Grove WSC
Leonard	Arledge Ridge WSC
Mesquite	City of Dallas
Mount Zion WSC	City of Rockwall
Mountain Springs WSC	Pioneer Valley Water Company
North Kaufman WSC	City of Kaufman
Northlake	Argyle WSC
Pantego	City of Arlington
Pelican Bay	City of Azle
Pink Hill WSC	City of Sherman
Providence Village WCID	Upper Trinity Regional Water District
R C H WSC	Blackland WSC
Red Oak	City of Glenn Heights; Rockett SUD
Reno (Parker)	City of Azle
Richardson	City of Dallas
Saginaw	City of Fort Worth

ENTITY NAME	EMERGENCY INTERCONNECT
Sansom Park	City of Fort Worth
Savoy	Southwest Fannin County SUD
Seagoville	City of Dallas
South Ellis County WSC	City of Italy
Southlake	City of Grapevine
Springtown	Walnut Creek SUD
Starr WSC	City of Sherman
Walnut Creek SUD	City of Springtown
Watauga	City of North Richland Hills
Waxahachie	Bardwell Lake
West Wise SUD	Walnut Creek SUD; City of Chico
Westminster SUD	Collin County Adventure Camp
White Shed WSC	Ravenna Nunnelee WSC
Willow Park	City of Weatherford
Wilmer	City of Hutchins; Pinto Water Station
Woodbine WSC	City of Callisburg; City of Gainesville; City of Oak Ridge

7.6 Drought Management Water Management Strategies

The RCWPG does not support drought management measures as a WMS in the Region C RWP. Such measures are not designed to address long-term growth in demand but, rather, are inherently temporary strategies intended to conserve water supplies or reduce adverse impacts during times of drought or emergency and are not active under more hydrologically favorable conditions. Drought management measures would not be implemented until well into a drought of record and would be lifted shortly after the drought has subsided. Because drought management is only active and beneficial under certain periods of time, its reliable yield is essentially zero when considered in an analogous manner to surface water, groundwater, reuse, or conservation. Also, as discussed previously, the efficacy of individual drought response measures is difficult to quantify and can vary considerably from one entity to another and one drought to another due to hydrologic and human factors. This creates additional uncertainty in the use of drought response as a reliable measure for addressing water needs. While drought management measures are not included as WMS in the Region C RWP, drought management is an important component of water supply management. The RCWPG supports implementation of DCPs under appropriate conditions by water providers to prolong supply availability and reduce impacts to water users and local economies.

In addition, as part of drought preparedness efforts, the Texas Section of the American Water Works Association (TAWWA) compiled the TAWWA Drought Planning Survey Results [2]. This report outlines key findings regarding drought planning for Texas public water utilities. It highlights effective measures for demand management during droughts, such as monetary consequences like fines and fees, which are seen as effective but diminishing in impact over time. Additionally, designated watering schedules are considered the next most effective water-saving measure. These drought measures have proven to be effective measures in reducing demand during droughts. Therefore, the Region C RWPG recommends that the WUGs within Region C area consider implementing these measures as part of their drought contingency planning if they are not already utilized.

7.7 Emergency Responses to Local Drought Conditions or Loss of Municipal Supply

In addition to regional or statewide droughts, entities may be subject to localized drought conditions or loss of existing water supplies due to infrastructure failure, temporary water quality impairment, or other unforeseen conditions. Loss of existing supplies, while relatively uncommon, is particularly challenging to address as the causes are often difficult to anticipate. Numerous entities within Region C have DCPs which include an emergency response stage and corresponding measures for droughts exceeding the DOR or for other emergency water supply conditions. Some entities, including a number of WWPs, also have emergency action plans which establish procedures for responding rapidly and effectively to emergency conditions.

Because it is not possible for water providers to predict all emergency conditions and because responses or repairs may require an extended period of time, it is important to consider the range of options for emergency water supply sources available under emergency conditions. A high-level analysis of options was performed to assess potential emergency water supply options for WUGs in Region C with an estimated Year 2020 population of 7,500 or less that rely on a sole source for existing supply, as well as for all county other WUGs. (These parameters were set forth in the scope of work for regional planning.) Consideration of emergency supply options for these entities is particularly important as many smaller WUGs may not have existing access to backup supplies through interconnect facilities with adjacent systems. It was assumed that the entities evaluated for emergency responses to local drought conditions or loss of municipal supply have 180 days or less of remaining supply. Applicable WUGs, including 16 county other WUGs and 68 additional municipal WUGs that rely on one water source and have an estimated 2020 population less than 7,500, were characterized by projected Year 2030 population, Year 2030 demand, existing supply source type (surface water, groundwater, or blend), and other WUG-specific information. These characteristics were then used to identify potentially feasible emergency supply options and associated infrastructure requirements. The results of this analysis are presented in **Appendix M.**

[2] https://savetexaswater.org/resources/doc/TAWWA-Drought-Survey-Summary-of-Findings_DRAFT1.pdf

7.8 Other Recommendations

Section 7.8 presents additional recommendations from the RCRWPG for entities in the Region C area, including those from the Texas Drought Preparedness Council (DPC), considerations related to the DCPs, and recommendations for entities not required to submit a DCP.

7.8.1 Texas Drought Preparedness Council

The DPC is composed of representatives from multiple State agencies and plays an important role in monitoring drought conditions, advising the governor and other groups on significant drought conditions, and facilitating coordination among local, State, and federal agencies in drought-response planning. The Council meets regularly to discuss drought indicators and conditions across the state and releases Situation Reports summarizing its findings.

Additionally, the Council has developed the State Drought Preparedness Plan, which sets forth a framework for approaching drought in an integrated manner to minimize impacts to people and resources. The RCWPG supports the ongoing efforts of the Texas Drought Preparedness Council and recommends that water providers and other interested parties regularly review the Situation Reports as part of their drought monitoring procedures. In a letter dated February 8, 2024, the Council provided three recommendations to the Region C RWPGs which are addressed in this chapter.

- "The regional water plans and state water plan shall serve as water supply plans under drought of record conditions. The DPC encourages regional water planning groups to consider planning for drought conditions worse than the drought of record, including scenarios that reflect greater rainfall deficits and/or higher surface temperatures."
  - Region C Response: Region C has utilized the Chapter 7 template provided by TWDB staff and has addressed the requirements related to a DWDOR, as shown in **Section 7.2.**
- "The Drought Preparedness Council encourages regional water planning groups to incorporate projected future reservoir evaporation rates in their assessments of future surface water availability."
  - Region C Response: DWU does consider alternative evaporation rates in developing its safe yields. However, the incorporation of future evaporation rates in the assessments of future surface water availability for Region C reservoirs would need to be developed by the TCEQ as part of the WAM updates. Regional water planning rules require the TCEQ-approved WAMs be used for surface water supplies.
- "The Drought Preparedness Council encourages regional water planning groups to identify in their plans utilities within their boundaries that reported having less than 180 days of available water supply to the Texas Commission on Environmental Quality during the current or preceding planning cycle. For systems that appeared on the 180-day list, RWPGs should perform the evaluation required by Texas Administrative Code Section 357.42(g), if it has not already been completed for that system."
  - Region C Response: Region C has addressed this requirement in **Section 7.7** and **Appendix M**.

7.8.2 Development, Content, and Implementation of DCPs

The RCWPG recognizes that the DCPs developed by water providers in the Region are the best available tools for drought management, and recommends the following actions regarding development, content, and implementation of DCPs:

- In addition to any monitoring procedures included in the DCP, regular monitoring of resources and information from TCEQ, TWDB, the Texas Drought Preparedness Council, and the U.S. Drought Monitor.
- Coordination with wholesale providers regarding drought conditions and potential implementation of drought stages, particularly during times of limited precipitation.
- Review of the DCP by appropriate water provider representatives, particularly during times of limited precipitation.
- Regular consideration of updates to the DCP document to accommodate changes in supply sources, infrastructure, water demands, or service area.
- Communication with customers during times of decreased supply or precipitation to facilitate potential implementation of drought measures and reinforce the importance of compliance with any voluntary measures.

Designation of appropriate resources to allow for consistent application of enforcement procedures as established in the DCP.

7.8.3 Recommendations for Entities Not Required to Submit a DCP

While wholesale suppliers, retail public water suppliers, and irrigation districts are required to have a DCP, no DCP is required for a number of users such as industrial operations and individual irrigators. While some of these users receive water from providers with established drought management procedures, all water users are subject to the impacts of drought. For entities not required to have a DCP and not under the DCP of a supplier, the RCWPG recommends that they consider developing a DCP based on one of the model plans provided on the Region C website. A link are provided in **Section 7.9** of this document.

The RCWPG recommends that these entities regularly monitor drought conditions to facilitate decision-making processes. Several resources are available for monitoring drought. For users that receive water from an outside supplier, communication and notifications of anticipated or implemented drought stages are key resources.

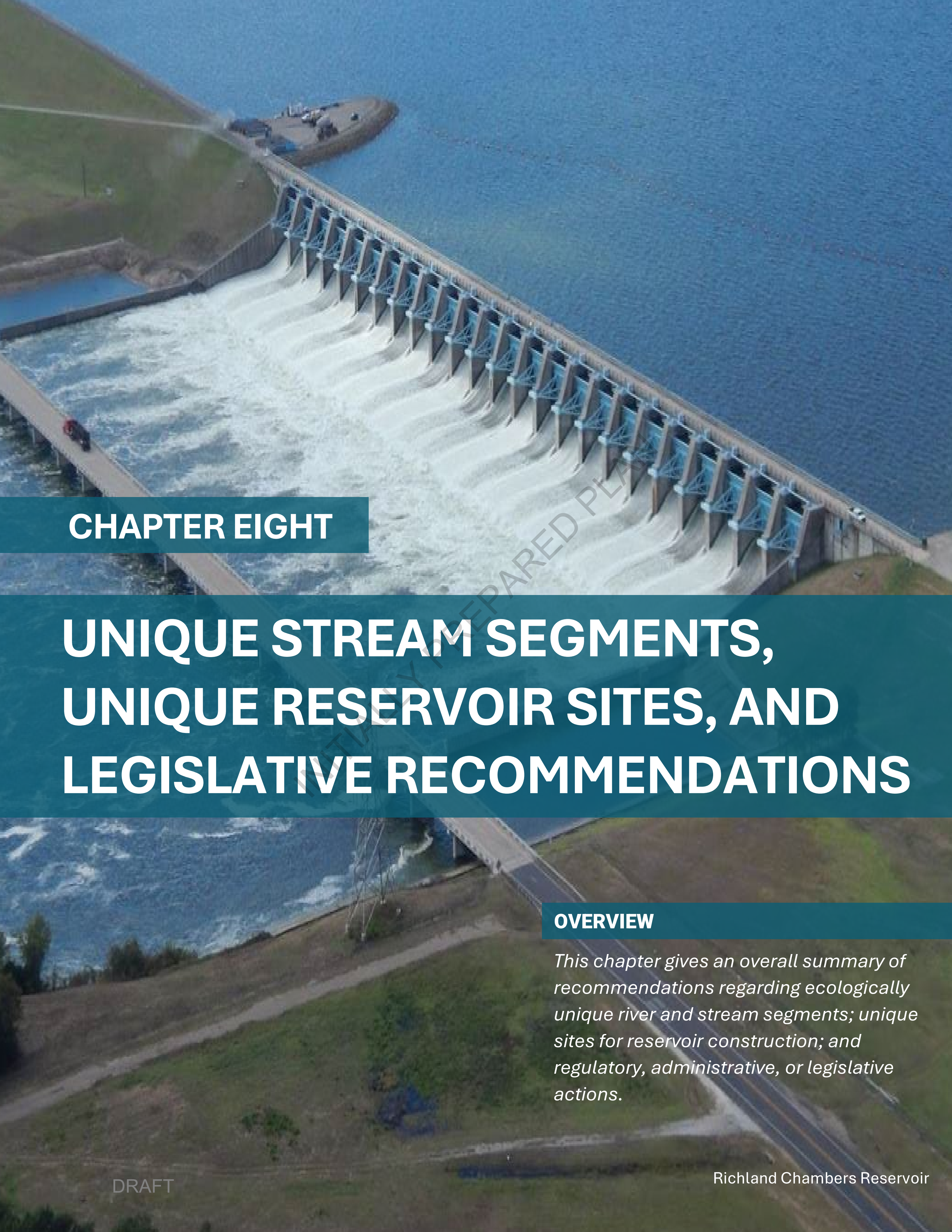
The following references are also recommended for consideration:

- **Palmer Drought Severity Index:** https://www.drought.gov/drought/data-maps-tools/current-conditions
- **U.S. Drought Monitor (Texas detail):** https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?TX
- **TCEQ drought information:** https://www.tceq.texas.gov/response/drought
- **TWDB drought information:** https://www.waterdatafortexas.org/drought

7.9 Model Drought Contingency Plans

Model drought contingency plans addressing the requirements of 30 TAC §288(b) were developed for Region C and are available on the Region C website. Model plans were developed for municipal providers, irrigation users, manufacturing users, and steam electric water users. These model plans were largely based on templates provided by the TCEQ, with several modifications made to elaborate on notification procedures, provide consistency with region-wide efforts to have three standard stages, and incorporate other components.

These plans are available in the 2026 Regional Water Plan documents folder at regioncwater.org.



CHAPTER EIGHT

UNIQUE STREAM SEGMENTS, UNIQUE RESERVOIR SITES, AND LEGISLATIVE RECOMMENDATIONS

OVERVIEW

This chapter gives an overall summary of recommendations regarding ecologically unique river and stream segments; unique sites for reservoir construction; and regulatory, administrative, or legislative actions.

Richland Chambers Reservoir

8 UNIQUE STREAM SEGMENTS, UNIQUE RESERVOIR SITES, AND LEGISLATIVE RECOMMENDATIONS

CHAPTER OUTLINE

Regional Water Planning Guidelines, Title 31, Part 10, Chapter 357 of the Texas Administrative Code, call for regional water planning groups to make recommendations regarding ecologically unique river and stream segments; unique sites for reservoir construction; and regulatory, administrative, or legislative actions that will facilitate the orderly development, management, and conservation of water resources. At the February 24, 2025, Region C Water Planning Group (RCWPG) meeting, the group voted to approve the recommendations which are reflected in this chapter.

8.1 Summary Recommendations

The recommendations for this chapter are divided into three main categories: Ecologically Unique River and Stream Segments; Unique Sites for Reservoir Construction; and Regulatory, Administrative, or Legislative Actions.

Recommendations for Ecologically Unique River and Stream Segments

The following are recommendations for ecologically unique river and stream segments:

- No recommendations to designate river or stream segments as ecologically unique.

Recommendations for Unique Sites for Reservoir Construction

The following are recommendations for unique sites for reservoir construction:

- Recommend that the Texas Legislature continue to designate the following sites as unique sites for reservoir construction:
    - Ralph Hall [under construction]
    - Marvin Nichols
    - Fastrill
    - Tehuacana
    - Columbia
- Recommend that the Texas Legislature designate the following sites as unique sites for reservoir construction:
    - George Parkhouse II (North)
    - George Parkhouse I (South)

- Encourage continued affirmative votes by sponsors of these proposed reservoirs to make expenditures necessary to construct or apply for required permits and avoid termination of unique reservoir site designations.

Policy and Legislative Recommendations

The following are recommendations for regulatory, administrative, or legislative action:

- Regional Water Planning Process
  - Encourage formation of a Working Group on Stream Segments of Unique Ecological Value.
  - Support legislative and state agency findings regarding water use evaluation.
  - Coordinate between TWDB and TCEQ to determine the appropriate data and tools for use in regional water planning and in permitting.
- TCEQ Policy and Water Rights
  - Remove some of the unnecessary barriers to interbasin transfers.
  - Support recent changes to the water code that exempt certain water right permits from cancellation for non-use.
  - Support reservoir construction.
- State Funding and Water Supply Programs
  - Continue and expand State funding for TWDB SWIFT, WIF, and other loans and programs.
  - More State funding for water conservation efforts.
  - Consider alternative financing arrangements for large projects.
  - Continue and expand funding of Groundwater Conservation Districts.
  - Funding for NRCS structures as a form of watershed protection.
- Water Reuse and Desalination
  - Support research to advance reuse and desalination.
  - Continue and expand funding assistance for desalination and water reuse projects.
- State and Federal Program – Water Supply Issues
  - Continued and increased State funding and support for efforts to develop out-of-state water supplies.
  - Revise Federal Section 316(b) regulations on power plant cooling water.
  - Develop a program for managing abandoned or deteriorating water wells.
  - Supports Interregional Planning Council recommendations, as discussed.

8.2 Recommendations for Ecologically Unique River and Stream Segments

In previous Region C Water Plans, the RCWPG did not recommend any river or stream segments as ecologically unique due to ongoing unresolved concerns regarding the implications of such a designation by the Texas Legislature. According to Texas Water Code 16.051(f), "This designation solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment designated by the legislature…" However, TWDB regulations governing regional water planning mandate the analysis of the impacts of water management strategies on unique stream segments, which suggests a level of protection beyond merely preventing reservoir development.

In April 2002, the Texas Parks and Wildlife Department (TPWD) released a publication titled Ecologically Significant River and Stream Segments of Region C, identifying ten river and stream segments in Region C that are deemed ecologically significant. These segments, along with the attributes that qualified them for ecological significance, are detailed in **Table 8.1**. Additionally, these segments are illustrated in red in **Figure 8.1**. Since April 2002, TPWD has not updated this list of streams, although there have been reports indicating that an update to the document is forthcoming.

Before constructing a reservoir at any of these sites, extensive environmental studies should be conducted to assess the potential environmental impacts and determine if they can be effectively mitigated. The data obtained from these studies is essential for making informed decisions about whether to construct a reservoir or preserve a riverine environment. A unique stream segment designation has not been identified as serving any regulatory purpose beyond precluding reservoir construction. Additionally, there are extensive regulations and programs in place to protect the environment within Region C.

Concerns persist among various regional water planning groups that designating a stream segment could result in unnecessary limitations on its use, such as restrictions on water diversions and discharges of treated effluent. Consistent with previous cycles, the RCWPG has reviewed this information and decided not to recommend any stream segments in the region for unique status, as existing programs are deemed adequate for protecting the region's streams from inappropriate reservoir construction. Furthermore, the RCWPG prefers TWDB to continue to consider issues related to unique stream segment designation before considering any potential designations.

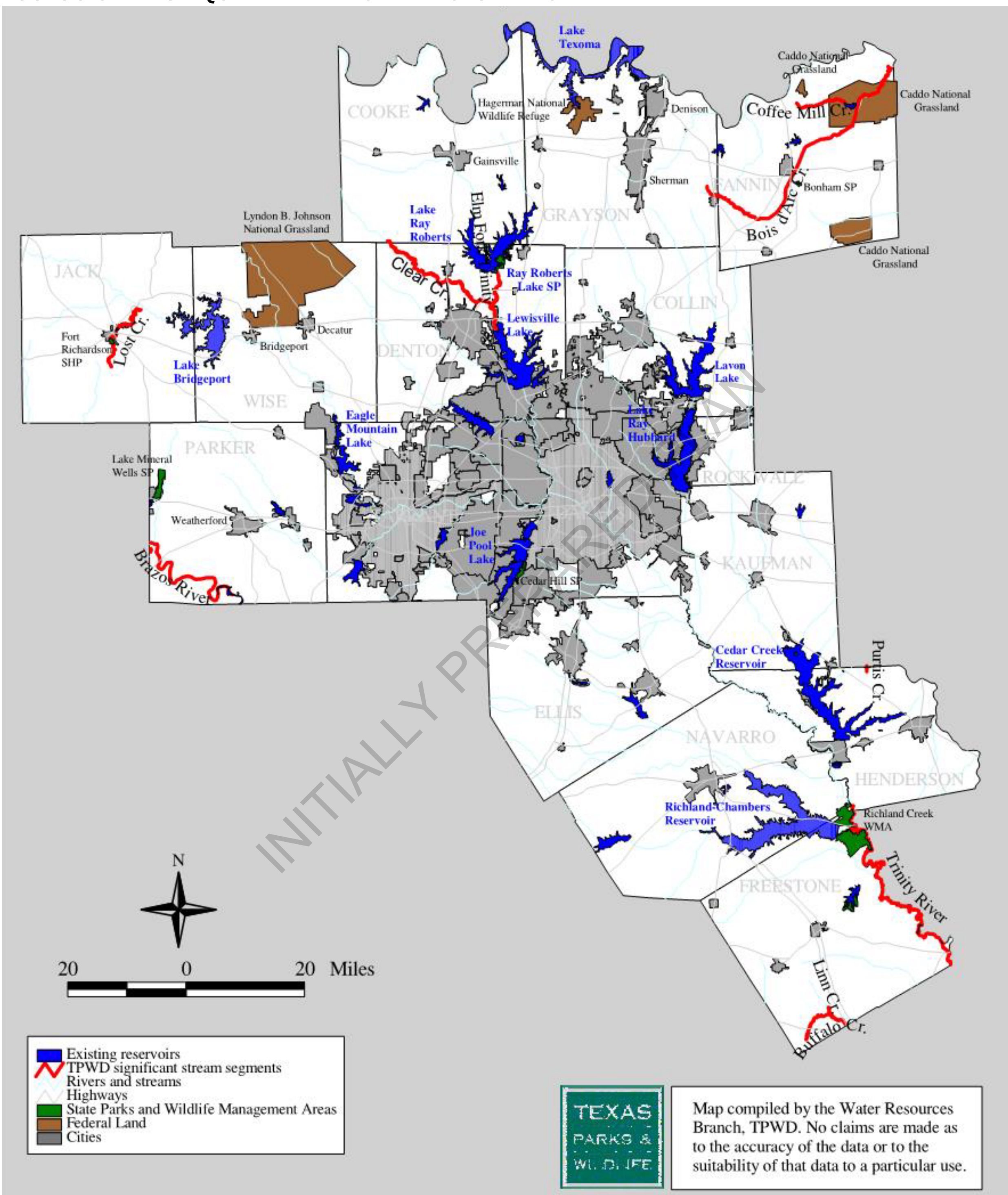
TABLE 8.1 TEXAS PARKS AND WILDLIFE DEPARTMENT RECOMMENDATIONS FOR DESIGNATION AS ECOLOGICALLY UNIQUE RIVER AND STREAM SEGMENTS

REGION C RIVER OR STREAM SEGMENT	DESCRIPTION	BASIN	COUNTY	TPWD REASONS FOR DESIGNATION [A]				
				BIOLOGICAL FUNCTION	HYDROLOGIC FUNCTION	RIPARIAN CONSERVATION AREA	HIGH WATER QUALITY/ EXCEPTIONAL AQUATIC LIFE/ AESTHETIC VALUE	ENDANGERED SPECIES/ UNIQUE COMMUNITIES
Bois d'Arc Creek	Entire length	Red	Fannin/ Grayson	X	X	X		
Brazos River	F.M. 2580 to Parker/Palo Pinto County line	Brazos	Parker	X			X	X
Buffalo Creek	Alligator Creek. to S.H. 164	Trinity	Freestone	X	X			
Clear Creek	Elm Fork Trinity River to Denton/Cooke County line	Trinity	Denton				X	
Coffee Mill Creek	Entire length	Red	Fannin			X		
Elm Fork of Trinity River	Lewisville Lake to Lake Ray Roberts Dam	Trinity	Denton			X		
Linn Creek	Buffalo Creek. to C.R. 691	Trinity	Freestone	X	X			
Lost Creek	Entire length	Trinity	Jack			X	X	
Purtis Creek	S. Twin Creek. to Henderson/Van Zandt County line	Trinity	Henderson			X		
Trinity River	Freestone/Anderson/Leon County line to Henderson/Anderson County line	Trinity	Freestone/ Anderson	X		X		X

[a]Data are from source [(2)].

[b]The criteria listed are from Texas Administration Code, Title 31, Section 358.2. The Texas Parks and Wildlife Department feels that their recommended stream reaches meet those criteria marked with an X.

FIGURE 8.1 TEXAS PARKS AND WILDLIFE DEPARTMENT RECOMMENDATIONS FOR DESIGNATION AS ECOLOGICALLY UNIQUE RIVER AND STREAM SEGMENTS



8.3 Recommendations for Unique Sites for Reservoir Construction

In 2007, the 80th Texas Legislature passed Senate Bill 3 (SB3), which designated unique sites for reservoir construction as recommended in the *2007 State Water Plan*, including the following sites previously recommended by the Region C Water Planning Group that are proposed to maintain designation:

- Ralph Hall site on the North Sulphur River in Fannin County [Under Construction]
- Marvin Nichols site on the Sulphur River in Red River, Titus, and Franklin counties
- Fastrill site on the Neches River in Anderson and Cherokee counties
- Tehuacana site on Tehuacana Creek in Freestone County.

SB3 also designated the Columbia site on Mud Creek in Cherokee County as a unique site for reservoir construction. This site was previously recommended by the East Texas Regional Water Planning Group.

According to Section 16.051 of the Texas Water Code, these designations were to terminate on September 1, 2015, unless there was "an affirmative vote by a proposed project sponsor to make expenditures necessary in order to construct or file applications for permits required in connection with the construction of the reservoir under federal or state law". To date, none of the existing reservoir designations have been terminated.

Two new reservoirs located at the George Parkhouse II (North) site and George Parkhouse I (South) site are included as alternative water management strategies in the *2026 Region C Water Plan* for the Upper Trinity Regional Water District (UTRWD) and the North Texas Municipal Water District (NTMWD). It was recommended in the *2022 State Water Plan* that the Texas Legislature designate the George Parkhouse II (North) site as a unique site for reservoir construction, and it is recommended in this plan that the Texas Legislature also designate the George Parkhouse I (South) site as a unique site for reservoir construction. The Legislature has not yet approved these additional designations.

Lake Ralph Hall is located on the North Sulphur River in southeast Fannin County, north of Ladonia. The site is located in the Sulphur River Basin in Region C. The reservoir will yield approximately 40,000 acre-feet per year, store 180,000 acre-feet, and covers approximately 7,600 acres. Lake Ralph Hall, currently under construction, is a recommended water management strategy for the UTRWD. The lake will provide water to southeast Fannin County residents, as well as to customers of the UTRWD in the Denton County area.

To develop Lake Ralph Hall, UTRWD has completed the following:

- Secured a water right. Permit 5821, issued in December 2013, allows UTRWD to impound up to 180,000 acre-feet in Lake Ralph Hall and to divert up to 45,000 acre-feet per year for municipal, industrial, irrigation, and recreation purposes. As part of the water right permitting process, UTRWD completed special engineering and cultural resources studies, including:

   - Hydrologic and hydraulic studies,
   - Biological and in-stream flow assessment,
   - Geologic characteristics study,
   - Economic impact study, and
   - Water conservation implementation plan.
- Received a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers (USACE) in January 2020. As part of the 404 permitting process, UTRWD has:
   - Completed special engineering and cultural resources studies, including:
   - Hydrologic and hydraulic studies,
   - Preliminary jurisdictional determination of waters of the U.S.,
   - Preliminary habitat assessment,
   - Archaeology & quaternary geology,
   - Biological and in-stream flow assessment,
   - Geologic characteristics,
   - Economic impact study,
   - Geomorphic and sedimentation evaluation, and
   - Mitigation plan for impacts to aquatic resources and terrestrial habitats.
- Developed an Environmental Impact Statement (EIS) and submitted it to the USACE. Final approval of the EIS was issued in September 2019.
- Began construction in 2021 with road and bridgework completion in late 2023. Project completion for water delivery is anticipated in 2026.

Marvin Nichols Reservoir would be located on the Sulphur River upstream from its confluence with White Oak Creek. The dam would be in Titus and Red River counties and would also impound water in Franklin County. The site is located in the Sulphur River Basin in Region D.

The Region C entities that are interested in development of Marvin Nichols Reservoir and other Sulphur Basin Supplies (NTMWD, TRWD, Dallas, UTRWD, and Irving) formed a Joint Committee on Program Development (JCPD). Since 2001, the JCPD has provided more than $5 million to further investigate the development of Marvin Nichols Reservoir and other potential water supply sources in the Sulphur River Basin, with the most comprehensive study completed with the USACE in 2014. The project partners have also sponsored independent studies on the economic impacts, updated hydraulic studies, dam design, and cost of the project. The most recent study was completed in 2024.

The *2026 Region C Water Plan* recommends Marvin Nichols Reservoir as a recommended strategy for three providers: TRWD, NTMWD and UTRWD. It is an alternative strategy for DWU and Irving. The proposed Marvin Nichols strategy would provide 400,200 acre-feet per year. Approximately 80 percent of the water supplied from the Marvin Nichols Reservoir is expected to serve customers of wholesale water providers in Region C and approximately 20 percent would serve water needs in Region D.

As mentioned above, since 2001, the JCPD has continued to investigate the development of Marvin Nichols Reservoir and other potential water supply sources in the Sulphur River Basin. These investigations have included:

- Land use/land cover classification
- Identification of reservoir sites and conservation pool elevations
- Reconnaissance geology review of potential dam sites
- Mapping
- A site selection study for Marvin Nichols Reservoir
- System operation assessment of Wright Patman Lake and Jim Chapman Lake
- Analysis of Sulphur River instream flows (hydrology, hydraulics, and fish habitat utilization)
- Aerial LIDAR survey
- Hydrologic and hydraulic modeling
- Modification of the TCEQ's Sulphur River Water Availability Model
- Development of a Sulphur River Basin Soil and Water Assessment Tool (SWAT) model
- Wright Patman Lake additional yield modeling
- Socioeconomic Assessment
- Comparative Environmental Assessment
- Studies of
    - Operation issues
    - Institutional issues
    - Water demand/availability

These studies are needed to develop applications for a state water permit and a Section 404 permit for the project. Some of the investigations listed above are part of the aforementioned Sulphur River Basin Feasibility Study, conducted by the JCPD in partnership with USACE and the SRBA [(4)]. More recent studies looked at updated yields, an updated Probable Maximum Flood (PMF) at the site and updated the dam design and costs of the project.

Per House Bill 1 of the 88th Regular Legislative Session, TWDB conducted a 2025 Feasibility Review of the proposed reservoir, including the implementation timeline, associated costs, land acquisition considerations, and the economic impact of the proposed project. The review found that the Dallas-Fort Worth area needs the reservoir based on the anticipated growth in population and water demand over the planning horizon. In addition, the project was determined to be considered feasible based on the components studied in the review.

Tehuacana Reservoir would be located on Tehuacana Creek in Freestone County, south of the Richland-Chambers Reservoir. The site is located in the Trinity River Basin in Region C and was originally conceived as an extension of Richland-Chambers Reservoir. The spillway at Richland-Chambers was sized to accommodate the spills from Tehuacana Reservoir. The proposed reservoir would have a safe yield of 22,330 acre-feet per year and would inundate approximately 15,000 acres. Tarrant Regional Water District would be the developer of Tehuacana Reservoir.

Tehuacana Reservoir is a recommended water management strategy in the *2026 Region C Water plan* to serve needs in Freestone County in addition to customers of TRWD. In addition, TRWD has completed an evaluation of four alternative dam locations and impact scenarios, reservoir site geology, natural resources, and land and mineral ownership [6].

Lake Columbia would be located on Mud Creek in Cherokee County, southeast of Jacksonville. The site is located in the Neches River Basin in Region I. The proposed reservoir is estimated to have a firm yield of 85,507 acre-feet per year. Approximately 75% of the firm supply (56,000 acre-feet per year) would be available to Dallas. Lake Columbia would cover 10,133 acres of land. The Angelina & Neches River Authority (ANRA) would be the developer of Lake Columbia. Purchasing water from Lake Columbia is a component of the recommended Neches Watershed water management strategy for Dallas. Implementation would likely occur after 2080 unless additional supplies are needed sooner. ANRA is currently under contract with 17 local participants who support the project. In addition, ANRA and the TWDB have an active master agreement in which the TWDB has a 37% interest in the project.

To develop Lake Columbia, ANRA has:

- Secured a water right. Permit 4228, issued in June 1985, allows ANRA to impound up to 195,500 acre-feet in Lake Columbia and to divert up to 85,507 acre-feet per year for municipal, industrial, and recreation purposes.
- Applied for a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers (USACE) in 2000 but was withdrawn in 2020 for insufficient purpose and need definition per USACE. ANRA continues to seek stakeholders who can satisfy the USACE purpose and need criteria requirements and the funding to complete the Section 404 permitting process. As part of the 404 permitting process, ANRA has:
    - Completed a downstream impact analysis.
    - Completed an archaeological field survey.
    - Completed a proposed mitigation plan.
    - Worked toward completion of a draft EIS.

There have been several bills passed into law that have further confirmed State support of Lake Columbia, including the following:

- SB 1600, 77th (R), 2001, Staples
    - State Water Right amendment extending the deadlines for construction of the reservoir.
- SB 1362, 78th (R), 2003, Staples
    - Renamed the project Lake Columbia, in honor of the space shuttle Columbia disaster;
    - Designated the site as a Unique Reservoir site;
    - Finding by the Legislature that the project was necessary to meet water supply requirements;

    - Legislative intent for the State Participation Program;
    - Rulemaking authority for water quality purposes.
- SB 1360, 81st (R), 2009, Nichols
    - Legislative findings declaring TWDB's interest in the project and the development of the project was in the public's interest;
    - State Water Right amendment removing construction deadlines.
- HB 3861, 81st (R), 2009, Hopson
    - Legislative findings that the project is in the public's interest, the TWDB has committed to acquire an interest in the project and made the determination that the state will recover its investment in the project;
    - Provided TWDB discretion in Making Findings:
        - In making any statutory finding under Section 16.135(1), Water Code, necessary to complete financing of the project, the Board may take into account any revenue reasonably expected to be received from:
            - a political subdivision not currently under contract with the authority to participate in paying the costs of the site acquisition stage of the project; or
            - a political subdivision not currently under contract to purchase a portion of the water to be supplied by the project.
        - The Board is not required to identify a political subdivision from which revenue is reasonably expected to be received as provided by Subsection (a) of this section at the time the Board makes a finding described by that subsection.

Lake Fastrill would be located on the Neches River in Anderson and Cherokee counties downstream of Lake Palestine and upstream of the Weches dam site. The site is located in the Neches River Basin in Region I. The proposed reservoir would yield 148,780 acre-feet per year and flood 24,950 acres. In 2006, the U.S. Fish and Wildlife Service established the Neches River Wildlife Refuge along the Upper Neches River near the same area as the proposed Lake Fastrill. Lake Fastrill was formerly a recommended water management strategy for Dallas. On February 22, 2010, the U.S. Supreme Court declined to hear an appeal of a decision by the 5th Circuit Court of Appeals that ruled against construction of Fastrill Lake and in favor of the wildlife refuge. Since that decision, Dallas has replaced Lake Fastrill with other projects in its long-range water supply planning. However, the Upper Neches River Municipal Water Authority (UNRMWA) has continued to pursue development of Lake Fastrill, and this reservoir could be a potentially feasible water management strategy for Dallas beyond the planning period.

George Parkhouse Reservoir II (North) would be located on the North Sulphur River in Lamar and Delta Counties, upstream of Marvin Nichols Reservoir and downstream of Lake Ralph Hall. The site is located in the Sulphur River Basin in Region D. With instream flow releases, the proposed reservoir would yield 94,460 acre-feet per year, but the yield would be reduced substantially by development of the Marvin Nichols Reservoir. The proposed reservoir would inundate approximately 14,400 acres. George Parkhouse Reservoir (North) is an alternative water management strategy for UTRWD and NTWMD.

George Parkhouse Reservoir I (South) would be located on the South Sulphur River in Delta and Hopkins Counties, upstream of Marvin Nichols Reservoir and downstream of Jim Chapman Lake. The site is located in the Sulphur River Basin in Region D. With instream flow releases, the proposed reservoir would yield 114,960 acre-feet per year, but the yield would be reduced substantially by development of Marvin Nichols Reservoir. The proposed reservoir would inundate approximately 28,900 acres. George Parkhouse Reservoir I (South) is an alternative water management strategy for UTRWD and NTWMD.

In partnership with the USACE and the SRBA, the JCPD (including UTRWD and NTWMD) has studied the proposed George Parkhouse Reservoirs as part of the Sulphur River Basin Feasibility Study. The environmental impacts of the reservoir are documented in the Feasibility Study. The reservoir yield was updated using the Sulphur River Basin WAM.

Recommendations. The Region C Water Planning Group recommends the following:

- The Texas Legislature continue to designate the following sites as unique sites for reservoir construction: Ralph Hall, Marvin Nichols, Tehuacana, Columbia, and Fastrill.
- The Texas Legislature designate the George Parkhouse II (North) site and George Parkhouse I (South) site as unique sites for reservoir construction.
- Sponsors of these proposed reservoirs continue to affirmatively vote to make expenditures necessary to construct or apply for required permits for these reservoirs and avoid termination of unique reservoir site designation.

8.4 Policy and Legislative Recommendations

The Region C Water Planning Group discussed legislative and policy issues that impact the planning and development of water resources. The group offers the following policy and legislative recommendations, which are divided by topic.

8.4.1 Regional Water Planning Process

The RCWPG proposes the following recommendations for the regional water planning process.

Encourage Formation of a Working Group on Stream Segments of Unique Ecological Value. As in previous planning cycles, the Region C Water Planning Group continues to recommend the formation of a working group comprised of representatives of TWDB, TPWD, TCEQ, and the sixteen water planning regions to bring clarity, purpose, and direction to the legislative mandate to "identify river and stream segments of unique ecological value". Specifically, it is expected that the working group would:

- Research, verify, and publicize the intent of ecologically unique river and stream segment legislation.

- Research agency rules and recommend changes or clarifications where needed.
- Ensure common understanding of "reservoir" as used in ecologically unique river and stream segment legislation and agency rules.
- Identify the lateral extent of ecologically unique river and stream segment designations.
- Seek clarification of quantitative assessment of impacts on ecologically unique river and stream segments.
- Illustrate the value of ecologically unique river and stream segment designations.

Support Legislative and State Agency Findings Regarding Water Use Evaluation. Per capita water use is unique to each water supplier and each region of the State. A statewide per capita water use value is not appropriate for the State, considering its wide variation in rainfall, economic development, and other factors.

The Texas Legislature has found that:

- "...using a single gallons per capita per day metric to compare the water use of municipalities and water utilities does not produce a reliable comparison because water use is dependent on several variables, including differences in the amount of water used for commercial and industrial sector activities, power production, permanent versus temporary service populations, and agricultural sector production..." and
- "a sector-based water use metric, adjusted for variables in water use by municipalities and water utilities, is necessary in order to provide an accurate comparison of water use and water conservation among municipalities and water utilities [7] [8]."

Similarly, in its *Guidance and Methodology for Reporting on Water Conservation and Water Use*, the TCEQ/TWDB/WCAC recognized that "a simple comparison of total gallons per capita per day among Texas municipal water providers may lead to inaccurate conclusions about comparative water use efficiencies among those municipal water providers. When examining the profiles of municipal water providers individually, significant differences may be found in climate, geography, source water characteristics, and service population profiles. As a metric, total gallons per capita per day has its limitations [8]." The Guidance further recommends use of sector-specific metrics in tracking and comparing water conservation and water.

The Region C Water Planning Group supports these findings and encourages continued development and refinement of sector-specific metrics for tracking water use.

Coordination between TWDB and TCEQ Regarding Use of the WAMs for Planning and Permitting. The TWDB requires that the Water Availability Models (WAMs) developed under the direction of TCEQ be used in determining available surface water supplies. The models were developed for the purpose of evaluating new water rights permit applications and are not appropriate for water supply planning. The assumptions built into the WAM (full use of all existing water rights, full operation of priority calls at all times, full permitted area and capacity, overlapping of environmental flow criteria developed during the Senate Bill 3 process and special conditions for instream flows developed using other statistical approaches) do not match the actual operations of supplies and could prohibit the issuance of water rights permits upon which implementation of the regional plans is dependent. Using these conservative assumptions could result in unnecessary water supply projects to meet projected needs that might otherwise be satisfied through the flexible operation of existing supplies. The TWDB and TCEQ should coordinate their efforts to determine the appropriate data and tools available through the WAM program for use in water planning and permitting. The TWDB should allow the regional water planning groups flexibility in applying the models made available for planning purposes, and TCEQ should exercise flexibility in permitting to allow for optimization of existing or future water supplies.

8.4.2 Water Policy and Water Rights

The RCWPG proposes the following recommendations regarding water policy and water rights.

Requirements for Interbasin Transfers Introduced in Senate Bill One. In 1997, Senate Bill One introduced a number of new requirements for applications for water rights permits to allow interbasin transfers. The requirements are found in Section 11.085 of the Texas Water Code [9]. The code includes many provisions that are not required of any other water right, including:

- Public meetings in the basin of origin and the receiving basin.
- Simultaneous (and dual) notices of an interbasin transfer application in newspapers published in every county located either wholly or partially in both the basin of origin and the receiving basin, without regard to the distance or physical relationship between the proposed interbasin transfer and any such county's boundaries.
- Additional notice to county judges, mayors, and groundwater districts in the basin of origin.
- Additional notice to legislators in the basin of origin and the receiving basin.
- TCEQ request for comments from each county judge in the basin of origin.
- Proposed mitigation to the basin of origin.
- Demonstration that the applicant has prepared plans that will result in the "highest practicable water conservation and efficiency achievable…"

Exceptions to these extra requirements placed on interbasin transfers are made for emergency transfers, small transfers (less than 3,000 acre-feet under one water right), transfers to an adjoining coastal basin, transfers to a county partially within the basin of origin, transfers within a retail service area, and certain imports of water from outside the state.

The effect of these changes is to make obtaining a permit for interbasin transfer significantly more difficult than it was under prior law and thus to discourage the use of interbasin transfers for water supply. This is undesirable for several reasons:

- Interbasin transfers have been used extensively in Texas and are an important part of Region C's and the state's current water supply.
- Current supplies greatly exceed projected demands in some basins of origin, and the supplies already developed in those basins can only be beneficially used as a result of interbasin transfers.

- Senate Bill One water supply plans for major metropolitan areas in Texas (Dallas-Fort Worth, Houston, and San Antonio) rely on interbasin transfers as a key component of their plans.
- Texas water law regards surface water as “state water” belonging to the people of the state, to be used for the benefit of the state as a whole and not merely that area or region of the state where abundant surface water supplies may exist [(10)].
- The current requirements for permitting interbasin transfers provide unnecessary barriers to the development of the best, most economical, and most environmentally acceptable source of water supplies.

The legislature should revisit the current law on interbasin transfers and remove some of the unnecessary, unduly burdensome, and counterproductive barriers to such transfers that now exist.

Cancellation of Water Rights for Non-Use. Texas Water Code [(11)] allows the Texas Commission on Environmental Quality to cancel certain water rights, in whole or in part, for ten consecutive years of non-use. In 2013 the Texas Legislature provided the following additional exceptions to cancellation for non-use:

- If a significant portion of the water authorized has been used in accordance with a specific recommendation for meeting a water need included in an approved regional water plan;
- If the water right was obtained to meet demonstrated long-term public water supply or electric generation needs as evidenced by a water management plan developed by the holder and is consistent with projections of future water needs contained in the state water plan; or
- If the water right was obtained as the result of the construction of a reservoir funded, in whole or in part, by the holder of the water right as part of the holder's long-term water planning.

Support for Reservoir Construction. The RCWPG supports the development of reservoirs for water supply. Reservoirs are a critical component of the region’s current and future water supplies, and the construction of reservoirs should not be restricted or prohibited.

These proposed changes to the interbasin transfer requirements, exceptions to cancellation of water rights, and the legislative support for reservoirs will assist with long-term water supply planning and allow water supply development to meet future needs, even if only part of the supply is used in the first ten years of the project’s operation.

8.4.3 State Funding for Water Supply Programs

The RCWPG proposes the following recommendations to state funding for water supply programs.

Continued and Expanded State Funding for Texas Water Development Board Loans and the State Participation Program. The total capital cost of strategies recommended in the 2022 State Water Plan is $80 billion, including $29.9 billion for Region C recommended strategies. Municipal water providers anticipate needing $47 billion from state financial assistance programs [(12)]. The Texas Water Development Board’s loan and State Participation Programs have been important tools in the development of existing supplies, but funding for many of these programs has been insufficient to serve all applicants. The SWIFT/SWIRFT funding program began in 2015 and has committed more than $11.5 billion towards water projects through Fiscal Year 2024. Twenty percent of the SWIFT funding is reserved for water conservation and reuse projects. The SWIFT funding program is expected to finance $27 billion in state water plan projects over 50 years [13].

These programs should be continued and expanded with additional funding as needed to assist in the development of the water management strategies recommended in the regional water plans to meet the future water needs in Texas. Region C supports the continued expeditious implementation of the SWIFT/SWIRFT funding program and does not support diversion of existing funding for other purposes.

Expand Eligibility for SWIFT Funding to Include Consistency with Adopted Regional Water Plans. The current legislation specifies that a water supply project must be in the adopted State Water Plan to be eligible for SWIFT funding. To allow the TWDB sufficient time to develop the State Water Plan, there is a one-year period between when a regional water plan is adopted and when the TWDB approves the corresponding State Water Plan. During this one-year period, the State Water Plan is based on recommended projects in a superseded regional water plan. Region C recommends that the consistency requirement with the State Water Plan for eligibility for SWIFT funds be expanded to include the currently adopted regional water plans.

State Funding for Water Conservation Efforts. In 2007, the Texas Legislature formed the Water Conservation Advisory Council to serve as an expert resource to the state government and the public on water conservation in Texas. The Council publishes biennial reports to the Legislature on progress of water conservation in Texas. In its December 2024 report, the Council recommended that "the Texas Legislature replenish funding in the Agricultural Water Conservation Fund sufficient to support the TWDB's grant and loan program for a total of no less than $15,000,000 for the next 10 years. Region C encourages adequate funding for the Water Conservation Advisory Council and for continued support of statewide water conservation efforts.

Consider Alternative Financing Arrangements for Large Projects. The Texas Water Development Board offers low-interest financing for development of projects from the State Water Plan through the Water Infrastructure Fund. TWDB also offers deferred financing with delayed requirements for repayment, but the terms for deferred financing are not as flexible as they could be.

To address this issue, the TWDB has created two flexible financing options in the SWIFT/SWIRFT funding program:

- Deferred loans have maturities of 20 to 30 years and may be used to fund developmental costs, such as planning and design. Principal and interest are deferred up to eight years or until end of construction, whichever is sooner.
- Board participation loans allow entities to reasonably finance the total debt for an optimally sized regional facility through temporary TWDB ownership interest in the facility. The local sponsor repurchases TWDB's interest on a repayment schedule that defers principal and interest. The typical maturity of a Board participation loan is 34 years.

Region C supports the flexible financing options offered under the SWIFT/SWIRFT funding program and encourages the Texas Water Development Board and the Legislature to continue to consider more flexible deferred financing.

Adequate Funding of Groundwater Conservation Districts. In recent years, the Texas Legislature has created a great number of new groundwater conservation districts across the state. Many of these districts continue to struggle to find adequate resources to develop and implement their rules. We recommend that the state fund a grant program to provide financial resources to support these districts.

Funding for NRCS Structures as a Form of Watershed Protection. One key element of water supply planning is the protection of the quality and usability of supplies already developed. Over the past 50 to 60 years, the U.S. Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service) has built numerous small dams for sediment control and flood control in Texas. The NRCS reservoirs improve water quality, prevent erosion in the watershed, provide water for livestock and provide increased streamflows during low flow periods. The goal of any rehabilitation efforts for these structures or construction of new structures is to promote the flow of water downstream to support water rights and beneficial uses.

The design life for the majority of the NRCS dams is 50 years. Most of the existing projects were built in the 1950s and 1960s and are nearing the end of their design life. Many NRCS structures are in need of maintenance or repair to extend their useful life. Under the PL-566[1] program, the NRCS provides technical assistance and funding for repair and rehabilitation of existing NRCS structures. The rehab program is a 65/35 split of federal funds to the sponsor's funds[(15)]. In U.S. Congressional Districts located completely or partially within Region C, there are 1,180 existing NRCS dams, of which about 66 percent are located in Region C. In addition, the NRCS and local sponsors plan to construct new dams in Region C. Under the PL-566 program and the similar PL-534[2] program, the NRCS will provide 100 percent of the construction costs of new dams, and the sponsor provides the land acquisition costs.

The State should develop a program to provide funding for the development and rehabilitation of new and existing NRCS structures, as a form of watershed protection. Elements of such a program could include:

- State grants or matching funding for studies of NRCS structures
- Seminars on watershed protection.

---

[1] PL-566 The Watershed Protection and Flood Prevention Act of 1954, provides for cooperation between the Federal government and the States and their political subdivisions in a program to prevent erosion, floodwater, and sediment damage; to further the conservation, development, utilization, and disposal of water; and to further the conservation and proper utilization of land in authorized watersheds.

[2] PL-534, the Flood Control Act of 1944, authorizes the Secretary of Agriculture to install watershed improvement measures in 11 watersheds, also known as pilot watersheds, to reduce flood, sedimentation, and erosion damage; improve the conservation, development, utilization, and disposal of water; and advance the conservation and proper utilization of land.

The Region C Water Planning Group recommends that the State seek additional federal funding to improve and maintain NRCS structures. Region C also recommends that the State provide funding to local sponsors to aid them in paying for their required 35 percent of the cost for the dam rehabilitation projects.

8.4.4 Water Reuse and Desalination

The RCWPG proposes the following recommendations to water reuse and desalination.

Support for Research to Advance Reuse and Desalination. Water reuse and desalination are extremely important sources of water supply for Texas. However, these sources have unique challenges related to water quality and cost-effective implementation. Region C recommends that the Legislature and the TWDB continue to support research to advance these water supply strategies in the coming years.

Funding Assistance for Desalination Projects. The Red River and Lake Texoma in Region C have high concentrations of salts. The water from these sources must either be blended with a less saline supply or desalinated for direct use. The smaller communities neighboring these water supplies could potentially use this water with help in funding the necessary desalination process. These sources would be more economical for the smaller communities than building small pipelines of great lengths to purchase water from a larger supplier.

The new Texas Water Fund has received $1 billion in funding. The TWDB has allocated at least $250 million from this fund for the following project types: marine and brackish water desalination, oil and gas produced water treatment projects, and aquifer storage and recovery projects. Region C recommends that the TWDB continue to provide funding assistance for desalination projects for smaller communities. Region C also recommends that federal funds be sought for desalination projects.

Funding Assistance for Water Reuse Projects. The Region C Water Plan includes reuse as a key water management strategy to meet the water needs of the Region between now and 2080. Water reuse projects are rapidly developing in Region C. In the *2021 Region C Water Plan*, the 2070 supply from existing reuse projects was almost 354,000 acre-feet per year [16]. In the current plan, newly developed projects have increased the supply available from existing reuse projects to more than 411,000 acre-feet per year by 2080. The current plan also calls for development of an additional 485,000 acre-feet per year in reuse projects by 2080. Statewide, all of the 16 regions included some type of reuse as a water management strategy by 2070 in their most recent water plans [16]. To achieve implementation of the significant quantities of reuse, there is a critical need to develop implementation approaches, funding support, and the technology and science associated with reuse. Region C recommends that the State Legislature work with water providers and associated professional organizations as well as provide funding support to pursue relevant reuse research

8.4.5 State and Federal Programs – Water Supply Issues

The RCWPG proposes the following recommendations to the state and federal programs related to water supply issues.

Continued and Increased State Funding and Support of Efforts to Develop Out-of-State Water Supplies. In recent years, water suppliers in Region C have been seeking to develop unused water resources in neighboring states. We encourage the State of Texas to continue and increase its support of efforts, as well as funding opportunities, to develop unused out-of-state water resources.

Revise Federal Section 316(b) Regulations on Power Plant Cooling Water. USEPA regulations adopted in 2017 implementing Section 316(b) of the Clean Water Act place requirements on cooling water intake structures that are intended to reduce fish/shellfish mortality due to impingement on screens/barriers or entrainment into flow entering an industrial facility. Although the regulations do not mandate cooling towers for new or existing power plants, they do generally require equivalent performance in terms of intake flowrates and velocities. Compared to once-through cooling (which was the usual approach in Texas prior to the new regulations), cooling towers reduce the amount of water diverted for a power plant but significantly increase the amount of water consumed. There is also a secondary impact; operation of cooling towers creates a high TDS (total dissolved solids) waste stream known as blowdown, that must be managed and/or treated, often resulting in additional increased water consumption. This higher water consumption is not good for Texas, where water supplies are scarce. We encourage TWDB and TCEQ to work with the Federal government on Section 316(b) regulations to allow the efficient use and conservation of water supplies for power plants and the state.

Support Ongoing Efforts of State Agencies to Develop Additional Data and Information Related to Evaluating the Feasibility of ASR Projects. House Bill 807 required regional water plans include a specific assessment of the feasibility of aquifer storage and recovery (ASR) projects for any regional water planning area with significant identified water needs. The Region C planning group acknowledges that ASR can be an effective water supply strategy under specific conditions. However, ASR is not a suitable or feasible strategy in all areas. Region C supports efforts to develop data and information regarding the site-specific applicability of ASR and the conditions under which ASR is or isn't a feasible WMS.

Program Related to Abandoned or Deteriorating Water Wells. Development of a program to manage the plugging of abandoned or deteriorating water wells, as these wells pose a direct threat to the long-term viability of the groundwater resources in many areas of the state. Abandoned wells can also release contaminants at the surface and affect water quality of the State's surface water sources.

8.4.6 Other Recommendations

Interregional Planning Council. The TWDB received the Interregional Planning Council report on March 4, 2024. This report outlines a series of recommendations as they pertain to the three charges enlisted to the Interregional Planning Council. Some of these recommendations are addressed in earlier sections or currently being implemented by Region C. The interregional coordination efforts of Region C are discussed in Section 10.5. Of the other recommendations, Region C supports:

- *Funding of long-range visionary planning*. Long-range visionary planning is critical to securing the water the region and state needs. This recommendation should also consider how projects that extend beyond the 50-year planning horizon are described in the plan and accommodated through the TWDB database application.
- *Provide financial incentive for local sponsorship of innovative, visionary and multi-benefit projects*.
- *Provide State financial assistance to projects without full local support*. Region C supports the State financial participation for large visionary projects, but these projects should be constructed and operated by the entities that will use the project. Region C supports the autonomy of local governance and control of water supply projects.
- *Amend the language in the Texas Water Code to strike simplified planning from the statute*. While the concept of simplified planning was intended to reduce effort and cost for regions with little changes, the implementation of the rules did not accomplish significantly less effort and cost.

8.5 Chapter 8 List of References

(1) Texas Water Code, *Chapter 16 Provisions Generally Applicable to Water Development, Subchapter C, Section 16.053* Amended by Acts 2023, 88th Leg., ch. 45, sec. 4, eff. Sept. 1, 2023, Austin, [Online], Available URL: http://www.statutes.legis.state.tx.us/Docs/WA/htm/WA.16.htm#16.053, accessed December 2024.

(2) Texas Parks and Wildlife Department: *Water Planning Data for Region C*, Austin, [Online] Available URL: https://tpwd.texas.gov/landwater/water/conservation/water_resources/water_quantity/sigsegs/regionc.phtml, accessed December 2024.

(3) Texas Parks and Wildlife Department: *Ecologically Significant River and Stream Segments for Region C*, April 2002, Austin, [Online] Available URL: http://www.tpwd.texas.gov/landwater/water/conservation/water_resources/water_quantity/sigsegs/media/region_c_map.pdf, accessed December 2024.

(4) Sulphur River Basin Authority: *Sulphur River Basin Feasibility Study*, [Online], Available URL: https://srbatx.org/sulphur-basin-feasibility-study.html , accessed December 2024.

(5) Buhman Associates, LLC, in cooperation with CDM Smith, Inc. and Freese and Nichols, Inc.: *Tarrant Regional Water District Integrated Water Supply Plan*, prepared for Tarrant Regional Water District, 2013, https://www.trwd.com/wp-content/uploads/2019/04/Integrated-Water-Supply-Plan-1-1.pdf, accessed December 2024.

(6) Fugro Consultants, Inc.: *Evaluation of Alternative Dam Locations Based Upon Impact to Natural Resources Proposed Tehuacana Reservoir Site Freestone County, Texas*, prepared for Tarrant Regional Water District, August 2012.

(7) Texas Water Code, *Chapter 16 Provisions Generally Applicable to Water Development, Subchapter C, Section 16.403(a)* Amended by Acts 2021, 87th Leg., ch. 36 (SB 669), sec. 1, eff. September 1, 2021, Austin, [Online], Available URL: http://www.statutes.legis.state.tx.us/Docs/WA/htm/WA.16.htm#16.403, accessed December 2024.

(8) Texas Commission on Environmental Quality, Texas Water Development Board, and Water Conservation Advisory Council: *Guidance and Methodology for Reporting on Water Conservation and Water Use*, December 2012, https://www.twdb.texas.gov/conservation/doc/SB181Guidance.pdf , accessed December 2024.

(9) Texas Water Code, *Chapter 11 Water Rights, Subchapter C, Section 11.085* Amended by Acts 2013, 83rd Leg., ch. 1065, sec. 1, eff. Sept. 1, 2013, Austin, [Online], Available URL: http://www.statutes.legis.state.tx.us/Docs/WA/htm/WA.11.htm#11.085, accessed December 2024.

(10) Texas Water Code, *Chapter 11 Water Rights, Subchapter B, Section 11.021* Amended by Acts 1977, 65th Leg., ch. 870, sec. 1, eff. Sept. 1, 1977, Austin, [Online], Available URL: http://www.statutes.legis.state.tx.us/Docs/WA/htm/WA.11.htm#11.021, accessed December 2024.

(11) Texas Water Code, *Chapter 11 Water Rights, Subchapter E, Section 11.173*, Amended by Acts 2013, 83rd Leg., ch. 1020, sec 2, eff. Sept. 1, 2013, Austin, [Online], Available URL: https://statutes.capitol.texas.gov/Docs/WA/htm/WA.11.htm#11.173 , accessed December 2024.

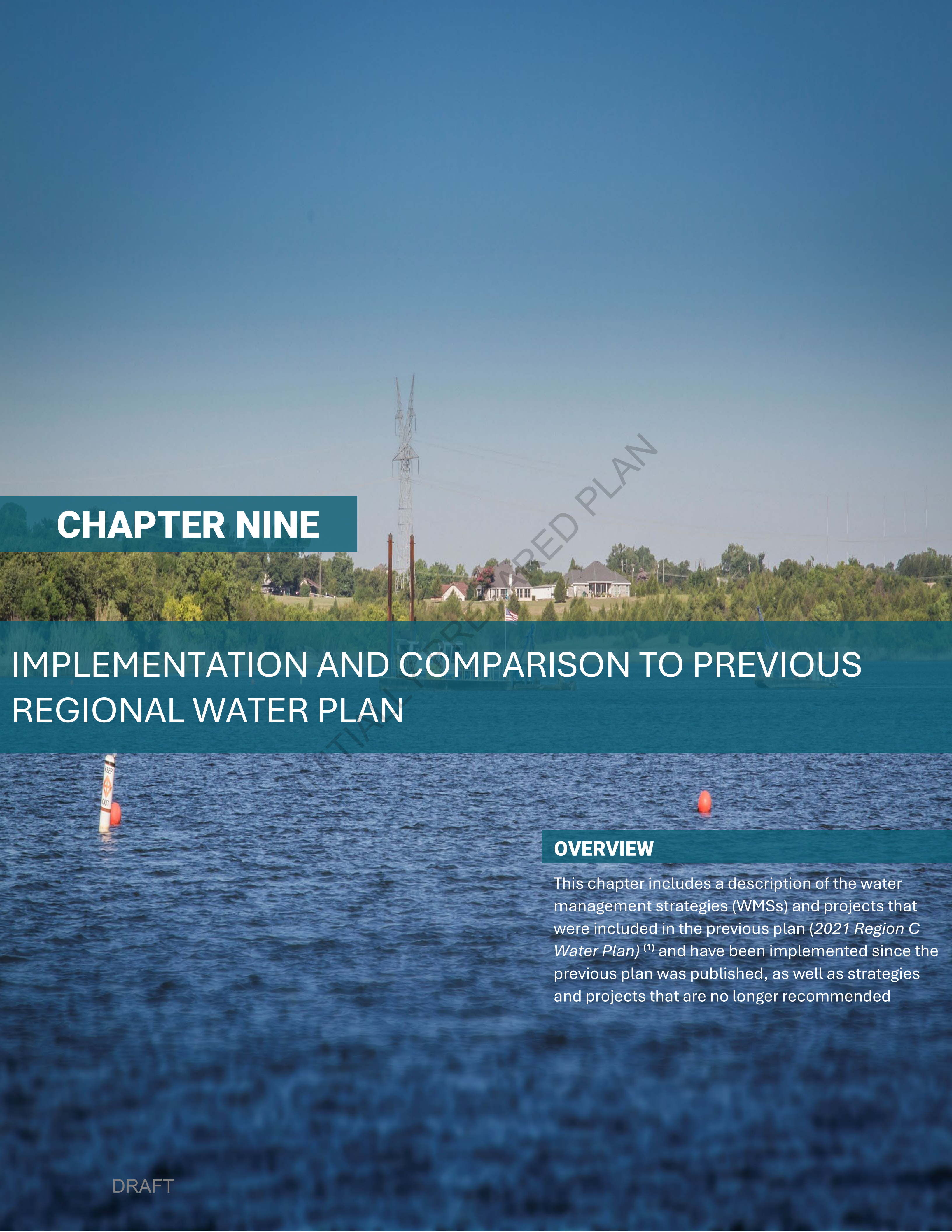
(12) Texas Water Development Board: *2022 Water for Texas State Water Plan*, Austin, [Online], Available URL: https://www.twdb.texas.gov/waterplanning/swp/2022/index.asp, January 2022.

(13) Texas Water Development Board: *State Water Implementation Fund for Texas (SWIFT)*, [Online], Available URL: http://www.twdb.texas.gov/swift/index.asp, accessed December 2024.

(14) Water Conservation Advisory Council*, Progress Made in Water Conservation in Texas: Report and Recommendations to the 89th Legislature*, December 2024, [Online], Available URL: https://savetexaswater.org/resources/doc/Water-Conservation-Advisory-Council-Report-to-the-89th-Texas-Legislature-2024.pdf, accessed December 2024.

(15) U. S. Department of Agriculture Natural Resources Conservation Service: *Watershed Rehabilitation - Texas*, [Online], Available URL: https://www.nrcs.usda.gov/programs-initiatives/watershed-rehabilitation/texas/watershed-rehabilitation-texas , accessed December 2024.

(16) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2021 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, November 2020.



CHAPTER NINE

IMPLEMENTATION AND COMPARISON TO PREVIOUS REGIONAL WATER PLAN

OVERVIEW

This chapter includes a description of the water management strategies (WMSs) and projects that were included in the previous plan (*2021 Region C Water Plan)* [1] and have been implemented since the previous plan was published, as well as strategies and projects that are no longer recommended

9 Implementation and Comparison to Previous Regional Water Plan

CHAPTER OUTLINE	
Section 9.1	Implemented and No Longer Included Water Management Strategies and Projects
Section 9.2	Differences Between the Previous and Current Regional Water Plan
Section 9.3	House Bill 807 Requirements
Section 9.4	Conclusion
RELATED APPENDICES	
Appendix C	Adjustments to Projections
Appendix E	Water Supply Available
Appendix J	Updated Quantitative Analysis of the Proposed Marvin Nichols Reservoir
Appendix N	Water Management Strategy Implementation Survey

This chapter includes a description of the water management strategies (WMSs) and projects that were included in the previous plan (*2021 Region C Water Plan)* [(1)] and have been implemented since the previous plan was published, as well as strategies and projects that are no longer recommended.

It also includes a discussion of the differences between the two plans, specifically regarding:

- Water demand projections
- Drought of record and hydrologic modeling and assumptions used in planning for the region
- Groundwater and surface water availability, existing water supplies, and identified water needs
- Changes to recommended and alternative water management strategies and projects
- Cost of the proposed plan

Updated WUG List

- 1 Removed WUG
- 10 New WUGs

Minimal Changes in Projections by Decade

- Population +/ 3.5%
- Demand +/ 1.3%

Increased Supplies from Implemented WMS

- Supplies +6.5% (2030)
- Supplies +8.9% (2070)

9.1 Implemented and No Longer Included Water Management Strategies and Projects

The following sections discuss the major water management strategies and projects that were recommended in the *2021 Region C Water Plan* [(1)] (2021 Plan) and have been partially or completely implemented since that plan was published, as well as WMSs and projects that are no longer being recommended and are not included in the 2026 Plan.

Appendix N includes the updated Water Management Strategy Implementation Survey provided by TWDB. Changes to WMSs since the 2021 Plan are discussed in **Section 9.2.6**.

9.1.1 Implementation of Previously Recommended Water Management Strategies and Projects

Since the 2021 Plan there have been numerous strategies implemented which are considered as existing supplies in the 2026 Plan. Many WMSs that have been partially implemented are still recommended in the 2026 Plan for additional implementation. Conservation was a recommended strategy for many WUGs in the 2021 Plan and continues to be recommended; additional information on conservation as a WMS and project is included in **Section 9.2.6**.

Region C did not consider drought management as a feasible strategy to meet long-term growth in demands or currently identified needs in any of the last three regional plans, so the implementation of this strategy is not relevant to the discussion in this chapter.

A summary of the strategies implemented since the 2021 Plan includes:

- **Two new major reservoirs**: Bois d'Arc Lake was constructed and began providing water for NTMWD and its customers in 2023. Lake Ralph Hall is under construction and expected to be completed before 2030. This lake will provide water for UTRWD and its customers.
- **Three indirect reuse projects**: Ennis (Bardwell Lake), Midlothian (Joe Pool Lake), and Weatherford (Lake Weatherford)
- **One direct reuse project** in the Alliance Corridor (TRA)
- **Seven new or expanded connections** to water providers
- **Over 20 new groundwater projects** have been completed and are providing groundwater to Region C WUGs
- **Several water providers have implemented treatment and infrastructure improvements** to utilize existing supplies

9.1.2 Water Management Strategies and Projects No Longer Included

Most of the projects that are no longer included in the 2026 Plan were no longer needed because of changes in water demands or changes in the recommendation of other strategies. For much of Region C, mining demands substantially decreased and eliminated the need for several strategies. In some cases, there were changes regarding customers served by the MWPs and WWPs, which resulted in changes in strategies. Overall, there are over 80 strategies that are no longer recommended as described in the 2021 Plan. Many are infrastructure improvements, such as water treatment plant expansions or connections to other water providers, that are no longer needed. Others are no longer shown because the water provider changed. For example, the Ellis County Project is now being served directly from TRWD rather than through TRA. Other projects, such as the GTUA regional system, are revised in the 2026 Plan and now serve different customers.

9.2 Differences Between the Previous and Current Regional Water Plan

The following sections provide a discussion of changes from the 2021 Plan to the 2026 Plan.

9.2.1 Water Demand Projections

Chapter 2 of this report details the projected water demands for Region C for the 2026 Plan. **Figure 9-1** compares the total demand projections from the 2021 and 2026 Plans. This figure shows that the water demand projections in the two plans are very similar. **Table 9-1** shows the difference in demands by county, and **Table 9-2** shows the difference by use category. As shown in **Table 9-2**, municipal and total demand projections are slightly higher in all decades except for 2070. This change is not evenly distributed across the region, however, with the greatest increases in projected demand occurring in Collin, Denton, Grayson, and Tarrant counties. Municipal and manufacturing demands have increased substantially, while demands for mining and steam electric power have decreased.

FIGURE 9-1 COMPARISON OF PROJECTED DRY YEAR DEMANDS IN THE 2021 PLAN AND 2026 PLAN

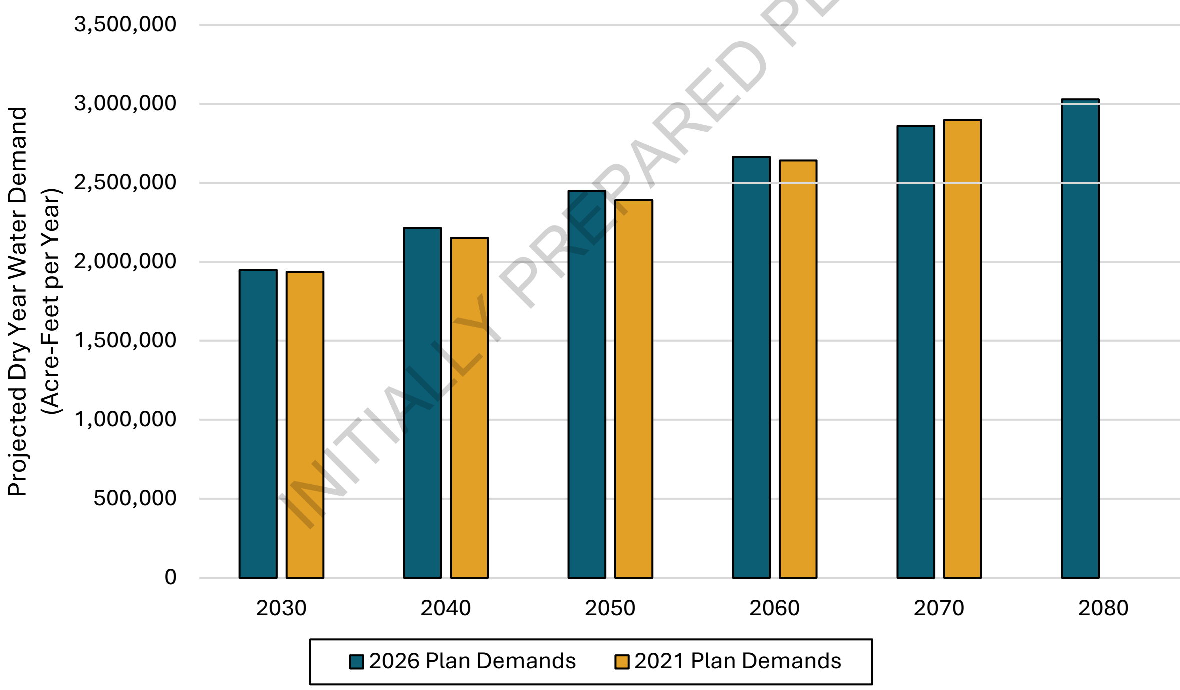


TABLE 9-1 CHANGE IN PROJECTED DRY YEAR DEMANDS FROM 2021 PLAN TO 2026 PLAN FOR REGION C BY COUNTY

CHANGE IN PROJECTED DRY YEAR WATER DEMAND (ACRE FEET/YEAR)					
COUNTY	2030	2040	2050	2060	2070
Collin	41,306	60,551	72,443	63,787	44,998
Cooke	(653)	(170)	(716)	(1,967)	(5,902)
Dallas	(18,895)	(40,259)	(55,297)	(67,888)	(68,517)
Denton	14,285	22,162	24,590	12,502	11,876
Ellis	2,541	6,419	5,247	(2,370)	(19,792)
Fannin	582	494	34	(1,663)	(3,310)
Freestone	(34,394)	(25,392)	(26,756)	(28,466)	(31,943)
Grayson	13,236	26,052	28,865	23,877	13,402
Henderson	(2,093)	356	757	(1,839)	(5,134)
Jack	(1,892)	(1,827)	(1,876)	(1,913)	(1,974)
Kaufman	4,256	4,416	6,529	5,479	3,122
Navarro	1,053	1,106	610	(17)	(1,187)
Parker	(15,559)	(9,319)	(8,602)	(9,419)	(8,674)
Rockwall	(1,944)	(2,065)	4,942	8,649	9,683
Tarrant	19,382	28,445	15,234	28,249	27,984
Wise	(9,429)	(8,838)	(7,462)	(4,855)	(2,636)
Region C Total	**11,782**	**62,131**	**58,542**	**22,146**	**(38,004)**
% Change	**0.6%**	**2.9%**	**2.4%**	**0.8%**	**(1.3%)**

TABLE 9-2 CHANGE IN PROJECTED DRY YEAR DEMANDS FROM 2021 PLAN TO 2026 PLAN FOR REGION C BY TYPE OF USE

CHANGE IN PROJECTED WATER DEMAND (ACRE FEET/YEAR)					
USE	2030	2040	2050	2060	2070
Municipal	61,576	82,505	77,649	39,260	(22,049)
Irrigation	1,674	1,674	1,674	1,674	1,674
Livestock	(1,647)	(1,647)	(1,647)	(1,647)	(1,647)
Manufacturing	12,005	21,937	24,105	26,354	28,685
Mining	(27,742)	(22,844)	(23,745)	(24,001)	(25,173)
Steam Electric Power	(34,084)	(19,494)	(19,494)	(19,494)	(19,494)
Region C Total	**11,782**	**62,131**	**58,542**	**22,146**	**(38,004)**
% Change	**0.6%**	**2.9%**	**2.4%**	**0.8%**	**(1.3%)**

9.2.2 Drought of Record and Hydrologic Modeling Assumptions Used in Planning for the Region

The drought of record for many water supplies used in Region C occurred from 1950 through 1957. More recent droughts (2003 through 2006 and 2011 through 2015) caused low inflows and low water levels for many Region C lakes. An update of the Red River Water Availability Model (WAM) shows new droughts of record in the Red River Basin. The droughts of record for three reservoirs in

Region C (Bois d'Arc Lake, Lake Bonham and Moss Lake) are now between 2010 and 2015 rather than the 1950s. Analysis using hydrologic data from recent years has indicated that Jim Chapman Lake in the Sulphur River Basin has recently experienced a new drought of record during this same period (2011 through 2015). Yields of proposed projects in the Sulphur Basin show as much as a 24 percent reduction in yield due to recent droughts. For other Region C supplies, based on the current hydrology in the Texas Commission on Environmental Quality (TCEQ) WAMs, the drought of the 1950s remains the drought of record.

Firm yields were evaluated for all reservoirs in Region C using the TCEQ WAMs, with modeling modifications made to more accurately reflect surface water conditions and operations in the region. Additional information on the hydrologic modeling assumptions can be found in **Appendix E**.

9.2.3 Available Water Supplies

Chapter 3 and **Appendix E** of this report detail the available supplies for Region C for the 2026 Regional Plan. **Figure 9-2** compares the total available supplies (not considering infrastructure or permit constraints) from the 2021 and 2026 Plans. **Table 9-3** shows the changes by source of supply. As the figure and table show, the total available supplies in the 2026 Plan have increased since the previous plan due to implementation of various surface water and reuse strategies, as well as updates to hydrologic modeling. The following is a summary of the changes:

- The available water supplies from the Red River Basin have changed in the 2026 Plan because the historical hydrology was extended through 2017. Previous plans used the prior WAM with hydrology through 1998. This hydrology extension affected reliable supplies from the run-of-river supplies and existing reservoirs.
- An increase in reservoir supplies is associated with the completion of Bois d'Arc Lake and Lake Ralph Hall. Both lakes are in Fannin County and were recommended strategies in the 2021 Plan.
- Other changes in reservoir supplies include updates to hydrologic modeling assumptions and the available supplies assumed for planning, which may be less than firm yield based on sponsor preferences to use safe yield or other more conservative planning assumptions.
- The decrease in imports is due to lower yields of sources in the Sulphur and Neches River basins and the exclusion of a former import from Lake Livingston to a now-closed power generation facility.
- Multiple small changes made up the difference in groundwater availability.
- Reuse has increased in the early decades due to additional return flows in Region C, including the following:
    - Increased return flow projections associated with previously developed reuse sources
    - Implementation of reuse strategies by Ennis, Flower Mound, Midlothian, and Weatherford

FIGURE 9-2 COMPARISON OF TOTAL AVAILABLE SUPPLIES IN THE 2021 PLAN AND 2026 PLAN

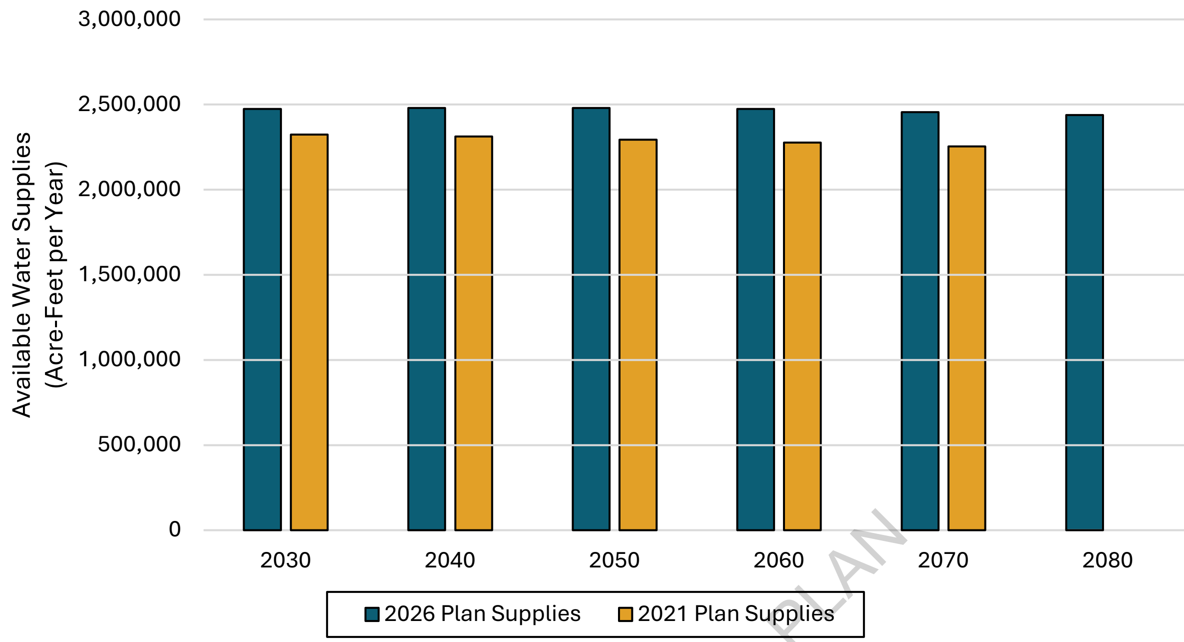


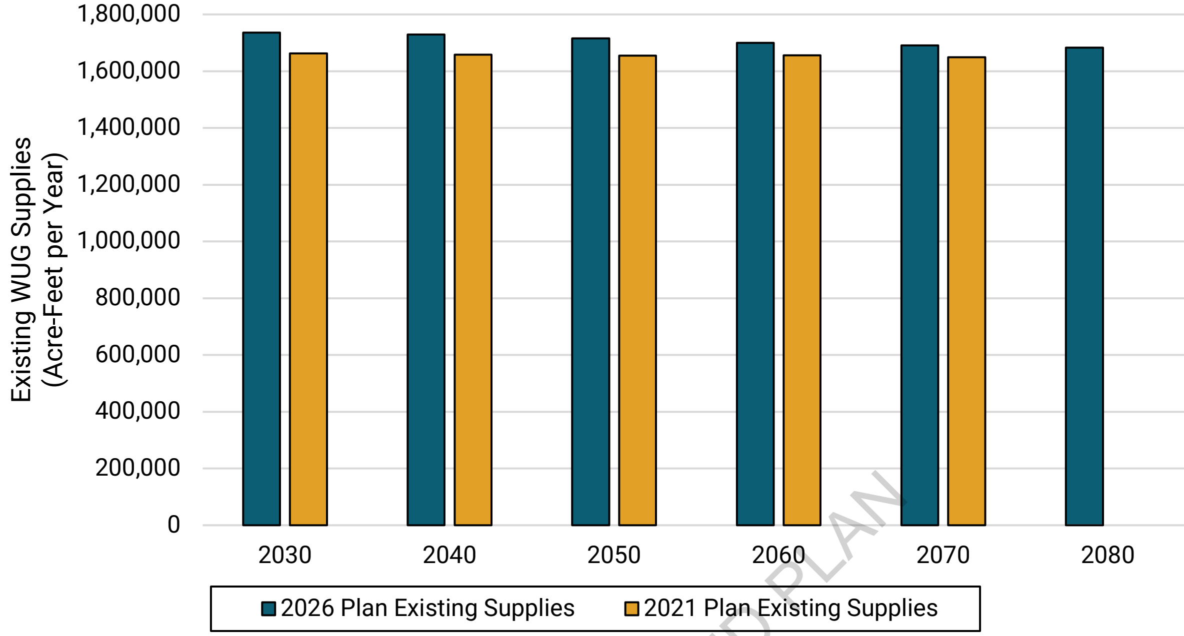
TABLE 9-3 CHANGE IN TOTAL AVAILABLE SUPPLIES FROM THE 2021 PLAN TO THE 2026 PLAN FOR REGION C

CHANGE IN AVAILABLE SUPPLIES (ACRE FEET PER YEAR)					
SOURCE OF SUPPLY	**2030**	**2040**	**2050**	**2060**	**2070**
Reservoirs in Region C	109,508	113,446	117,680	122,083	125,724
Run-of-River Supply	462	462	462	462	462
Other Local Supply	(3,097)	(2,897)	(2,424)	(2,056)	(2,056)
Surface Water and Groundwater Imports	(28,197)	(24,694)	(21,205)	(18,829)	(16,011)
Groundwater	(2,275)	(1,800)	(451)	164	1,520
Reuse	73,582	83,957	92,704	95,946	92,091
REGION C TOTAL	**149,983**	**168,474**	**186,766**	**197,770**	**201,730**
% Change	**6.5%**	**7.3%**	**8.1%**	**8.7%**	**8.9%**

9.2.4 Existing Water Supplies of WUGs

Existing water supplies for WUGs include those supplies which are both available and which are usable within system constraints, such as regulatory requirements or infrastructure capacity limits. Changes to the existing water supplies for WUGs are summarized in **Figure 9-3**. Increases are mostly attributable to implementation of strategies, as well as updated information on supply availability and WUG constraints.

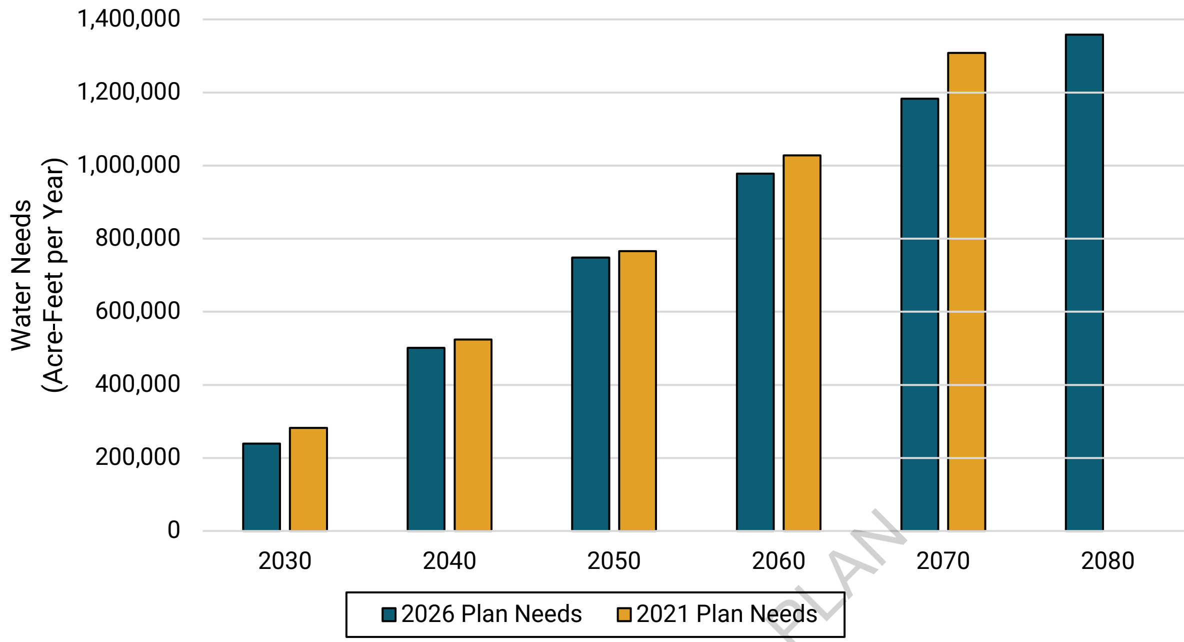
FIGURE 9-3 COMPARISON OF CONNECTED SUPPLIES (WITH CONSTRAINTS) IN THE 2021 PLAN AND 2026 PLAN



9.2.5 Identified Water Needs

Chapter 4 of this report details the identified water needs for Region C for the *2026 Regional Water Plan*. The identified needs are the sum of all the needs of each WUG, not considering any surpluses of other WUGs. **Figure 9-4** is a comparison of those needs in the 2021 Plan and 2026 Plan. The total 2070 need in the 2026 Plan is 1,182,869 acre-feet per year. The total 2070 need in the 2021 Plan was 1,308,539 acre-feet per year. The lower need is in part due to the new water sources (Bois d'Arc Lake and Lake Ralph Hall).

FIGURE 9-4 COMPARISON OF NEEDS IN THE 2021 PLAN AND 2026 PLAN



9.2.6 Changes to Recommended and Alternative Water Management Strategies and Projects

In addition to the implemented and no longer recommended WMSs and projects discussed in **Section 11.1** there have been numerous changes and additions to the recommended and alternative water management strategies and projects presented in the 2021 Plan. New strategies and projects in the 2026 Plan are summarized in **Table 9-5**, and changes to strategies and projects that were included in the 2021 Plan are summarized in **Table 9-6**.

Table 9-6 does not include the 10 new WUGs added since the 2021 Plan, nor the one entity no longer considered a WUG (now part of Mustang SUD). For reference, these new or removed WUGs are listed in **Table 9-7**. Any strategies or projects associated with these new and removed WUGs are considered changes compared to the 2021 Plan even though they are not listed in the table of changes. Similarly, changes to WMSs due to changes in WUG names (shown in **Table 9-8)** are not included in **Table 9-6**.

It is important to note that the changes to the WMSs and projects listed in **Table 9-6** are only changes to the base WMS and project. For example, if a WUG had a strategy in the 2021 Plan to purchase additional water from DWU and if in the 2026 Plan new infrastructure is required to purchase that water, that is not considered a change to the WMS because there was no change to the source of supply. It is, however, considered a new project. Additionally, many strategies or projects have been recommended in both the 2021 Plan and 2026 Plan but have had a change in the recommended online decade due to a shift in timing of needs and supply availability; these are not included in **Table 9-6**. Similarly, projects are not listed if only a minor change was made (e.g., change in recommend capacity increase of a WTP) due to changes in water needs or updates to existing capacity information. Because conservation strategies were included for a large number of WUGs, changes to conservation strategies are discussed below and are not listed by WUG in **Table 9-6.**

In addition to the information summarized in **Table 9-6**, detailed information regarding significant changes to WMSs for the MWPs is provided below. The information below is intended to highlight the changes to several of the major water provider WMSs and projects since the 2021 Plan, not to provide detailed information on the WMS or project itself. That information can be found in **Chapter 5C** and **5D** of this report.

Conservation. The currently recommended Water Conservation Package for municipal WUGs (described in **Chapter 5B**) is generally consistent with the Water Conservation Package recommended in the 2021 Plan. The RCWPG also recommends that municipal WUGs be able to substitute any other appropriate, service-area specific water conservation strategies and projects for those specifically listed in the Water Conservation Package.

This recommendation is presented in greater detail in **Chapter 5B**. For non-municipal WUGs, the RCWPG has renewed the 2021 recommendation for irrigation rebate programs and on-site recycling for mining WUGs. In addition to the measures recommended for municipal WUGs in the 2021 Plan, which have been maintained, the 2026 Plan includes a recommendation to implement landscape ordinances for new development in WUGs with a population greater than 20,000. Based on this addition and updated evaluations of potential savings, the potential savings in 2070 associated with recommended municipal conservation measures have increased from 193,227 acre-feet per year in the 2021 Plan to 261,648 acre-feet per year in the 2026 Plan. Based on a review of annual water conservation data reports submitted to Region C, the most widely implemented municipal water conservation measures in the region are metering new connections, retrofitting existing connections, utility water audit and water loss practices, water waste prohibitions, water conservation pricing, and providing public information.

Marvin Nichols Reservoir. The Marvin Nichols Reservoir has been included as a recommended strategy in each of the Region C Water Plans since the beginning of regional water planning and in previous State Water Plans. This project is retained as a recommended strategy in the 2026 Region C Water Plan for three major water providers and an alternative for two others.

During the development of the 2021 Plan, updated yield analyses were performed for the Sulphur Basin to include the new drought of record which spanned from 2011 to 2015. The yield available to Region C in the 2021 Plan was 361,200 acre-feet per year. The yield available to Region C in the 2026 Plan from the Marvin Nichols Reservoir strategy was evaluated using the TCEQ-approved Sulphur Basin WAM. The yield in the 2026 Plan was slightly reduced to 320,000 acre-feet per year due in part to instream flow considerations both downstream of Marvin Nichols Reservoir and Wright Patman Reservoir. Final delivery locations to the sponsors of the project were also updated.

The impact analysis of the Marvin Nichols Reservoir in **Appendix J** was updated as appropriate based on new aerial surveys and data sources. The socio-economic study conducted in 2020 (**Attachment J-2**) was not updated,

Tarrant Regional Water District Reuse Strategies. The 2021 Plan included multiple reuse strategies sponsored by Tarrant Regional Water District (TRWD), including Reuse from TRA Central WWTP, Additional Capacity for Conveyance of Richland Chambers Reuse, and Cedar Creek Wetland Reuse. In the 2026 Plan, these strategies continue to be recommended, and the proposed constructed wetland at Cedar Creek has been renamed to the Marty Leonard Wetlands. A new strategy to divert reuse from Fort Worth Mary's Creek Water Reclamation Facility (WRF) has also been added to the list of recommended strategies for TRWD.

9.2.7 Total Cost of Recommended Strategies

Most of the new supplies for Region C will be developed by the major wholesale water providers in the region. The total cost of implementing all of the recommended water management strategies in the 2026 Region C Plan is approximately $49 billion, compared to a total cost of $30 billion in the 2021 Region C Plan. The primary factors contributing to the increase in cost to develop the WMSs are changes to several of the large WMSs, inflation, and increased material and equipment costs for pump stations and pipelines.

9.2.8 Unmet Water Needs

As described in **Section 9.2.5**, over 1.1 million acre-feet per year of needs have been identified in Region C by 2070. The recommended strategies in the 2026 Plan address almost all these needs; however, needs for a small number of WUGs were not fully met.

Many of the unmet needs in the 2021 Plan resulted from limitations of modeled available groundwater (MAG). In the 2026 Plan, MAG limitations also restrict supplies to irrigation and manufacturing users in some counties. However, the causes of unmet municipal needs in the 2026 Plan are due to rapid growth, lack of available supplies, and the timing required to develop strategies to provide additional supply. Additionally, some needs for steam electric power in Freestone County are unmet in both plans; it is anticipated that some of this demand may not be realized due to changed conditions in the county (closure of facilities). **Table 9-4** lists the WUGs with unmet needs in the 2021 Plan and the 2026 Plan. Considerations for unmet needs in the Region C 2026 Plan are discussed in detail in **Chapter 6** of this plan.

TABLE 9-4 REGION C WUGS WITH UNMET NEEDS IN THE 2021 PLAN AND 2026 PLAN

2021 Plan	2026 Plan
Hickory Creek SUD	Celina
Irrigation, Ellis	County-Other, Parker
Irrigation, Fannin	Irving
Mining, Fannin	Irrigation, Ellis
Mining, Freestone	Irrigation, Fannin
Steam Electric Power, Freestone	Irrigation, Parker
Mining, Kaufman	Manufacturing, Ellis
Mining, Navarro	Manufacturing, Henderson
	Steam-Electric Power, Freestone

9.3 Regional Strategies and Economies of Scale

Pursuant to Texas Water Code (TWC) §16.053(e)(12), regional planning guidelines include the requirement that "RWPs must include an assessment of the region's efforts to encourage cooperation between WUGs for the purpose of achieve economies of scale and incentivizing WMSs that benefit the entire region." Generally, since nearly 90 percent of the municipal water supplies are provided by the MWPs, every strategy developed by these providers serves more than one entity. Other wholesale water providers also provide water for more than one entity. Those that serve only one entity are generally limited to specific direct reuse projects and self-supplied groundwater projects. In the 2021 Region C Water Plan, 35 strategies served more than one entity. Of these strategies, one has been completely implemented (Bois d'Arc Lake) and two others have been partially implemented (Lake Ralph Hall and Reuse and Alliance direct reuse). For the 2026 Plan, there are 47 recommended strategies that serve more than one entity.

The RCWPG has continued to encourage joint water management strategies that benefit multiple water providers and provide economies of scale. Examples of these joint projects include:

- Integrated Pipeline - a joint delivery strategy recommended for Tarrant Regional Water District and Dallas Water Utilities.
- Marvin Nichols Reservoir– a joint reservoir development and delivery strategy recommended for Tarrant Regional Water District, North Texas Municipal Water District, and Upper Trinity Regional Water District; alternative strategy for Dallas Water Utilities and Irving.
- Wright Patman Reallocation – a joint reservoir reallocation strategy recommended for Tarrant Regional Water District and North Texas Municipal Water District; alternative strategy for Dallas Water Utilities, Irving, and Upper Trinity Regional Water District.
- GTUA Regional Water System – recommended strategies in Grayson, Cooke, Collin and Denton counties.
- Parker County and Wise County Regional Systems – new strategies in the 2026 Plan to provide economies of scale through development of new regional water provider to serve growing communities in Parker and Wise counties, respectively.
- Fannin County Supply Project- this is a regional transmission system to serve multiple water users in Fannin County.

9.4 Conclusion

Total water demand in Region C increased in most decades compared to the 2021 Plan, with a slight decrease in 2070. Since the 2021 Plan, total available supplies have also increased due to the implementation of some strategies, such that overall needs have decreased somewhat. However, some areas in Region C are struggling to keep up with the rapid growth and demand for water. Further study and cooperation with regional providers are needed to address these concerns.

TABLE 9-5 NEW WATER MANAGEMENT STRATEGIES/PROJECTS SINCE THE 2021 REGION C WATER PLAN

SPONSOR	WMS NAME	PROJECT NAME	COMMENT
Major Water Provider Strategies / Projects			
Dallas	Interstate - Little River-Millwood Lake		Alternative strategy
Dallas	Interstate - Kiamichi River		Alternative strategy
North Texas Municipal Water District	Sabine Creek WWTP Reuse		
North Texas Municipal Water District	Interim Upper Sabine Basin		
Tarrant Regional Water District	Reuse from Mary's Creek WRF		
Upper Trinity Regional Water District	Grapevine Lake Exchange		
Upper Trinity Regional Water District	Additional Chapman Lake (Sulphur Springs)		
Upper Trinity Regional Water District	Groundwater		Alternative strategy
Upper Trinity Regional Water District	Aquifer Storage and Recovery		Alternative strategy
WUG Strategies / Projects			
Annetta	Groundwater	New Well(s) in Trinity Aquifer	
Arlington	Additional Supplies from TRWD	8 MGD WTP Expansion	New infrastructure project for previously recommended strategy
Arlington	Additional Supplies from TRWD	Parallel Raw Water Pipeline	New infrastructure project for previously recommended strategy
Athens MWA	Additional Treated Water Supply	WTP Pump Station Expansion	
Aubrey	Groundwater	New Well(s) in Trinity Aquifer	
Buena Vista-Bethel SUD	Groundwater	New Well(s) in Trinity Aquifer	
Collinsville	Groundwater	New Well(s) in Trinity Aquifer	
County Other Denton	Additional Supplies from Denton		
County Other Denton	Additional Supplies from Flower Mound		
County Other, Collin	Groundwater	New Well(s) in Trinity Aquifer	

SPONSOR	WMS NAME	PROJECT NAME	COMMENT
County Other, Wise	Additional Supplies from UTRWD through Justin (New Fairview)		Alternative strategy
County Other, Wise	Groundwater	Additional Well(s) in Trinity Aquifer	
County Other, Wise	New Regional Water Supplier (through TRWD)		
Decatur	Additional Supplies from Wise County WSD	WTP Expansion and Infrastructure Improvements	New infrastructure project for previously recommended strategy
Denton	Additional Indirect Reuse with Storage		
Denton	Aquifer Storage and Recovery		
Denton	Direct Potable Reuse		
Flower Mound	Long Prairie Direct Reuse		
Frisco	Additional Supplies from NTMWD	Additional Transmission	New infrastructure project for previously recommended strategy
Grand Prairie	Additional Fort Worth (TRWD)		
Gunter	Additional Supplies from Mustang SUD		
Ladonia	Groundwater	New Well(s) in Trinity Aquifer	
Mansfield	TRWD (Existing and Additional Supplies)	28 MGD New WTP Plant Expansion	A second expansion of the Mansfield New WTP is recommended in the 2026 RWP. The new WTP and a first expansion were included in the 2021 RWP.
Mesquite	Additional Water from DWU		
Mesquite	Additional Water from DWU through Grand Prairie		
Mustang SUD	Additional Supplies from Sherman		
Mustang SUD	Connect to and Purchase Water from Denton		
Mustang SUD	Direct Potable Reuse		
Mustang SUD	New GTUA Regional Water System		
Mustang SUD	New Well(s) in Trinity Aquifer		
Ponder	Connect to and Purchase Water from Denton		
Sherman	Additional Texoma (Existing Water Right)		Additional Texoma supply through Sherman was shown as part of

SPONSOR	WMS NAME	PROJECT NAME	COMMENT
			the GTUA Regional Water System in the 2021 RWP. The concept of that WMS has changed, and Additional Texoma Supply through Sherman is a new WMS in the 2026 RWP.
Sherman	Acquire Water Rights in Valley Lake (Luminant)		
Sherman	Additional Texoma	Expand Raw Water Delivery from Lake Texoma Phase II	Infrastructure expansion associated with both Sherman / Lake Texoma strategies
Two Way SUD	Groundwater	New Well(s) in Trinity Aquifer	
Waxahachie	Additional Indirect Reuse		
Weatherford	Additional Supplies from TRWD	Additional Transmission	New infrastructure project for previously recommended strategy
Whitesboro	Groundwater	New Well(s) in Trinity Aquifer	

TABLE 9-6 CHANGES TO WATER MANAGEMENT STRATEGIES/PROJECTS SINCE THE 2021 REGION C WATER PLAN

SPONSOR	WMS/PROJECT NAME	CHANGE FROM 2021 PLAN
Major Water Provider Strategies		
Dallas	Lake Columbia	Changed from recommended to alternative WMS
Dallas	Sabine Conjunctive SysOp (Off Channel Reservoir and Groundwater)	Previous alternative WMS now included as two separate recommended WMS (Sabine Conjunctive Use Part 1 and Part 2)
North Texas Municipal Water District	Oklahoma	Changed from recommended to alternative WMS
North Texas Municipal Water District	Lake O' the Pines (Cypress Basin Supplies)	Previous alternative WMS now recommended
Trinity River Authority	Central Reuse to Irving	Changed from recommended to alternative WMS with updates to project concept
Upper Trinity Regional Water District	Wright Patman Reallocation	Changed from recommended to alternative WMS
WUG Strategies		
Anna	Sherman through GTUA (CGMA)	Strategy concept revised; now shown as CGMA from NTMWD through GTUA; no longer goes through Sherman
Annetta	Connect to Weatherford	2021 RWP strategy "Connect to Surface Water" changed from recommended to alternative WMS; updated to show Weatherford as potential surface water supplier
Collinsville	GTUA Regional Water System through Sherman	GTUA RWS concept has been updated and is sponsored by GTUA without routing through Sherman infrastructure.
County Other, Denton	UTRWD	UTRWD is no longer source of existing supply due to changes in Denton County Other, so the previous WMS of additional UTRWD supply is now shown as a new connection to UTRWD.
County Other, Parker	TRWD	2021 RWP recommended supplies through TRWD with a 12.5 MGD WTP. Now recommended that TRWD supplies through a new regional water supplier.
Denison	10 MGD Desalination WTP Expansion	Two WTP expansions are now recommended instead of one.
Files Valley WSC	Connect to Waxahachie	Changed from recommended to alternative WMS
Howe	Sherman through GTUA (CGMA)	Strategy concept revised; now shown as CGMA from NTMWD through GTUA; no longer goes through Sherman
Irving	TRA Central Reuse Project	Changed from recommended to alternative WMS with updates to project concept
Italy	Waxahachie	Changed from recommended to alternative WMS
Manufacturing, Dallas	DWU	Shown as two WMS with supply direct from DWU and from DWU through Grand Prairie
Manufacturing, Dallas	NTMWD	shown as two WMS with supply through Garland and Mesquite
Melissa	Sherman through GTUA (CGMA)	Strategy concept revised; now shown as CGMA from NTMWD through GTUA; no longer goes through Sherman

SPONSOR	WMS/PROJECT NAME	CHANGE FROM 2021 PLAN
Northwest Grayson County WCID 1	GTUA Regional Water System through Sherman	GTUA RWS concept has been updated and is sponsored by GTUA without routing through Sherman infrastructure.
Trenton	Fannin County Water Supply Project	Changed from recommended to alternative WMS
Two Way SUD	GTUA Regional Water System through Sherman	GTUA RWS concept has been updated and is sponsored by GTUA without routing through Sherman infrastructure.
Van Alstyne	Sherman through GTUA (CGMA)	Strategy concept revised; now shown as CGMA from NTMWD through GTUA; no longer goes through Sherman
Whitesboro	GTUA Regional Water System through Sherman	GTUA RWS concept has been updated and is sponsored by GTUA without routing through Sherman infrastructure.
Woodbine WSC	GTUA Regional Water System through Sherman	GTUA RWS concept has been updated and is sponsored by GTUA without routing through Sherman infrastructure.

TABLE 9-7 WUGS ADDED AND REMOVED SINCE THE 2021 REGION C WATER PLAN

NEW WUGS	REMOVED WUGS
AMC Creekside	Marilee SUD
City of Blue Mound	
City of Log Cabin	
City of Savoy	
Denton County FWSD 11-C	
Kaufman County MUD 14	
Lancaster MUD 1	
Nash Forreston WSC	
Southern Oaks Water Supply	
Terra Southwest	

TABLE 9-8 WUGS RENAMED SINCE THE 2021 REGION C WATER PLAN

2021 REGION C PLAN WUG NAME	2026 REGION C PLAN WUG NAME
Ables Springs WSC	Ables Springs SUD
College Mound WSC	College Mound SUD
Copeville SUD	Copeville WSC
Westminster WSC	Westminster SUD

9.5 Chapter 9 List of References

(1) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2021 Region C Water Plan*, prepared for the Region C Water Planning Group, Fort Worth, November 2020.

CHAPTER TEN

PLAN APPROVAL PROCESS AND PUBLIC PARTICIPATION

OVERVIEW

This section describes the plan approval process for the Region C Water Plan and the efforts made to inform the public and encourage public participation in the planning process. Special efforts were made to inform the general public, water suppliers, and others with special interest in the regional water plan and to seek their input.

10 PLAN APPROVAL PROCESS AND PUBLIC PARTICIPATION

This section describes the plan approval process for the Region C Water Plan and the efforts made to inform the public and encourage public participation in the planning process. Special efforts were made to inform the general public, water suppliers, and others with special interest in the regional water plan and to seek their input.

10.1 Regional Water Planning Group

The legislation for State Water Planning and TWDB planning guidelines establish regional water planning groups to control the planning process [1]. Each regional water planning group includes representatives of twelve designated interest groups: general public, counties, municipalities,

industrial, agricultural, environmental, small businesses, electric generating utilities, river authorities, water districts, water utilities and groundwater management areas.

Table 10.1 lists the members of the Region C Water Planning Group as of February 2025 and the interests they represent. For most of the sixth round of planning, Kevin Ward (Trinity River Authority) was the Chair of the Region C Water Planning Group. Upon Mr. Ward's retirement from the planning group, the RCWPG elected Dan Buhman as Chair. Russell Laughlin served as Vice-Chair and Jenna Covington served as Secretary during this planning cycle. A number of planning group members either retired from the group or did not seek reelection as their terms expired. Members that participated for much of this planning cycle, but left before the final plan was approved are noted as "retired'.

TABLE 10.1 CURRENT MEMBERS OF THE REGION C WATER PLANNING GROUP (FEBRUARY 2025)

INTEREST	MEMBER
Water Districts	Dan Buhman, Chair
Industry	Russell Laughlin, Vice Chair
Water Districts	Jenna Covington, Secretary
Agriculture	John Paul Dineen III
Counties	Steve Starnes, G.K. Maenius (retired)
Electric Generating Utilities	Ryan Bayle, Gary Spicer (retired)
Environment	Grace Darling
Environment	John Stevenson
Groundwater Management Areas (GMA6)	Doug Shaw
Groundwater Management Areas (GMA8)	Harold Latham
Groundwater Management Areas (GMA11)	Gary Douglas
Groundwater Management Areas (GMA12)	David Bailey
Municipalities	Stephen Gay
Municipalities	Chris Harder
Municipalities	Rick Shaffer
Municipalities	Denis Qualls
Public	Jay Barksdale
Public	John Lingenfelder
River Authorities	Glenn Clingenpeel, Kevin Ward (former chair, retired)
Small Business	Steve Mundt
Water Districts	Paul Sigle, Drew Satterwhite (retired)
Water Utilities	Chris Boyd
Water Utilities	Connie Standridge

10.2 Outreach to Water Suppliers, Water User Groups, and Regional Planning Groups

The Region C Water Planning Group made special efforts to contact water suppliers and water user groups in the region and neighboring regional water planning groups to obtain their input in the planning process. Water suppliers and water user groups were surveyed and contacted to solicit information on their current water needs and their future water plans. Region C coordinated with

Regions B, D, G, H, and I regarding shared resources and water user groups that are in multiple regions.

Five of the six major water providers in the region (Dallas Water Utilities, Tarrant Regional Water District, North Texas Municipal Water District, Fort Worth, and Trinity River Authority) are represented on the water planning group. In addition, the planning group encouraged the Region C consultants to keep in touch with wholesale water providers and other water suppliers as planning proceeded. Other specific measures to obtain input from water suppliers and from other regional water planning groups are discussed below.

10.2.1 Questionnaires and Surveys

Several questionnaires and/or surveys have been sent to the Region C water user groups and wholesale water providers. **Appendix C** includes a sample copy of the population and demand questionnaire that was emailed in March and April of 2023 to named municipal WUGs (not sent to County Other WUGs) located in Region C. This survey also inquired about the implementation status of projects recommended in the 2021 Region C Water Plan that were to be online by 2020. If no response was received, follow-up phone calls were made to selected WUGs based on changes in the projections and uncertainties of 2020 projects. A total of 83 WUGs responded to the questionnaire. The overall response rate for this survey was about 32 percent.

Another survey was emailed to the Region C WUGs and Wholesale Water Providers (WWPs) in June 2024 to solicit input on the projected water needs and water management strategies identified for each WUG and wholesale provider. Individual meetings were held with the Major Water Providers and regional providers. (See Section 10.2.2.) **Appendix F** includes a sample copy of the water management strategy (WMS) questionnaire. This survey also inquired about implementation of any WMSs from the *2021 Region C Water Plan* (results of which are summarized in **Chapter 9** of this report), any current contracts, existing water supply and delivery infrastructure, and any emergency interconnections with other water suppliers. Over 60 water suppliers responded to this survey. Follow-up surveys were sent and/or phone calls were made to providers with needs that did not respond to the initial survey.

10.2.2 Meetings with Major Water Providers and Other Suppliers

The Region C consultants met in person with all the major water providers and met either by teleconference or in person with the regional water providers, several wholesale water providers, and water user groups that were interested in meeting.

Discussion topics included current water supplies, current customers, population and demand projections, recommendations from the 2021 Plan, future water supplies, water treatment plant capacity and planned expansions, and additional wholesale customers.

The meetings with the providers provided a better understanding of the current water supplies, current customers, current infrastructure limitations, potential future customers, and planned water supply and infrastructure improvement projects. These meetings were useful in determining recommended strategies for the Region C Water Plan.

10.2.3 Rural Outreach

Region C is a mix of urban and rural areas. Much of the region is becoming more urban as population continues to grow. The TWDB identified 210 water providers as rural within the Region C planning area. Most of these providers are designated water user groups (WUGs) and are planned for directly in the 2026 Region C Water Plan. Each WUG was sent surveys as discussed in **Section 10.2.1**.

There are 64 smaller municipal water suppliers that fall under the "County-Other" category. Of these entities, only 13 are self-supplied. The other small rural systems purchase water from a wholesale water provider and are covered in the plan for the wholesale water provider.

As part of the rural outreach efforts for Region C, each rural provider was evaluated for risk of insufficient water supplies. If there was a moderate or higher level of uncertainty about the provider's long-term supplies, the provider was contacted by phone to discuss water needs and strategies. A moderate or higher level of uncertainty is defined as having self-reported water use restrictions to TCEQ or having reported less than 180 days of supplies during this planning cycle. An entity would also be targeted for outreach if the entity is self-supplied, had a near-term need in the 2021 Region C Water Plan, and has not previously engaged in the regional water planning process.

Only one water provider in Region C indicated a moderate level of uncertainty for water supplies. This is Marilee SUD, which has since been acquired by Mustang SUD and is actively planned for in the 2026 Region C Water Plan. All the County-Other providers have a very low to low level of uncertainty for potential water needs. For completeness, phone calls were made to the 13 self-supplied systems as part of the rural outreach. One provider responded and had no comments or changes.

A list of the rural water providers and discussion of the Region C outreach efforts is included in **Appendix O**.

10.3 Outreach to the Public

The outreach plan for Region C used multiple communication vehicles to keep the public informed of the progress and activities of the Region C Water Planning Group.

10.3.1 Region C Website

The Region C website is the primary vehicle to disseminate information to RCWPG members and the public. An update of the Region C website was initiated during the last planning cycle and completed in 2023 for the 2026 planning cycle. The more contemporary WordPress platform makes it easier to upload and update documents by the Region C consultants and is also more accessible, visually appealing, intuitive to navigate and user-friendly for members of the public. The updated site is fully responsive and adaptive for optimal functionality and legibility on a wide variety of devices and browsers, ensuring that the public can access its critical information whether on a desktop computer, laptop, tablet device or cell phone. The updated site also allows for use of Google Analytics, enabling the RCWPG to count unique visitors that use the site.

The updated website is more user friendly and provides a mechanism to ask questions and request information. To make the *2026 Initially Prepared Region C Water Plan* more accessible to the public, the draft plan was made available on the Region C website, www.regioncwater.org, in February 2025. The website has been used extensively in the sixth round of regional water planning, with all key documents uploaded to the site for public review. The site has also provided updates on upcoming meetings (including agenda and meeting materials) and key dates in the water planning process, as well as contact information for RCWPG members and consultants. Members of the press have also been able to access information and submit requests for interviews via the website.

10.3.2 Media and Public Communications

There has been considerable media coverage of water issues in the greater Metroplex area, including water shortage in the western parts of Region C and the public interest in the Marvin Nichols Reservoir. The media and other organizations have reached out to Region C planning group members and consultants to discuss the water issues in the region. Kevin Ward (former chair of Region C) gave several interviews to multiple media outlets on the Region C Water Plan and proposed water supply projects, including television interviews to Channel 8 in the Metroplex and input to newspaper and magazine articles.

Representatives of Region C have given presentations to local groups and organizations. These include the North Texas Regional Water Conservation Symposium, Association of Water Board Directors, Wise County Mayors Coalition, and others. Most recently Region C representatives spoke at the North Texas 2050: Infrastructure: Water and Transportation Conference held on February 21, 2025. This panel discussion focused on water issues in the Region C area.

10.4 Public Meetings and Public Hearings

All regular, committee, and subcommittee meetings of the regional water planning group were posted and held in accordance with the Texas Open Meetings Act, the Texas Public Information Act, statutes, and regional water planning rules.

10.4.1 Initial Public Meeting

As required by Senate Bill One rules, the Region C Water Planning Group held an initial public meeting on November 1, 2021, to discuss the planning process and solicit input from the public on the issues that should be addressed or provisions that should be included in the 2026 Region C

Water Plan. The public were notified by the notice that was published in accordance with Texas Water Development Board (TWDB) guidelines [1].

10.4.2 Regular Public Meetings

The Region C Water Planning Group held regular meetings during the development of the plan, receiving information from the region's consultants and making decisions on planning efforts. These meetings were open to the public, proper notice was made under the Texas Open Meetings Act, and these meetings met all requirements of the Texas Open Meetings Act and regional planning rules. All full Region C Water Planning Group meetings were held at the North Central Texas Council of Governments offices in Arlington, a central location in the region. Subcommittee meetings were held in various public locations, including the offices of TRA and the City of Fort Worth. The water planning group met regularly during the planning process, approximately two to three times per year. A total of ten full planning group meetings were held from November 2021 to February 2025.

In addition, the Water Conservation Subcommittee met twice during the planning cycle to discuss recommended water conservation strategies. The By-Laws Subcommittee and the Nominating Subcommittee each met once during the planning cycle. All subcommittee meetings were open to the public.

Public comments were accepted at each meeting and documented in the meeting minutes.

10.4.3 Public Hearing on Initially Prepared Plan

A public hearing on the *2026 Initially Prepared Region C Water Plan* will be held in the spring of 2025. Official public notice will be posted in accordance with the TWDB requirements and meet all requirements of the Texas Open Meetings Act. The date, time and place for the public hearing has not been set.

Public notice for this hearing will be conducted as required by TWDB (TAC 357.21), including notices in both the Dallas Morning News and the Fort Worth Star Telegram. In this public notice, the information provided includes: 1) where to access the IPP, and 2) how to provide comment on the IPP at the public hearing and/ or submit written comments up to 60 days after the public hearing. Oral comments at the public hearing will be recorded and included in **Appendix P** of this report. Written comments accepted by the planning group also will be included in **Appendix P** as well as responses to the submitted comments.

10.4.4 Public Input

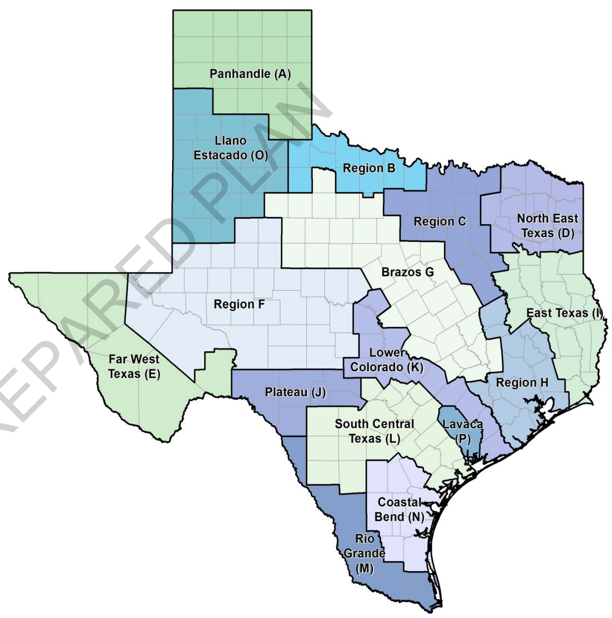
The Region C Water Planning Group encouraged the public to participate in the planning process by providing an opportunity for the public to speak at each public meeting during the planning cycle.

As part of the interregional coordination efforts (see Section 10.5), Region C held a special public meeting on the Marvin Nichols Reservoir project. Several members of Region D and the public spoke on this proposed water management strategy. In addition, up to forty members of the public attended the meeting from both Regions C and D. The media was also in attendance and provided information to the greater public.

After the submittal of the Initially Prepared Plan (IPP) to TWDB on March 3, 2025, Region C distributed copies of the IPP to the required locations, including county clerks' offices in all 16 Region C Counties and at least one public library in each of the 16 Region C counties. These copies were made available to the public at these locations at least 30 days prior to the Public Hearing.

10.5 Interregional Coordination

FIGURE 10.1 REGIONAL WATER PLANNING AREAS



Region C is in north central Texas and borders five regions: Regions B, D, G, H, and I (see **Figure 10.1**). There are areas of mutual interest warranting interregional coordination with each of these regions. For example, there are shared water supplies, split WUGs, and the need for compatible approaches to surface water supplies. These topics are discussed and coordinated between the regions and their consultants through interregional coordination memoranda and meetings as needed. These efforts are initiated early in the planning process and continue until the final plans are approved.

To foster coordination with the adjoining regions, the RCWPG assigned liaisons to the adjoining region. The liaisons attend the assigned region's planning group meetings and provide updates to the entire group. In turn, assigned liaisons from the adjoining regions to Region C have attended Region C meetings and provided updates to the region.

The assigned regional liaisons by region are shown in **Table 10.2**.

TABLE 10.2 ASSIGNED REGIONAL LIAISONS

REGION	FROM REGION C	TO REGION C
B	Doug Shaw	Tracy Metzler
D	Ronna Hart	Sharon Nabors
G	(vacant)	Kathy Jones
H	(vacant, formerly Kevin Ward)	(vacant, formerly Kevin Ward)
I	Connie Standridge	John Martin

10.5.1 Region C and Region D Interregional Coordination

In response to the interregional conflict between Region C and Region D for the 2016 Regional Water Plan, the Texas Legislature created the Interregional Planning Council. A representative from each planning group is nominated to be on the Council. The purpose of the group is to foster coordination across regions to help solve Texas' water issues. It is the first step in recognizing that sufficient water supply is a state issue, not a regional issue. One of the recommendations that came from the group was to coordinate with adjoining regions early, especially on known projects that may affect the adjoining region.

This guidance was honored by both Regions C and D once the sponsors of the Marvin Nichols Reservoir project chose to include the project in the Region C water plan. Region C invited Region planning group members to a presentation on the Marvin Nichols project. This meeting took place on September 30, 2024. Several Region D members attended and multiple people from the Region C and D areas provided public comments. Region D reciprocated Region C's invitation with an invitation to Region C members to attend a meeting in Region D on October 30, 2024. Over 200 people attended the meeting, with approximately 10 representatives from Region C. Region C planning group members answered questions from Region D members and as requested by the Region D Chairman. Extensive public comment was provided. Most comments focused on landowner concerns. During this meeting, the Region D chairman stated the region's intent is to declare an interregional conflict between Regions C and D over the Marvin Nichols Reservoir project.

In light of the potential conflict declaration, Region C has compiled information in support of the recommended Marvin Nichols Reservoir. Specifically, we will address the requirements of the TWDB and the reasons cited by Region D for the interregional conflict.

After a judicial decision associated with the 2016 conflict, the TWDB redefined an interregional conflict. The new definition states:

- more than one regional water plan (RWP) includes the same source of water supply for identified and quantified recommended water management strategies (WMS) and there is insufficient water available to implement such WMSs;
- or in the instance of a recommended WMS proposed to be supplied from a different regional water planning area, the regional water planning group (RWPG) with the location of the strategy has studied the impacts of the recommended WMS on its economic, agricultural, and natural resources and demonstrated to the Texas Water Development Board (TWDB) Board members (Board) that there is a potential for a substantial adverse effect on the region as a result of those impacts.

Sufficient water available: The proposed Marvin Nichols Reservoir project was evaluated using the TCEQ Sulphur Basin WAM. In accordance with the TWDB rules and guidance, environmental flows were estimated using the Consensus Method. Environmental flows were considered both below the Marvin Nichols dam and below Wright Patman. Based on this analysis there is sufficient water to support the project. Of the total firm yield of the project, 20 percent is identified to remain in the Sulphur River Basin for local use. Currently, there is little to no need for this water. **Conclusion: There is no conflict due to insufficient water available.**

No substantial adverse impacts: Region C and the sponsors have conducted multiple studies on the impacts of the Marvin Nichols Reservoir. These studies include evaluations on the economic, agricultural, and natural resources within the region. In fact, the evaluations and studies for this project are far more comprehensive studies of any other water management strategy in the State Water Plan. Appendix J details these evaluations. A summary of the impacts analysis is presented below:

- Economic impacts: A study by Terry Clower (2020) on the economic impacts of the Marvin Nichols Reservoir found that the construction of the project would boost economic activities by $5 billion. Operation provides an additional $120 million per year in revenue and increases in visitors and local spending is greater than $325 million per year. Overall, the reservoir would increase the economic activities in Region D. The reduction in timber and timber activities in Region D is expected to be about 1 percent of the total timber production based on forested areas. The total estimated stumpage value of all potential harvested timber within the reservoir footprint is $457,000. This is much less than the estimated millions of dollars in economic activity spurred by the Marvin Nichols Reservoir. Other economic activities associated with hunting leases, grazing leases and agricultural production are a small fraction of the expected economic benefits of the reservoir.

  If the region is unable to develop sufficient water supplies to meet its growing demands, there will be economic impacts not only to Region C but to the entire state. Region C provides 30 percent of the state's economy and is expected to continue to provide this percentage or greater in the future. According to the economic study conducted by Clower & Associates (Attachment J-2), *if a lack of available water supply were to disrupt the projected job growth in just six industries, the region would lose $19 billion in annual economic activity, expressed in 2020 dollars, and more than 136,000 total jobs*. The impact of **not building** Marvin Nichols would be significant to the Region C economy.

- Agricultural impacts:
  - Timber industry- The total amount of potential harvestable timber within the Marvin Nichols Reservoir is estimated at 40,134 acres. This represents 7.7 percent of the total timberlands in the three counties where the reservoir is located. It is 1 percent of the total timberland of Region D. While impacts associated with potential mitigation lands are unknown at this time, the lands targeted for mitigation are those that are degraded and would generate the greatest ecological improvements with mitigation. Generally, established timberlands would not be used for mitigation.
  - Farming and ranching – There are active farms and ranches within the reservoir footprint. Available data indicate there are about 700 acres of row cropping and over 18,000 acres of potential pastureland. NRCS estimates the amount of prime farmland[1] at 594 acres based on updated classifications of soils that were previously associated with prime farmlands. It is known that the actual farming acreages are greater than this, but not significantly. Neither farmland nor pastureland is limited in Region D. The reduction of these agricultural acreages would not have a substantial adverse impact to the region.

[1] USDA defines prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses." (See Appendix J)

- Natural resources impacts:
    - Bottomland hardwoods – There are about 9,289 acres of bottomland hardwoods along the Sulphur River flood plain. These bottomland hardwoods would be lost after inundation of the reservoir. To compensate for this loss, mitigation would be implemented to offset the loss of habitat. Presently, these bottomlands are not protected and could be harvested at any time by the property owners. Mitigated properties are protected in perpetuity.
    - Wetlands- There are nearly 25,000 acres of wetlands (forested, emergent and shrub) within the Marvin Nichols Reservoir footprint. This represents about 5 percent of the total wetlands in Region D. As required by the TCEQ and the federal Clean Water Act, mitigation will be required such that there is no net loss of wetlands.
    - Streams –Streams located within the footprint of the reservoir would be converted to a lacustrine habitat (lake). Impacts to aquatic species will be assessed during permitting but are not expected to be substantial. Many aquatic species can thrive in both river and lake environments. There will be reduced high flows downstream of the dam, which will reduce localized flooding. There is little difference in low flow frequencies that are necessary to maintain the ecological health of the stream.
    - Minerals – Recently there has been concern over potential loss of mineral resources. Mineral rights are a property right and any transfer of such rights will be compensated. Mineral harvesting of oil/gas and lithium can be conducted by surface wells and/or horizontal drilling, which could continue with the reservoir. There may be the potential for landowners to retain their mineral rights. The reservoir should not have substantial impact to the mineral resources in Region D.

The TWDB definition for an interregional conflict specifies that for a conflict to occur there must be a substantial adverse effect on the source water region. While every project has some impacts, "*substantial adverse impact*" represents large impacts that cannot or are not mitigated. The economic studies show that the Marvin Nichols project will have a net positive economic impact on the region through new taxes, increased businesses, etc. The potential adverse economic impact associated with the timber industry is expected to be small. The total potential timber within the footprint of the reservoir is less than 8 percent of the total available timber in the three counties where the reservoir is located and 1 percent of the timber in the East Texas Region. Much of the timber in the Marvin Nichols project site is also considered to be bottomland hardwoods that are cited by Region D for protection rather than harvesting. It is uncertain how many acres within the footprint of the reservoir have timber contracts that would be affected by the project. Secondary economic impacts are expected to be small since only a small portion of the available timber within the region is affected. If the project is not constructed and Region C is unable to secure sufficient water supplies, the reduction in growth in Region C would have an adverse economic impact on Region D and the timber industry, as well as the state of Texas.

Adverse impacts to natural resources will be mitigated as required by the state and federal permitting processes. Environmental flows are considered in the evaluation of the project to protect instream uses and natural resources. The final environmental flow requirements will be determined by the TCEQ during the permitting process. The amount and location of the mitigation land will also be determined during the permitting process. Typically, mitigation improves degraded habitats and natural resources and provides a benefit to the region where the mitigation occurs.

The most frequently cited concern of Region D is the loss of property. Property needed for the project will be acquired at fair market value. Project sponsors will attempt to acquire the property through willing buyer/willing seller agreements, as was done for nearly all the properties acquired for the Bois d'Arc Lake and Lake Ralph Hall projects.

Conclusion: There are no substantial adverse impacts to Region D.

The discussion above addresses the studies and analyses conducted by Region C on the impacts of the Marvin Nichols Reservoir project. Region D also cites several studies it uses to justify the declaration of a conflict. The Region D draft 2025 Initially Prepared Water Plan summarizes its position on the Marvin Nichols Reservoir in the following statement:

"It has been and continues to be the position of the NETRWPG that due to the significant negative impacts upon environmental factors, agricultural resources/rural areas, other natural resources, and third parties, Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan."[(5)]

In support of this statement Region D cites references that are outdated or no longer applicable, including the Texas Forest Service Study (2002) and the TWDB Reservoir Site Protection Study (2008). There is much discussion on the acreage differences of timberlands, bottomland forest, and wetlands from different report sources. Collectively, there are little differences for the total acreage. Over time acreages change with new data and changes in activities. The final cover types and amount of habitat requiring mitigation will be determined during the permitting process.

Other studies or documents cited include Trungale (2014) and Mattox (2014). Trungale focuses on the reduction in stream flows and potential impacts on downstream habitats. He advocates for high flows and overbanking flows for the bottomland hardwoods that are not included in the Region C analysis. He is correct that the Consensus Method used for regional water planning does not address high pulse flow events, but the TWDB requires the regions to use this methodology. During review of a water right application, TCEQ must consider environmental flows, either project-specific or basin-wide. The proposed Marvin Nichols Reservoir would be evaluated under the criteria set by the TCEQ. It is premature to assume what the criteria should be for regional planning. For planning purposes, Region C did include environmental flows both below the Marvin Nichols dam and below the Wright Patman dam. This is more than required for regional water planning. Any losses associated with reduced downstream flows will be assessed during the permitting process and must be mitigated.

Sharon Mattox (2014) prepared an opinion on the mitigation requirements. Region D also cites a study by TPWD/ USFWS and the Texas Forest Study (2002) for justification that the total acreage of the project, including mitigation, is much larger than estimated by Region C. Each of these documents propose mitigation acreages that are not substantiated by fact or analysis. They are based on outdated approaches to mitigation. Mitigation today is based on the uplift in habitat values and not acreage ratios. Considering the most recent reservoirs permitted (Bois d'Arc Lake in 2018 and Lake Ralph Hall in 2019), mitigation land requirements have been approximately equal to the reservoir acreage or less. Lands identified for mitigation are those that are most amenable for restoration, which are typically degraded and deforested lands. Impacts to the agricultural industry, including silviculture, should be considerably less than estimated in these past studies. For regional water planning it is assumed that the mitigation acreage needed is equal to the reservoir acreage and an equivalent cost would be needed to improve these lands. Ultimately, mitigation location and requirements will be determined during the permitting process.

Region D estimates the economic impacts to agricultural and natural resources using outdated data and frequently double counts agricultural resources for timber production and natural resources for protection. Region C acknowledges that there would be changes to the landscape in Region D where the reservoir is located, but these changes do not pose a substantial adverse impact on the region. In fact, there should be a net positive economic impact to Region D and a neutral impact to natural resources after mitigation.

Finally, the regional water planning process and the State Water Plan are simply plans to identify potential new water supplies for the future growth of Texas. It is not the place to eliminate options. The viability and merits of a project will be determined during the detailed studies and permitting phases for development. The state and federal government have in place a system that addresses the concerns of Region D. The Marvin Nichols Reservoir project should be allowed to proceed through this process.

10.6 Chapter 10 List of References

(1) Texas Water Development Board, *Exhibit C Second Amended General Guidelines for Fifth Cycle of Regional Water Plan Development* (April 2018), Austin, [Online] Available URL: http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/doc/current_docs/contract_docs/2ndAmendedExhibitC.pdf?d=1571062426136

(2) Patteson, K. *Resolution of the Interregional Conflict between the 2011 Region C and the Region D Regional Water Plans* [Memorandum]. Austin: Texas Water Development Board. [Online] Available URL: http://www.twdb.state.tx.us/board/2014/08/Board/Brd01.pdf, December 19, 2014.

(3) Texas Water Development Board, *Region C and Region D Interregional Conflict* (January 2015), Austin, [Online] Available URL: http://www.twdb.texas.gov/home/tabs/doc/hot/RegionCandDConflict.asp, February 3, 2015.

(4) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: *2016 Region C Water Plan, Appendix Z*, prepared for the Region C Water Planning Group, Fort Worth, December 2015, Available URL: http://www.regioncwater.org/Documents/Final%202016%20Region%20C%20Water%20Plan/Appendix%20Z%20B&W.pdf

(5) Presentation at Region D Planning Group Meeting on Draft Initially Prepared Plan, presented by Carollo Engineers, February 19, 2025.