WATER SUPPLY STUDY FOR ELLIS COUNTY, JOHNSON COUNTY, SOUTHERN DALLAS COUNTY, AND SOUTHERN TARRANT COUNTY

APRIL 2009

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REGION C WATER PLANNING GROUP

Water Supply Study for Ellis County, Johnson County, Southern Dallas County, and Southern Tarrant County

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ES. Executive Summary

In 2004, after the population and demand projections for the last round of regional water planning were finalized and approved by the Texas Water Development Board [1, 2, 3], the North Central Texas Council of Governments (NCTCOG) released its own population projections for North Texas [4]. The NCTCOG projections for Ellis and Johnson Counties were significantly higher than those used in the regional water plans. Recent population estimates also show that the counties are growing faster than projected in the regional plans but not as fast as projected by NCTCOG. Water supplies for southern Dallas and Tarrant Counties are closely linked with Ellis and Johnson Counties.

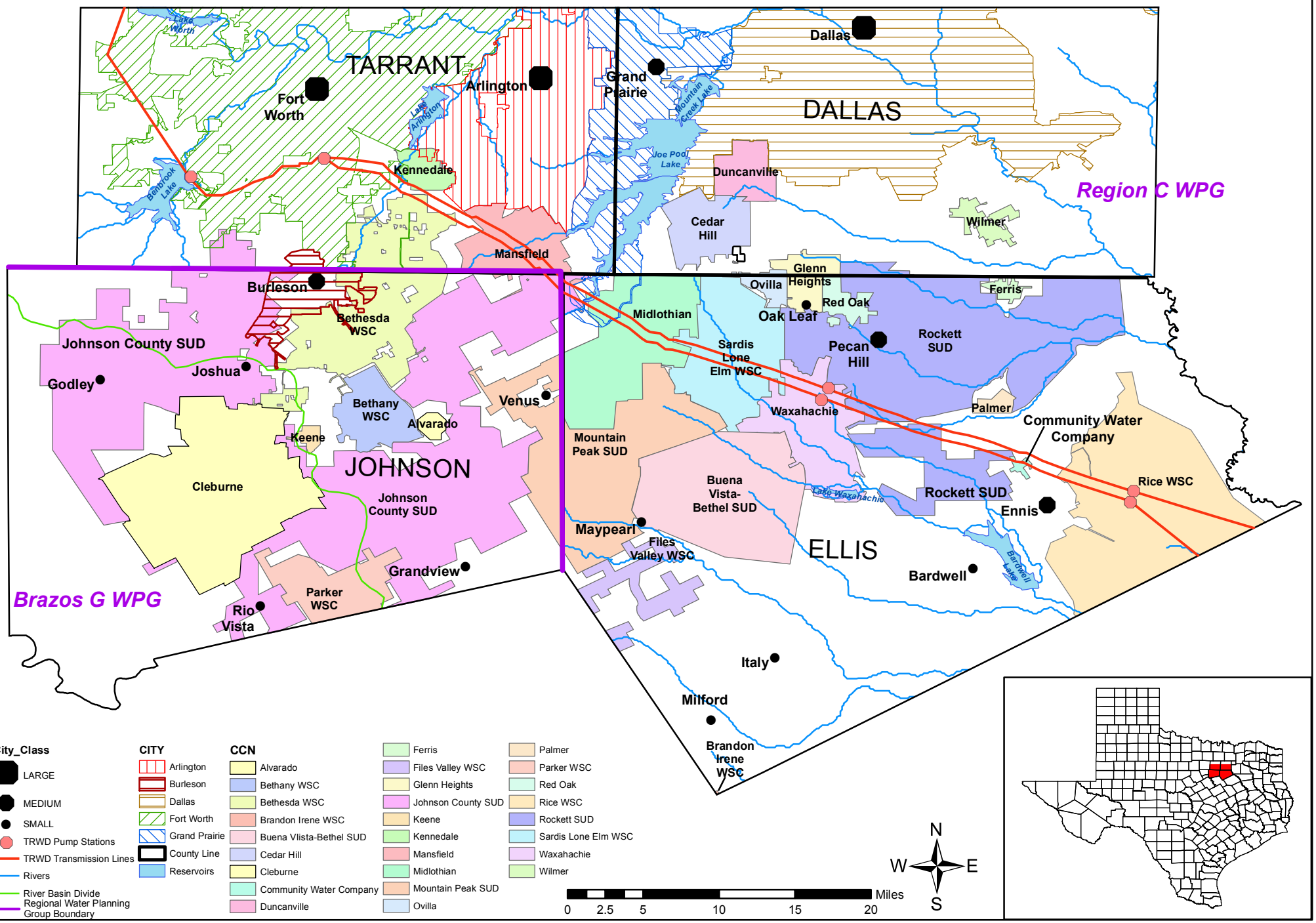
The purpose of this study is to review recent growth in the study area, make adjustments to population and demand projections to account for the growth, and update the current and future water plans of the water user groups and wholesale water providers in the study area. This study included conducting meetings and compiling survey data provided by water suppliers regarding their current and future water plans, determining revisions to population and demand projections, and developing a water supply plan for the study area.

This special study covers Ellis and Johnson Counties and southern Dallas and Tarrant Counties as shown in Figure ES.1. It provides an opportunity to update population and demand figures based on recent experience and to revise water management strategies to reflect new demand projections and current planning by area water suppliers. Table ES.1 summarizes the population and demand projections for Ellis and Johnson Counties and the changes from the previous regional water plan projections.

Water supply in Ellis County is largely decentralized, with supplies for the smaller water user groups coming from larger suppliers and from groundwater wells in the Trinity and Woodbine aquifers. The county's largest cities rely primarily on surface water. The Tarrant

(1) Superscripted numbers in parentheses match references in Appendix A.

Figure ES.1
Four County Study Area



Regional Water District (TRWD) pipelines bring water from East Texas to Tarrant County via Ellis County and the northeast corner of Johnson County. The major sources of supply currently in use in Ellis County include Lake Bardwell, Lake Waxahachie, Joe Pool Lake, Dallas, Tarrant Regional Water District, groundwater, and reuse.

Table ES.1
Summary of Population and Demand Projections for Study Area

	2000 Historical	2010	2020	2030
Ellis County Population Projections				
2006 Region C Water Plan	111,360	149,627	188,280	230,402
NCTCOG	111,360	180,617	329,476	448,588
Recommended	111,360	181,740	259,676	333,472
Recommended Increase from the 2006 Plan		32,113	71,396	103,070
Ellis County Demand Projections				
2006 Region C Water Plan	25,469	46,567	59,550	70,648
Recommended	25,469	55,729	77,998	96,580
Recommended Increase from the 2006 Plan		9,162	18,448	25,932
Johnson County Population Projections				
2006 Brazos G Regional Water Plan	126,811	151,468	180,509	211,020
NCTCOG	126,811	166,759	284,411	444,151
Recommended	126,811	162,236	242,627	327,898
Recommended Increase from the 2006 Plan		10,768	62,118	116,878
Johnson County Demand Projections				
2006 Brazos G Regional Water Plan		32,407	37,478	42,911
Recommended		43,405	56,505	74,248
Recommended Increase from the 2006 Plan		10,998	19,027	31,337
Southern Dallas County Population Projections				
2006 Region C Water Plan	*178,964*	*237,894*	*282,971*	*326,808*
Recommended	178,964	241,905	296,607	341,870
Southern Dallas County Demand Projections				
2006 Region C Water Plan		*40,885*	*47,630*	*54,017*
Recommended		47,380	56,940	64,645
Southern Tarrant County Demand Projections				
2006 Region C Water Plan	*73,711*	*112,282*	*147,231*	*179,046*
Recommended	73,711	113,181	135,022	151,119
Southern Tarrant County Demand Projections				
2006 Region C Water Plan		*23,389*	*31,425*	*38,289*
Recommended		24,046	27,714	30,315

In 1989, the Trinity River Authority and local water suppliers developed a long range water supply plan for Ellis County [(5)]. The plan called for regional water treatment plants in the Midlothian, Waxahachie, and Ennis area using TRWD raw water and operated by a regional entity. Water supply service in Ellis County has not developed as outlined in the 1989 report. Water treatment plants are being developed by local suppliers rather than a regional service provider such as the Trinity River Authority.

Ellis County projected water demands have the potential to significantly impact the cost of operation of the TRWD supply system. Since Ellis County treated surface water supply system has not developed from the regional service provision basis as planned, Ellis County lacks adequate strategies to protect itself from TRWD supply transmission interruption. Approximately 70 percent of the projected demands in Ellis County are expected to be met with TRWD supplies (managed by TRA) in the year 2030.

Johnson County is located in the Trinity and Brazos River Basins, with about equal land coverage (50:50) in each basin. Johnson County is currently experiencing significant population growth and increased water demands, which are anticipated to continue into the future. Current water supplies in Johnson County are inadequate to meet long term projected water needs. According to the Brazos G 2006 Plan, projected municipal water demands for Johnson County are expected to increase by 14,541 acre-feet per year (or 70%) by Year 2030 when compared to Year 2000 demands.

Similar to Ellis County, Johnson County water supply is also decentralized. Major water supplies in Johnson County come from the Brazos River Authority Surface Water and Treatment System (BRA SWATS[a]), Fort Worth, and groundwater. Cleburne, the largest incorporated city in Johnson County, treats its own supplies of raw water from Lake Pat Cleburne, BRA (Lake Aquilla) and groundwater from the Trinity aquifer. Cleburne also provides reuse water for a steam electric power plant. Johnson County Special Utility District (SUD) accounts for about 30% of the municipal water demand in Johnson County (including Joshua). In 2006, Johnson

[a] BRA operates SWATS subject to contracts with four entities: The City of Granbury, Acton Municipal Utility District, Johnson County Special Utility District, and the City of Keene. All capacity of the facility is contractually obligated to these four entities. Any expansions, alterations, or additions of customers to SWATS would be subject to the review and approval of the four entities.

County SUD developed a long range water supply plan that included an evaluation of additional water supplies from the Trinity and Brazos River Basins. During the study, JCSUD met with local and regional water providers. Based on information from meetings, potential future supplies from TRWD were identified (either directly or indirectly through their primary customers) for projected demands in the Trinity Basin portion of Johnson County. The smaller water user groups in Johnson County typically rely on groundwater.

In the course of this study, the project team met with and surveyed water user groups in the study area to discuss and review current and planned water supplies. The project team also met with wholesale water providers in the area. These discussions revealed a number of changes to water supply plans for the study area from the strategies in the 2006 regional water plans. The most significant changes were as follows:

- Waxahachie and Rockett SUD plan to develop the Sokoll Water Treatment Plant in northern Waxahachie by 2010 and provide supplies to other water user groups. (The plant will use raw water from TRWD.)
- There are new plans for sales between study area water suppliers. The larger examples include:
  - Arlington, Mansfield and Midlothian to Grand Prairie
  - Grand Prairie and Mansfield to Johnson County SUD
  - Arlington to Bethesda WSC
- Cleburne plans to develop a desalination water treatment plant on Lake Whitney and to develop additional reuse facilities.

TRWD is the largest wholesale water supplier in this study area. TRWD provides raw water directly to study area suppliers, with current contracts for an average-day supply of 28.95 MGD (32,456 acre-feet per year). The amount of raw water TRWD supplies to the study area will increase significantly in the coming decades. TRWD plans to meet water needs in Ellis County and the Trinity Basin portion of Johnson County in the future. Cleburne, Ennis, Midlothian, Mansfield, Rockett SUD, and Waxahachie will continue to treat their own water supplies. Other study area suppliers will use groundwater and buy treated water from others.

Table ES-2 is a summary of the sources of current and future supply for water user groups in the study area. The significant changes in water supply expected in the coming decades are as follows:

- As population and water demand grows, many suppliers will find current groundwater sources inadequate and will connect to surface water supplies, generally purchasing from larger suppliers.
- The Sokoll water treatment plant currently under construction in Ellis County will make substantial additional surface water supplies from TRWD available to Rockett SUD, Waxahachie, and their wholesale customers.
- Midlothian's proposed water treatment plant will make additional surface water from TRWD available to Midlothian and its wholesale customers.
- The treated water supplies available in the study area from TRWD's primary customers (Fort Worth, Arlington, and Mansfield) will increase over time.
- Cleburne will develop additional reuse supplies for manufacturing and mining use and will develop a desalination plant to use water from Lake Whitney (BRA contract).
- The supply from Dallas in the study area will increase with the growth of current customers and the completion of the connection with Red Oak.

Table ES.2
Current and Future Supplies for Study Area Water User Groups

Water User Group	Primary County	Other Counties	New Sources for Future?	Water Supply Sources														Comments
				Ground-water	Own Surface Water	TRA Reser-voirs	TRWD		Dallas		BRA SWATS		Other BRA		Reuse	Surface from Other Suppliers	Local Supplies	
							Direct	Through Others	Direct	Through Others	Direct	Through Others	Direct	Through Others				
Cedar Hill	Dallas	Ellis		▲		▲			▲									Does not have plans to use TRA contract for Joe Pool Lake in near future.
Duncanville	Dallas					▲			▲									Does not have plans to use TRA contract for Joe Pool Lake in near future.
Grand Prairie	Dallas	Tarrant, Ellis	■	▲		▲		▲	▲	▼								May get water from Dallas through Cedar Hill and TRWD through Arlington, Mansfield, and Midlothian.
Wilmer	Dallas		■	▲						▼								May get Dallas water through Hutchins or Lancaster.
Bardwell	Ellis		■	▲				▼										Will get TRWD water through Waxahachie.
Buena Vista-Bethel SUD	Ellis		■	▲				▼										Will get TRWD water through Waxahachie.
Community Water Company	Ellis							▲								▲		Supplies are from Ennis.
Ennis	Ellis					▲	▲								▲			
Ferris	Ellis		■	▲				▼								▲		Will get TRWD water through Rockett SUD.
Glenn Heights	Ellis	Dallas		▲					▲									
Italy	Ellis		■	▲				▼										Will get TRWD water through Waxahachie.
Maypearl	Ellis		■	▲				▼										Will get TRWD water through Waxahachie.
Midlothian	Ellis		■			▲	▼											Will build plant to treat TRWD water.
Milford	Ellis			▲										▲				
Mountain Peak SUD	Ellis	Johnson	■	▲												▲		Plans to drill Woodbine wells.
Oak Leaf	Ellis		■					▼		▲						▲		May get TRWD water through Rockett SUD.
Ovilla	Ellis	Dallas		▲					▲									
Palmer	Ellis		■	▲				▼								▲		Will get TRWD water through Rockett SUD.
Pecan Hill	Ellis		■					▲								▲		Rockett SUD currently provides all water supply to Pecan Hill.
Red Oak	Ellis		■	▲				▼	▲							▲		Will get TRWD water through Rockett SUD for portion of city located in Rockett SUD's CCN. Red Oak is purchasing wholesale treated water from Dallas.
Rockett SUD	Ellis	Dallas	■	▲			▼									▲		Will connect to TRWD with Sokoll plant.
Sardis-Lone Elm WSC	Ellis	Dallas	■	▲				▼										May get TRWD water through Rockett SUD.
Waxahachie	Ellis		■		▲	▲	▼								▲			Will connect to TRWD with Sokoll plant.
Ellis County-Other	Ellis		■	▲			▼											May get TRWD water through Rockett SUD and Wax.
Ellis County Irrigation	Ellis		■	▲											▼		▲	
Ellis County Livestock	Ellis																▲	
Ellis County Manufacturing	Ellis			▲		▲		▲								▲		Ennis, Midlothian, Waxahachie
Ellis County Mining	Ellis			▲													▲	
Ellis County Steam Electric Power	Ellis					▲									▲	▲		Ennis and Midlothian now. Waxahachie and TRA reuse future.
Brandon-Irene WSC	Hill	Ellis												▲				BRA Lake Aquilla from Aquilla WSC.
Files Valley WSC	Hill	Ellis												▲				Lake Aquilla water through Aquilla WSC.
Acton MUD	Hood	Johnson		▲							▲							
Alvarado	Johnson		■	▲				▼										May get TRWD water through Midlothian
Bethany WSC	Johnson		■	▲				▼										May get BRA SWATS water through Keene or JCSUD.
Bethesda WSC	Johnson	Tarrant	■	▲				▲										Has TRWD water through Fort Worth, will get from Arlington.
Burleson	Johnson	Tarrant						▲										TRWD water through Fort Worth.
Cleburne	Johnson		■	▲	▲								▲		▲			Will develop desalination to use BRA water from Whitney.
Godley	Johnson		■	▲								▼						May get BRA SWATS water through JCSUD.
Grandview	Johnson		■	▲								▼						May get BRA SWATS water through JCSUD.
Johnson County SUD	Johnson	Tarrant, Ellis	■	▲				▲			▲							Additional TRWD water via Mansfield. Will get Grand Prairie water.
Joshua	Johnson		■	▲				▲				▲						Supplied by Johnson County SUD.
Keene	Johnson			▲							▲							
Parker WSC	Johnson	Hill	■	▲								▼		▲				Will get BRA SWATS water through JCSUD.
Rio Vista	Johnson		■	▲								▼						May get BRA SWATS water through JCSUD.
Venus	Johnson			▲				▼								▲		TRWD water from Midlothian.
Johnson County-Other	Johnson			▲										▼				Will get BRA SWATS water through JCSUD.
Johnson County Irrigation	Johnson			▲													▲	
Johnson County Livestock	Johnson			▲													▲	
Johnson County Manufacturing	Johnson		■	▲										▲	▼	▲		Cleburne reuse.
Johnson County Mining	Johnson		■	▲									▼				▲	Cleburne reuse.
Johnson County Steam Electric	Johnson			▲										▲	▲	▲		
Rice WSC	Navarro	Ellis						▲								▲		
Kennedale	Tarrant		■	▲				▼										TRWD water through Fort Worth.
Mansfield	Tarrant	Johnson, Ellis					▲											

Current sources shown with Blue Triangle = ▲
Future sources shown with Red Triangle = ▼

1. Introduction

1.1 Background

In 1997, the Texas Legislature passed Senate Bill One, legislation to address Texas water issues. The passage of Senate Bill One established a grass-roots regional process to plan for the future water needs of all Texans. The Texas Water Development Board (TWDB) was charged with overseeing this process, and they created 16 regional planning groups across the state and established regulations governing regional water planning efforts.

Figure 1.1 is a map of Region C, one of the planning regions established by the TWDB. Region C includes all of Collin, Cooke, Dallas, Denton, Ellis, Fannin, Freestone, Grayson, Jack, Kaufman, Navarro, Parker, Rockwall, Tarrant, and Wise Counties and the portion of Henderson County that is in the Trinity River Basin. The Region C Water Planning Group oversees water planning efforts in Region C and is composed of representatives of 11 interest groups designated by the Legislature in the original Senate Bill One legislation. Table 1.1 lists the current members of the Region C Water Planning Group. The Region C Water Planning Group hired the consulting team of Freese and Nichols, Inc., Alan Plummer Associates, Inc., Chiang, Patel, and Yerby, Inc., and Cooksey Communications, Inc. to provide technical analyses and to prepare the regional water plans. Since 1997, the Region C Water Planning Group has developed two regional water plans, the *2001 Region C Water Plan* [6] and the *2006 Region C Water Plan* [1]. As of the year 2000, Region C was home to slightly over one-fourth of the population of Texas. The region includes some of the fastest growing communities in Texas and in the United States.

The third round of regional water planning is now underway. As part of the third round, the planning group is conducting a Water Supply Study for Ellis County, Johnson County, southern Dallas County, and southern Tarrant County. Since Johnson County is in the Brazos G Planning Region, the study was conducted in cooperation with the Brazos G Regional Water Planning Group. This study was undertaken due to Ellis and Johnson Counties growing faster than projected in the *2006 Region C Water Plan* [1] and the 2006 Brazos G Water Plan [2]. Members of the Brazos G Water Planning Group are listed in Table 1.2. HDR Engineering, Inc. is the lead consultant for the Brazos G Region.

Figure 1.1
Region C

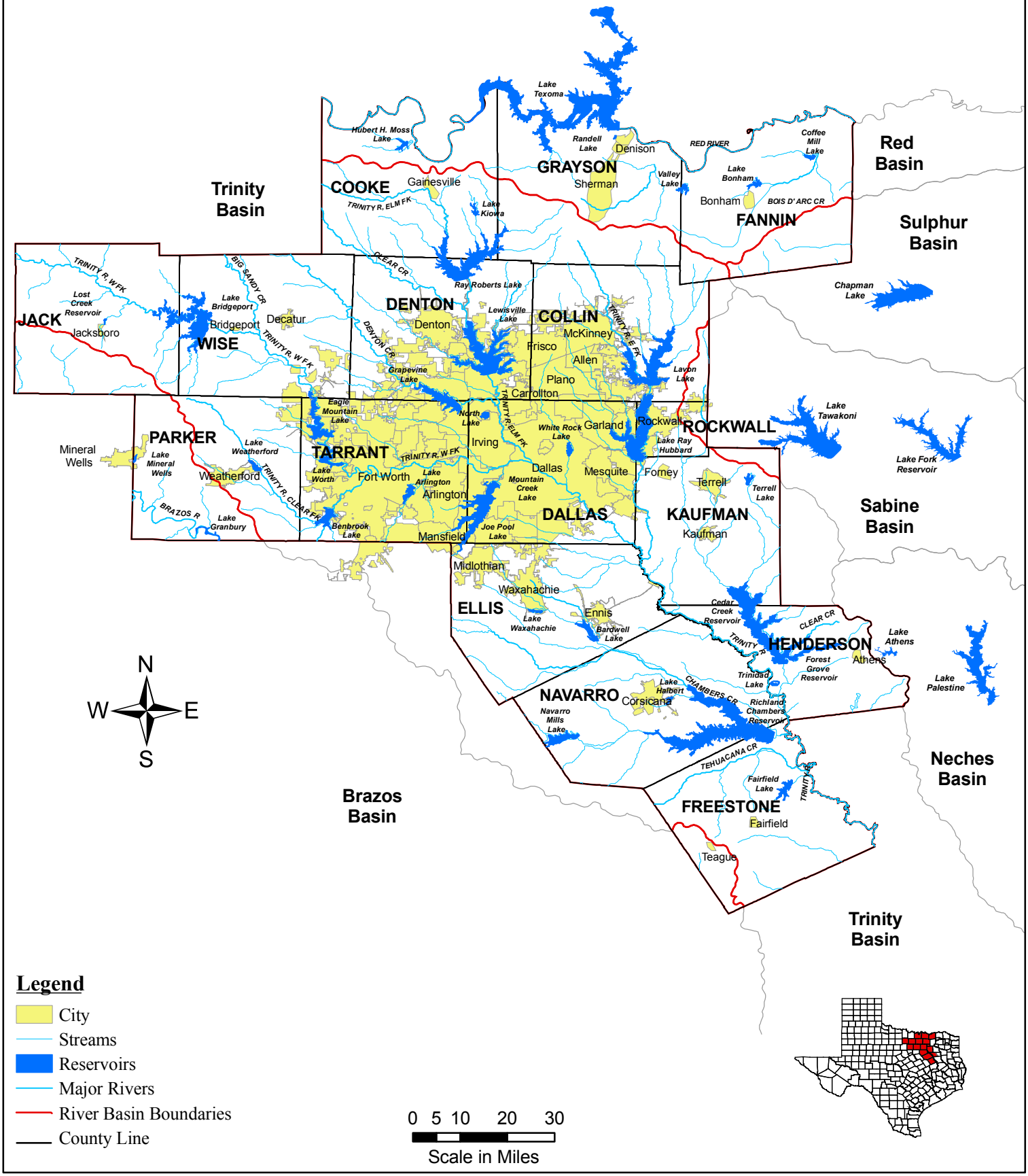


Table 1.1
Members of the Region C Water Planning Group

Member	Interest
James (Jim) Parks, Chair	Water Districts
Jody Puckett, Vice-Chair	Municipalities
Russell Laughlin, Secretary	Industries
Steve Berry	Environmental Interests
Jerry W. Chapman	Water Districts
S. Frank Crumb	Municipalities
Gary Spicer	Electric Generating Utilities
Bill Lewis	Small Businesses
G. K. Maenius	Counties
Howard Martin	Municipalities
Jim McCarter	Water Utilities
Paul Phillips	Municipalities
Bill Ceverha	Public
Robert O. Scott	Environmental Interests
Connie Standridge	Water Utilities
Jack Stevens	Water Districts
Danny Vance	River Authorities
Mary E. Vogelson	Public
Tom Woodward	Agricultural Interests

Figure 1.2 is a map of the area covered by this study. Ellis and Johnson Counties are included because of their rapid growth in recent years, and southern Dallas and Tarrant Counties are included because water supplies for these areas are closely linked with Ellis and Johnson Counties.

1.2 Need for Study and Project Objectives

In 2004, after the population and demand projections for the last round of regional water planning were finalized and approved by the Texas Water Development Board, the North Central Texas Council of Governments (NCTCOG) released its population projections for North Texas [(4)]. For the region as a whole, the NCTCOG projections were very close to the population projections used in the *2006 Region C Water Plan* [(1)]. However, NCTCOG projections for Ellis County were higher than those used in the Region C plan. The NCTCOG

Table 1.2
Members of the Brazos G Water Planning Group

Member	Interest
Scott Mack, Chair	Public
Dale Spurgin, Vice Chair	Agriculture
Phil Ford, Secretary/Treasurer	River Authorities
Jon Burrows	Counties
Tom Clark	Municipalities
Alva Cox	Municipalities
Scott Diermann	Electric Utilities
Tim Fambrough	Counties
Terry Kelley	Water Districts
Mike McGuire	Groundwater Conservation Districts*
Tommy O. O'Brien	Municipalities
Gail Peek	Small Business
Sheril Smith	Environmental
Mike Sutherland	Counties
Wiley Stem III	Municipalities
Randy Waclawczyk	Industry
Kent Watson	Water Utilities
Kathleen J. Webster	Water Districts
Wayne Wilson	Agriculture

* Indicates that the position was added by the Brazos G Water Planning Group.

projections for Johnson County were also significantly higher than the Johnson County projections in the *Brazos G Regional Water Plan* [(2)]. As shown on Figures 1.3 and 1.4, by 2030, the NCTCOG projects the population for these counties to be approximately twice the population projected by the regional water plans. The increases in the population projections for the study area will also result in increases to water demand projections. This significantly greater historical and projected growth for Ellis and Johnson Counties warranted a more in-depth review and study of the area.

The study area includes two fast growing counties and the southern portions of Tarrant and Dallas Counties. The water supply distribution to users in this area is complex due to the number and proximity of providers, and the variety of water sources. The 2006 regional water plans considered these factors during the development of water management strategies. However, as the area continues to grow rapidly, several water suppliers in Ellis and Johnson Counties have revised their water supply plans to address these changes. This study reviews the

Figure 1.2
Four County Study Area
Certificates of Convenience and Necessity (CCN)

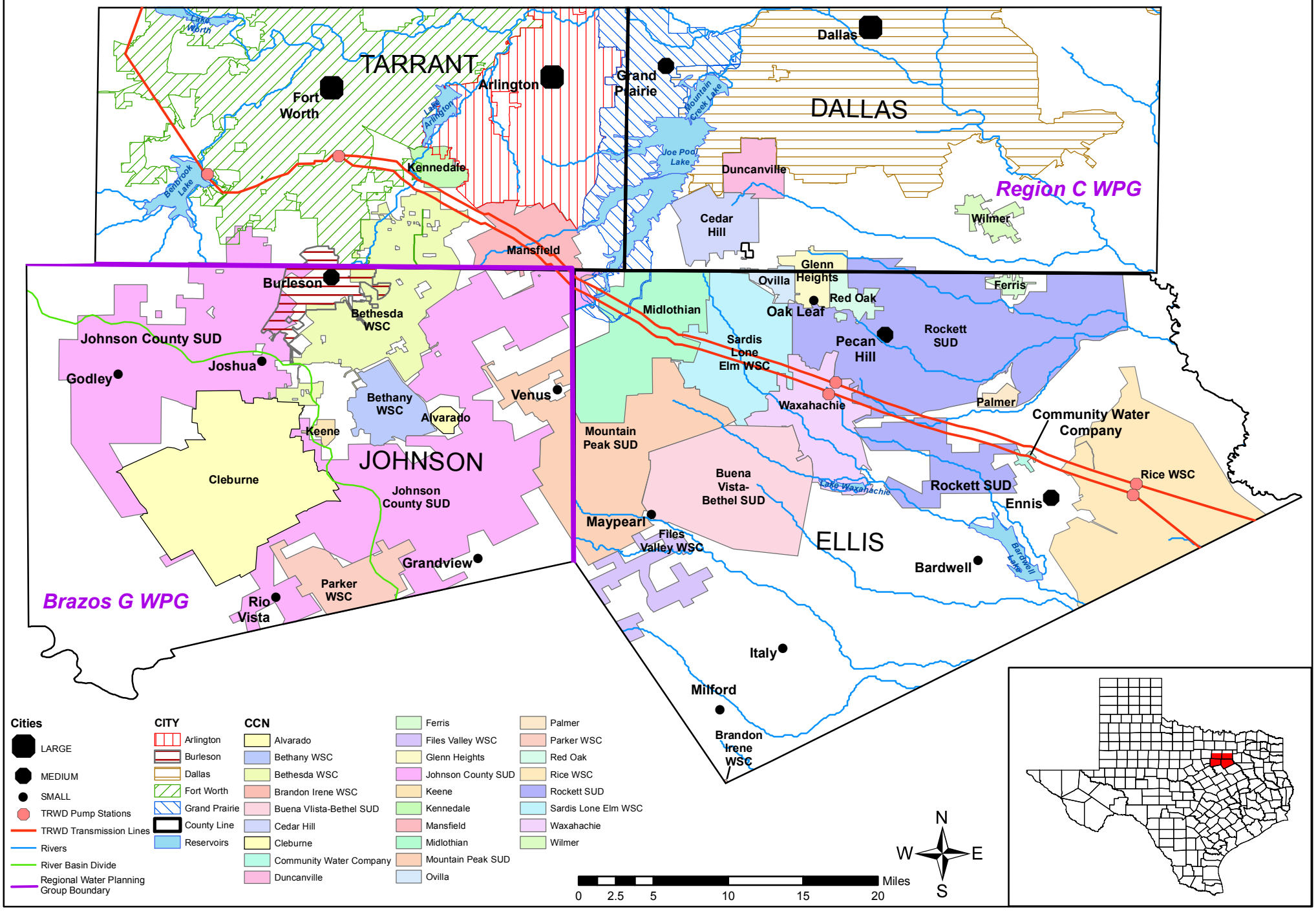


Figure 1.3
Population Projections for Ellis County

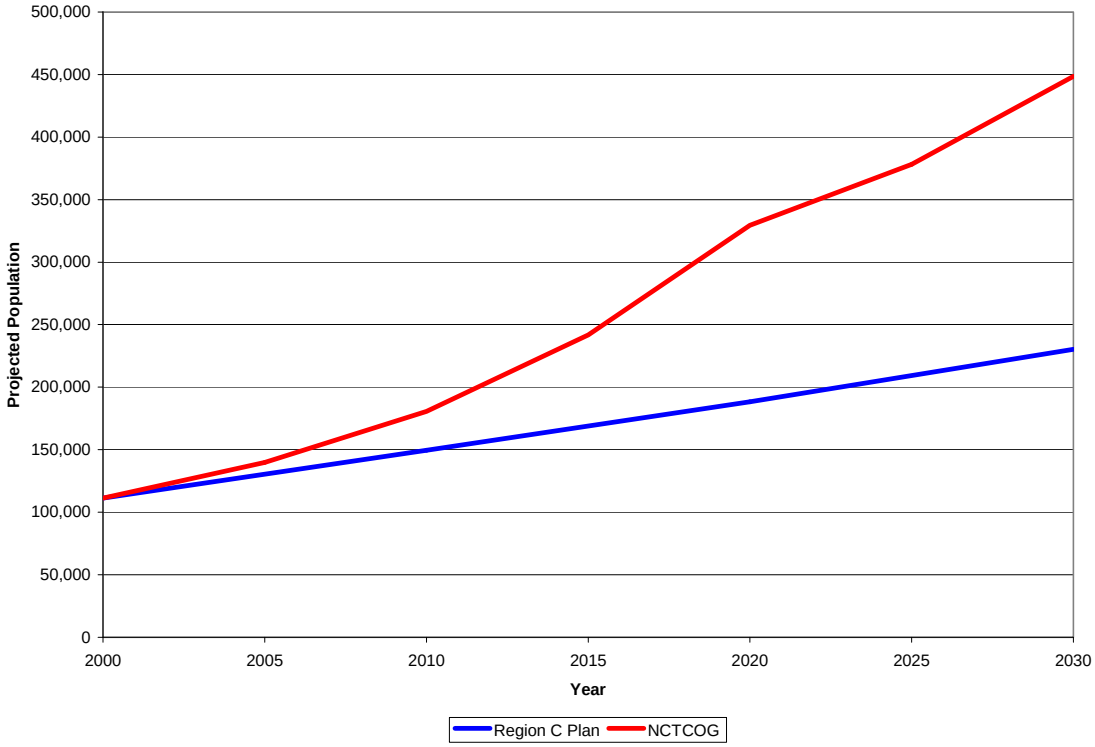
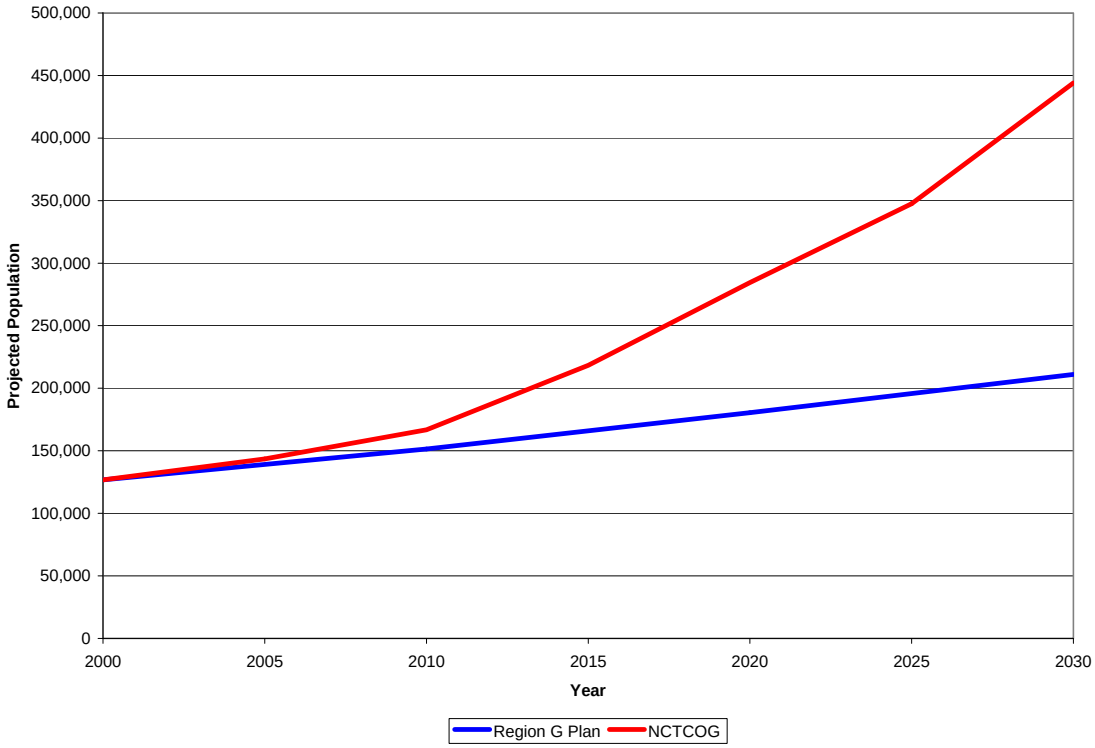


Figure 1.4
Population Projections for Johnson County



water management strategies for the study area considering increased water needs and other changes. It also provides an opportunity to collect data necessary to update population and demand figures for the 2011 regional water plans and to update water management strategies to reflect the new demands and current plans of area water suppliers.

The purpose of the study is to update and refine water management strategies for Ellis and Johnson Counties and the nearby southern portion of Dallas and Tarrant Counties. The scope of work for this study included the following elements:

- Initial meetings with study area water suppliers and data gathering
- Review of recent water supply studies
- Survey of other study area water suppliers
- Development of revised population and demand projections
- TRWD contracting and operational issues
- Supply plan development for the Four County Study Area

This report discusses the results of the study. Section 2 describes the study area and previous water supply plans. Section 3 summarizes input provided by area water suppliers. Section 4 includes revised demand projections and the comparison of contracted supplies and projected demands. Section 5 presents recommended water management strategies, and Section 6 includes additional recommendations from this study.

2. Description of the Study Area and Previous Water Supply Plans

2.1 Description of the Study Area

Figure 1.2 shows a map of the study area, which includes all of Ellis and Johnson Counties and the southern portion of Tarrant and Dallas Counties. Ellis County had a population of 111,360 [(7)] in 2000, and the estimated population in 2007 is 142,270 [(8)]. This represents a 27.8 percent increase in 7 years (3.56 percent average annual growth rate). Johnson County had a population of 126,811 [(7)] in 2000, and the estimated population in 2007 is 153,299 [(8)]. This represents a 20.9 percent increase in 7 years (2.75 percent average annual growth rate). Both counties have experienced rapid population growth in the early years of this decade, and populations are expected to continue to grow in the coming decades.

Table 2.1 lists cities in Ellis County and their estimated 2000 and 2007 populations, and Table 2.2 lists Johnson County cities. A large portion of the population in both counties lives outside of the cities and receives water from special utility districts and water supply corporations. Table 2.3 lists the population projections for the southern Dallas County and southern Tarrant County cities included in the study area.

Ellis County

Ellis County is located in the Trinity River Basin. Water supply in Ellis County is largely decentralized. Much of the water supply for the smaller water user groups in the county comes from larger suppliers (in and out of the county) and from groundwater wells in the Trinity and Woodbine aquifers. The county's largest cities (Ennis, Midlothian, and Waxahachie) rely primarily on surface water. The Tarrant Regional Water District (TRWD) pipelines bring water from the East Texas reservoirs (Cedar Creek and Richland-Chambers) to Tarrant County, via Ellis County and the northeast corner of Johnson County. TRWD continues to plan to provide water to water user groups in Ellis County. Since 1990, the Trinity River Authority (TRA) has served as the contracting agency for the TRWD water contracts in Ellis County. Table 2.4 lists the current sources of water supply for water providers in Ellis County. Figure 2.1 is a schematic diagram showing the sources of supply for municipal water user groups. The major sources of supply currently in use in Ellis County are as follows:

Table 2.1
Estimated 2007 Populations for Ellis County Cities

City	2000 Census Population[7]	State Data Center Estimated 2007 Population[8]	% Average Annual Growth Rate
Bardwell	583	707	2.79%
Cedar Hill*	49	64	3.89%
Ennis	16,045	20,683	3.69%
Ferris	2,175	2,529	2.18%
Glenn Heights*	1,606	2,204	4.63%
Grand Prairie*	46	309	31.27%
Italy	1,993	2,275	1.91%
Mansfield*	129	217	7.71%
Maypearl	746	940	3.36%
Midlothian	7,480	14,890	10.34%
Milford	685	737	1.05%
Oak Leaf	1,209	1,467	2.80%
Ovilla*	3,154	3,766	2.57%
Palmer	1,774	2,123	2.60%
Pecan Hill	672	661	-0.24%
Red Oak	4,301	7,276	7.80%
Waxahachie	21,246	26,918	3.44%
Rural County-Other	47,467	54,504	1.99%
County Total	111,360	142,270	3.56%

* Notes: Some of the population of these communities is located in neighboring counties. Only the population for the portion of the entity located in Ellis County is shown here. Most of the areas outside city limits are supplied by special utility districts and water supply corporations. County-Total includes city population and rural unincorporated areas within the county.

Lake Bardwell – Water rights are held by the Trinity River Authority. It has a yield of about 9,600 acre-feet per year (declining over time due to sedimentation). TRA has contractually committed 55 percent to Ennis and 45 percent to Waxahachie and supplies other Ellis County water user groups through these cities.

Joe Pool Lake – The Trinity River Authority holds water rights for Joe Pool Lake, which has a yield of 15,333 acre-feet per year (declining over time due to sedimentation). [1] TRA has contracted with Midlothian, Grand Prairie, Cedar Hill, and Duncanville for the use of water from Joe Pool Lake. At the current time, Midlothian treats its share of the supply (up to 6,670 acre-feet

Table 2.2
Estimated 2007 Populations for Johnson County Cities

City	2000 Census Population[7]	State Data Center Estimated 2007 Population[8]	% Average Annual Growth Rate
Alvarado	3,288	4,087	3.16%
Burleson*	17,514	27,329	6.56%
Cleburne	26,005	29,567	1.85%
Godley	879	1,061	2.72%
Grandview	1,358	1,543	1.84%
Joshua	4,528	5,299	2.27%
Keene	5,003	5,971	2.56%
Mansfield*	622	867	4.86%
Rio Vista	656	768	2.28%
Venus	1,892	2,435	3.67%
Rural County-Other	65,066	74,372	1.93%
County Total	126,811	153,299	2.75%

Notes: *Some of the population in these communities is located in neighboring counties. Only the population for the portion of the entity located in Johnson County is shown here. Most of the areas outside city limits are supplied by special utility districts and water supply corporations. Rural County-Other is served by water supply corporations, special utility districts, and cities with population less than 500 people. County-Total includes city population and rural unincorporated areas within the county.

Table 2.3
Estimated 2007 Populations for Southern Dallas and Southern Tarrant County Cities

City	2000 Census Population[7]	State Data Center Estimated 2007 Population[8]	% Average Annual Growth Rate
Southern Dallas County			
Grand Prairie*	99,760	120,661	2.75%
Duncanville	36,081	34,856	-0.49%
Cedar Hill*	32,044	42,288	4.04%
Glenn Heights*	5,618	7,813	4.82%
Wilmer	3,393	3,666	1.11%
Ovilla*	251	283	1.73%
Southern Tarrant County			
Grand Prairie*	27,621	33,723	2.89%
Mansfield*	27,280	42,263	6.45%
Kennedale	5,850	6,916	2.42%
Burleson*	3,462	5,598	7.11%

Notes: *Some of the population in these communities is located in neighboring counties. Only the population for the portion of the entity located in the specified county is shown here. Most of the areas outside city limits are supplied by special utility districts and water supply corporations.

Table 2.4
Current Water Supply Sources for Ellis County

Water User Group	Current Supplies	Contracted Supplies Not Yet in Use
Bardwell	Woodbine aquifer	
Brandon-Irene WSC	Aquilla WSD (Lake Aquilla), Trinity aquifer (Hill County)	
Buena Vista-Bethel SUD	Trinity aquifer	TRWD water through TRA
Cedar Hill (mostly Dallas Co)	Dallas, Trinity aquifer	TRA Joe Pool Lake
Community Water Company	Ennis (TRA Lake Bardwell)	
Ennis	TRWD, TRA (Bardwell Lake), Direct reuse (sold to Steam Electric Power)	
Ferris	Woodbine aquifer, Rockett SUD	TRWD water through TRA
Files Valley WSC	Aquilla WSD (Lake Aquilla)	
Glenn Heights	Trinity aquifer, Dallas	
Grand Prairie (mostly in Dallas and Tarrant Counties)	Trinity aquifer, Dallas, Fort Worth (TRWD), TRA Joe Pool Lake	Midlothian (Joe Pool Lake and TRWD)
Italy	Trinity aquifer, Woodbine aquifer	TRWD water through TRA
Johnson County SUD	Trinity aquifer, Brazos River Authority SWATS (Lake Granbury); Mansfield (TRWD Sources)	
Mansfield	Tarrant Regional Water District	
Maypearl	Trinity aquifer, Woodbine aquifer	TRWD water through TRA
Midlothian	TRA (Joe Pool Lake), Sardis-Lone Elm WSC (retail service in city limits)	TRWD water through TRA
Milford	Woodbine aquifer, Files Valley WSD (Lake Aquilla)	
Mountain Peak SUD	Trinity aquifer, Midlothian	
Oak Leaf	Glenn Heights (Dallas), TRWD water through TRA (retail service in city limits)	
Ovilla	Woodbine aquifer, Dallas, Sardis-Lone Elm WSC (retail service in CCN)	
Palmer	Woodbine aquifer, Rockett SUD	TRWD water through TRA
Pecan Hill	Rockett SUD	
Red Oak	Woodbine aquifer, Rockett SUD (retail service in CCN), Dallas	TRWD water through TRA
Rice WSC	Corsicana (Navarro Mills Lake), Ennis (TRA Bardwell Lake)	
Rockett SUD	Trinity aquifer, Midlothian, Waxahachie	TRWD water through TRA; Dallas
Sardis-Lone Elm WSC	Trinity aquifer, Woodbine aquifer	
Waxahachie	Lake Waxahachie, Trinity River Authority (Lake Bardwell), Reuse	TRWD water through TRA; Dallas
Ellis County-Other	Trinity aquifer, Woodbine aquifer, Ennis (TRA Bardwell Lake), Waxahachie, Rockett SUD	TRWD water through TRA
Ellis County Irrigation	Trinity aquifer, Local Supply	
Ellis County Livestock	Local Supply, Woodbine aquifer	

Table 2.4, Continued

Water User Group	Current Supplies	Contracted Supplies Not Yet in Use
Ellis County Manufacturing	Trinity aquifer, Woodbine aquifer, Midlothian, Waxahachie, Ennis (TRA Bardwell Lake)	
Ellis County Mining	Woodbine aquifer	
Ellis County Steam Electric Power	Ennis direct reuse, Midlothian (TRA Joe Pool Lake)	

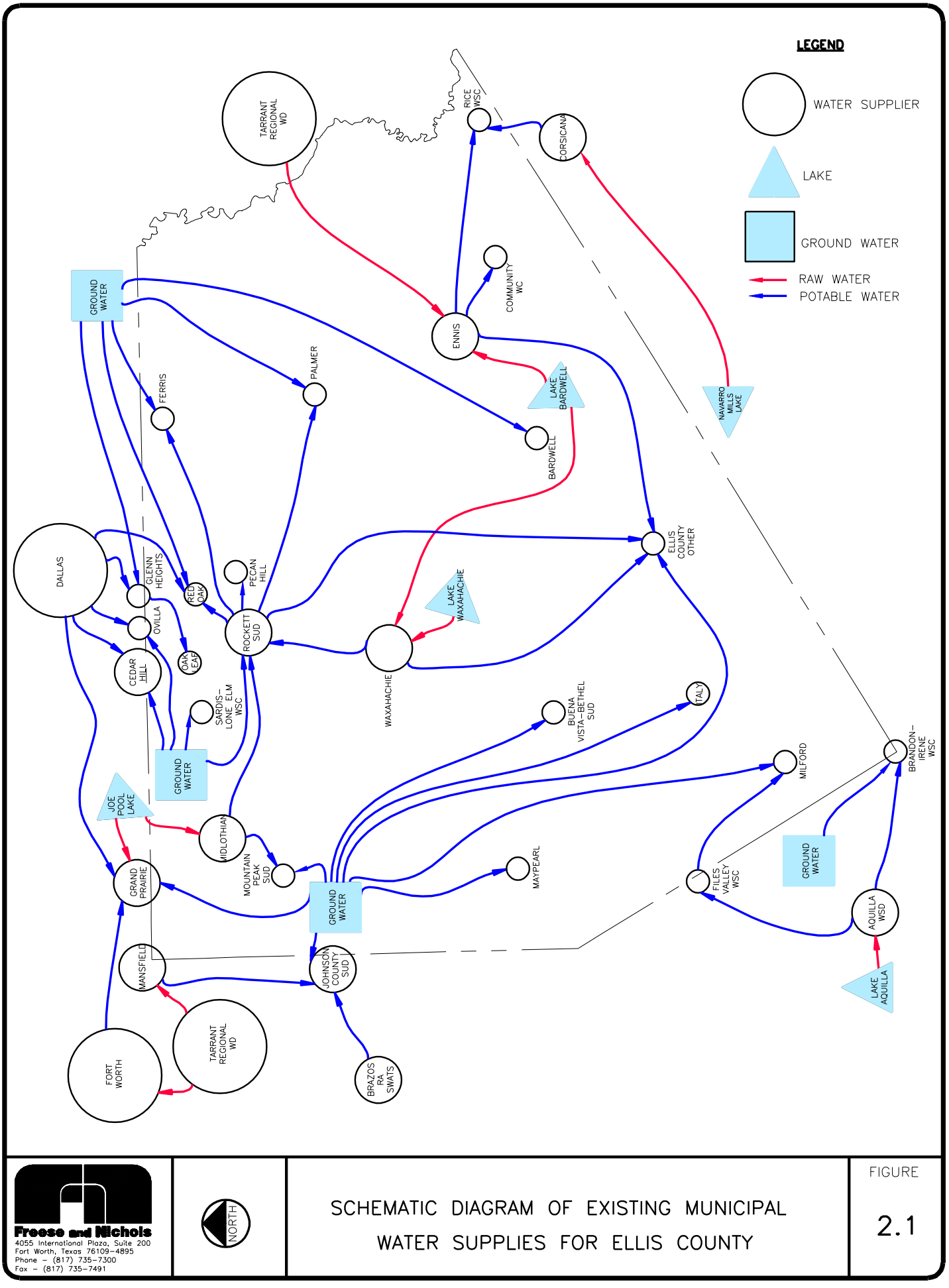
per year) for municipal use and Grand Prairie uses about 1,794 acre-feet per year for golf course irrigation.

The City of Grand Prairie plans to utilize the remainder of its water supply in Joe Pool Lake to support irrigation of the planned resort on the Joe Pool Lake peninsula. An existing wholesale treated water contract between Midlothian and Grand Prairie provides that Midlothian will provide wholesale water service to Grand Prairie in a CCN area held by Midlothian but located in the corporate limits and ETJ of the City of Grand Prairie. The contract will allow Grand Prairie to provide any unused portion of its raw water to Midlothian in return for a raw water credit on the potable water sale.

Cedar Hill and Duncanville are not currently using their supplies from Joe Pool Lake. At this time, Cedar Hill and Duncanville do not have any plans to use this supply. At this time, no other entities have expressed interest in using this supply.

Reuse – Waxahachie has 3,969 acre-feet per year of reuse supply available (water rights held by the Trinity River Authority). The yield from this source will increase over time as return flow increase. Ennis can sell up to 2,915 acre-feet per year of reuse directly to a power plant for cooling and also has authorization for indirect reuse through Lake Bardwell (rights held by TRA). TRA also has a reuse permit in Joe Pool Lake for 4,368 acre-feet per year for municipal, industrial, and irrigation purposes.

Lake Waxahachie – Waxahachie holds Lake Waxahachie water rights. The yield of 3,570 acre-feet per year (declining over time due to sedimentation) is used to supply Waxahachie residents and other Ellis County users buying water from Waxahachie.



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NORTH

SCHEMATIC DIAGRAM OF EXISTING MUNICIPAL WATER SUPPLIES FOR ELLIS COUNTY

FIGURE 2.1

Dallas – Dallas sells treated water on a wholesale basis to communities in northern Ellis County, including Cedar Hill, Glenn Heights, Grand Prairie, Oak Leaf (through Glenn Heights), Ovilla, and Red Oak.

Tarrant Regional Water District – The Tarrant Regional Water District pipelines from Cedar Creek and Richland-Chambers Reservoirs to Tarrant County pass through Ellis County and the northeast corner of Johnson County, as shown on Figure 1.2. Mansfield currently gets water from TRWD. Ennis, Grand Prairie, and Johnson County SUD currently get TRWD water indirectly through TRA, Fort Worth, and Mansfield, respectively. Other Ellis County water suppliers plan to use TRWD supplies in the future. Buena Vista-Bethel SUD, Ferris, Italy, Maypearl, Midlothian, Palmer, Pecan Hill, Red Oak, Rockett SUD, Waxahachie, and a few entities that fall in the County-Other category currently have contracts for TRWD water (through TRA) but are not yet using this source.

Groundwater – According to the Region C Water Plan [(1)], the reliable supply from the Trinity and Woodbine aquifers in Ellis County is 8,400 acre-feet per year. Current use in Ellis County exceeds that amount.

Johnson County

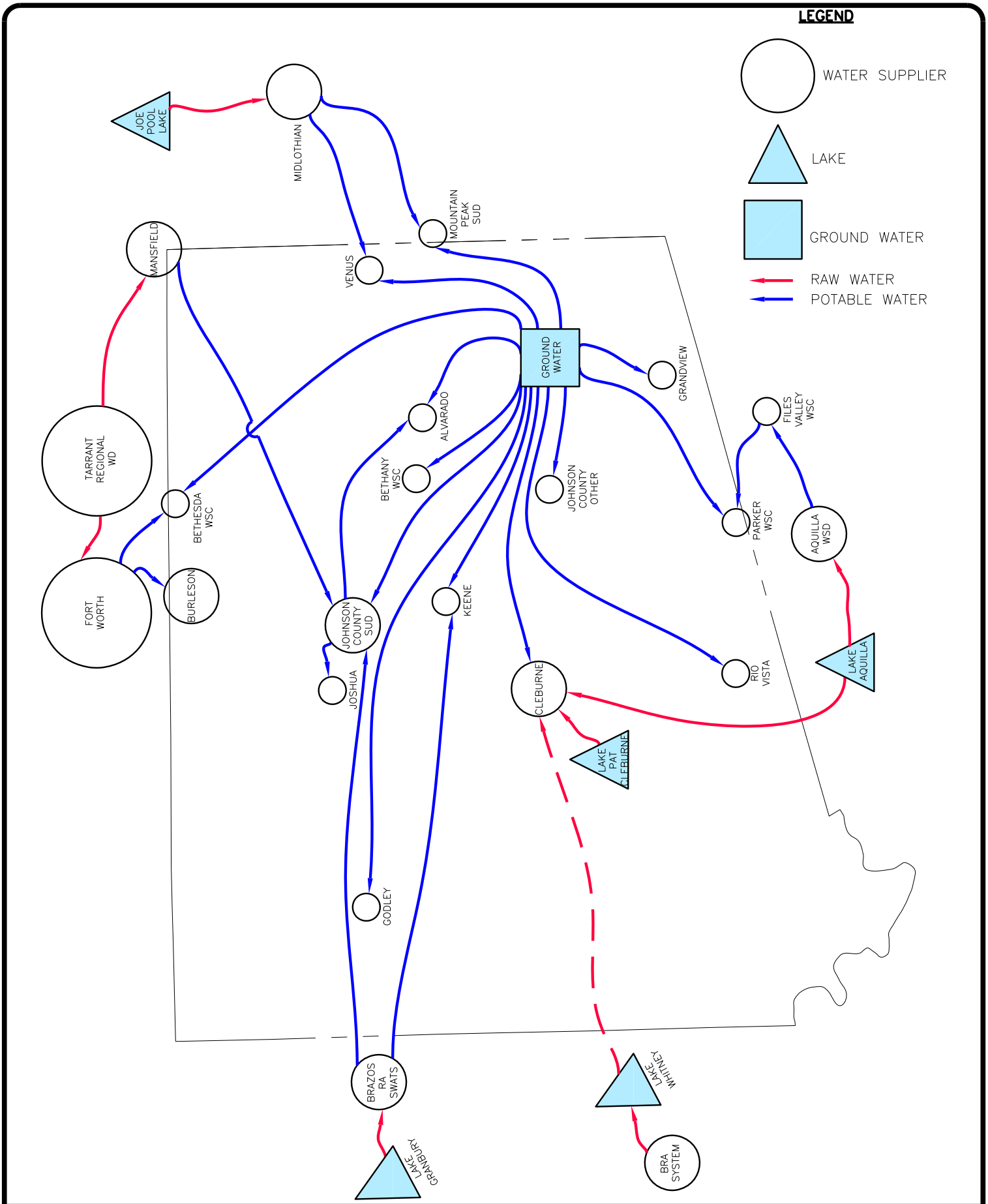
Johnson County is located in the Trinity and Brazos River Basins. The Brazos River Authority (BRA) provides surface water supply to several water user groups in the county from the BRA Surface Water Area and Treatment System (BRA SWATS). Fort Worth provides treated water to Bethesda WSC and Burleson. Cleburne treats its own supplies, getting raw water from Lake Pat Cleburne, BRA (Lake Aquilla) and groundwater. The smaller water user groups typically rely on groundwater supplies. When the BRA developed its SWATS project, they reached an informal agreement with the TRWD that BRA would provide surface water to entities in Johnson County. The demand for surface water in Johnson County now exceeds what BRA can provide. The TRWD considers the Trinity Basin portion of Johnson County to be in its service area. Much of the Trinity Basin in Johnson County will likely be served by Mansfield, Grand Prairie, or Fort Worth through retail sales. Table 2.5 lists the current sources of water supply for water providers in Johnson County, and Figure 2.2 is a schematic diagram showing the sources of supply for municipal water user groups. The major sources of supply currently in use in Johnson County are as follows:

Table 2.5
Current Water Supply Sources for Johnson County

Water User Group	Current Supplies
Acton MUD	Trinity aquifer, BRA SWATS
Alvarado	Trinity aquifer, Johnson County SUD
Bethany WSC	Trinity aquifer
Bethesda WSC	Fort Worth (TRWD), Trinity aquifer
Burleson	Fort Worth (TRWD)
Cleburne	Lake Pat Cleburne, Lake Aquilla, Lake Whitney (contracted but not yet used), Trinity aquifer, Reuse (for Steam Electric)
Godley	Trinity aquifer
Grandview	Woodbine aquifer
Johnson County SUD	Brazos River Authority SWATS, Trinity aquifer, Mansfield (TRWD)
Joshua	Johnson County SUD
Keene	Brazos River Authority SWATS, Trinity aquifer
Mansfield	Tarrant Regional Water District
Mountain Peak SUD	Trinity aquifer, Midlothian
Parker WSC	Trinity aquifer, Files Valley WSC (Aquilla WSD)
Rio Vista	Trinity aquifer
Venus	Midlothian (TRWD), Woodbine aquifer, Trinity aquifer
Johnson County-Other	Trinity aquifer, Woodbine aquifer
Johnson County Manufacturing	Cleburne, Trinity aquifer
Johnson County Steam Electric	Cleburne
Johnson County Mining	Local Suppliers, Trinity aquifer, Cleburne
Johnson County Irrigation	Local Suppliers, Trinity aquifer
Johnson County Livestock	Local Suppliers, Trinity aquifer

Brazos River Authority Surface Water and Treatment System (SWATS[1]) – The Brazos River Authority (BRA) owns and operates this system, which desalinates water from Lake Granbury for water suppliers in Hood and Johnson Counties. The plant has a current operational capacity of between 10.5 MGD and 13 MGD, depending on the water quality in Lake Granbury. For water supply planning purposes during drought conditions, this study used a current SWATS treated water capacity of 10.5 MGD. BRA plans to expand the plant to 15.54 MGD in the near future. Most of the SWATS supply is used in Johnson County. Johnson County

1 BRA operates SWATS subject to contracts with four entities: The City of Granbury, Acton Municipal Utility District, Johnson County Special Utility District, and the City of Keene. All capacity of the facility is contractually obligated to these four entities. Any expansions, alterations, or additions of customers to SWATS would be subject to the review and approval of the four entities.



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NORTH

SCHEMATIC DIAGRAM OF EXISTING MUNICIPAL WATER SUPPLIES FOR JOHNSON COUNTY

FIGURE 2.2

customers include the Johnson County Special Utility District (which supplies Joshua), Acton MUD, and Keene.

Lake Aquilla – The BRA holds the water rights for Lake Aquilla, and the City of Cleburne has a contract for about 5,300 acre-feet per year from the lake. The amount available will decline slowly over time due to sedimentation.

Lake Pat Cleburne – The City of Cleburne owns Lake Pat Cleburne. The City of Cleburne has a water right for 5,760 acre-feet per year for municipal use and 240 acre-feet per year for irrigation from Lake Pat Cleburne. According to the *Brazos G Regional Water Plan* [(2)], the yield from this lake is about 5,183 acre-feet per year in 2010. The City of Cleburne uses this supply. The supply available from this lake will decline over time due to sedimentation.

Lake Whitney – The BRA holds the water right for Lake Whitney. The BRA's water right authorizes a priority diversion of 18,336 acre-feet per year for industrial and municipal purposes. The City of Cleburne and the City of Whitney contract for water from BRA. Cleburne's contract with BRA with anticipated Lake Whitney diversions totals 9,700 acre-feet per year. The City of Whitney's BRA contract is for 750 acre-feet per year. The BRA also uses Lake Whitney as part of its reservoir system to meet downstream customer demands. The supply will decline over time due to sedimentation.

Fort Worth – Fort Worth sells treated water (from Tarrant Regional Water District raw water supplies) to Burleson and Bethesda WSC in Johnson County.

Mansfield – Mansfield sells treated water (from Tarrant Regional Water District raw water supplies) to Johnson County SUD in Johnson County.

Groundwater – According to the *Brazos G Regional Water Plan* [(2)], the reliable supply available from the Trinity and Woodbine aquifers in Johnson County is about 2,600 acre-feet per year. Current groundwater use in the county exceeds this reliable supply.

Reuse – Cleburne currently has about 2,000 acre-feet per year of reuse supply available, which it provides to a steam electric power plant in the city.

Southern Dallas County and Southern Tarrant County Entities in the Study Area

Table 2.6 lists the current sources of supply for Dallas and Tarrant County water suppliers in the study area. Dallas provides treated water for many Dallas County suppliers, and Fort Worth does the same for some Tarrant County suppliers. Other Tarrant County suppliers get raw water from Tarrant Regional Water District and provide their own water treatment. The Trinity aquifer is the source of supply for many smaller entities and a supplemental supply for larger entities.

2.2 Previous Regional Water Supply Plans

The *2006 Region C Water Plan* [(1)] describes long range water supply plans for entities in Dallas, Ellis, and Tarrant Counties. The *Brazos G Regional Water Plan* [(2)] gives similar information for Johnson County. The elements of both plans are reflected in *Water for Texas – 2007*, [(3)] the 2007 state water plan. The plans for the study are summarized below, and detailed plans for each water user group can be found in the regional water plans. In 1989, the Trinity River Authority and local water suppliers developed a long range water supply plan for Ellis County [(5)].

Table 2.6
Current Water Supply Sources for Study Area Water Suppliers in Tarrant and Dallas Counties

Water Supplier	County(ies)	Current Supply Sources
Bethesda WSC	Tarrant, Johnson	Fort Worth (TRWD), Trinity aquifer
Burleson	Tarrant, Johnson	Fort Worth (TRWD)
Cedar Hill	Dallas, Ellis	Dallas, Trinity aquifer
Duncanville	Dallas	Dallas
Glenn Heights	Ellis, Dallas	Dallas, Trinity aquifer
Grand Prairie	Dallas, Tarrant, Ellis	Dallas, Fort Worth (TRWD), Trinity aquifer, Trinity River Authority (Joe Pool Lake)
Kennedale	Tarrant	Fort Worth (TRWD), Trinity aquifer
Mansfield	Tarrant, Johnson, Ellis	Tarrant Regional Water District
Ovilla	Dallas, Ellis	Dallas, Woodbine aquifer, Sardis-Lone Elm WSC (retail service in CCN)
Rockett SUD	Ellis, Dallas	Midlothian, Trinity aquifer, Waxahachie, contract for TRA (TRWD) not in use, contract for Dallas water not in use
Sardis-Lone Elm WSC	Ellis, Dallas	Trinity aquifer, Woodbine aquifer
Wilmer	Dallas	Trinity aquifer

Region C Plan (Ellis, Southern Dallas, and Southern Tarrant Counties)

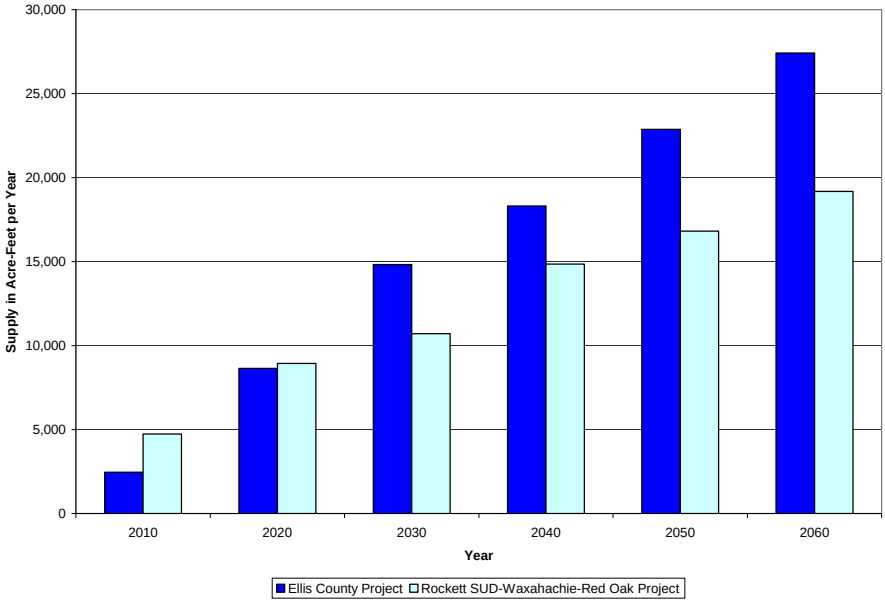
The *2006 Region C Water Plan* [1] calls for development of a new regional water system in Ellis County (called the Ellis County Water Supply Project) in response to limited groundwater availability and increasing demands. The raw water for the regional system would come from Tarrant Regional Water District, and the water would be treated at regional facilities. The Ellis County project would start by 2010, expand over time, and provide supplies for Ennis, Waxahachie, Midlothian, Rockett Special Utility District, and other water utility groups. The other major new supply proposed for Ellis County in the 2006 Region C plan is treated water from Dallas for Rockett Special Utility District, Waxahachie, and Red Oak. Development of this system would also begin before 2010, with supplies increasing over time. Figure 2.3 shows the projected supplies for these two projects from the 2006 plan. The total supplies from the two projects are over 46,600 acre-feet per year by 2060. The water management strategies proposed for Ellis County in the *2006 Region C Water Plan* [1] included the following:

- Water conservation (for all municipal water user groups)
- Participation in the TRA Ellis County Water Supply Project using TRWD sources (Buena Vista-Bethel SUD, Ennis, Ferris, Italy, Maypearl, Midlothian, Palmer, Red Oak, Rockett SUD, and Waxahachie)
- Water from Dallas (Red Oak, Rockett SUD, and Waxahachie in a joint project and Johnson County SUD as an individual wholesale water provider)
- Additional water from Dallas (Cedar Hill, Glenn Heights, Grand Prairie, and Ovilla)
- Purchase of water from other suppliers (Buena Vista-Bethel SUD, Community Water Company, Ferris, Grand Prairie, Mansfield, Mountain Peak SUD, Oak Leaf, Palmer, Pecan Hill, Rice WSC, and Sardis-Lone Elm WSC)
- Expansion of water treatment plants (Ennis, Mansfield, Midlothian, and Waxahachie)
- Additional groundwater (Bardwell, Buena Vista-Bethel SUD, Italy, Maypearl, Mountain Peak SUD, Palmer, and Sardis-Lone Elm WSC)
- Reuse (Ennis and Waxahachie)

The *2006 Region C Water Plan* [1] calls for Wilmer to purchase Dallas water from Hutchins or Lancaster (Dallas County) and for other Dallas County water suppliers in the study area to increase their supplies from Dallas. Wilmer has recently expressed interest in purchasing water directly from Dallas. Grand Prairie will also purchase water from other suppliers. In southern Tarrant County, Arlington, Fort Worth, and Mansfield will get additional water from

Tarrant Regional Water District. Other southern Tarrant County suppliers purchase water from Fort Worth.

Figure 2.3
2006 Region C Water Plan Supplies from the Ellis County Project and the Rockett SUD-Waxahachie-Red Oak Project (from Dallas)



Brazos G Plan – Johnson County

The *Brazos G Regional Water Plan* [2] shows that the reliable groundwater supply in Johnson County is insufficient to provide for all of the water suppliers currently using groundwater. As a result, the plan has many of the smaller suppliers in the county purchasing treated surface water from other suppliers. The Brazos G Regional Water Plan included development of additional supplies through reuse as a recommended water management strategy for Cleburne and Johnson County Special Utility District. Conservation was considered for all water suppliers, and advanced conservation was recommended for those with a projected municipal use in excess of 140 gallons per person per day in 2060.

The water management strategies proposed for Johnson County in the *Brazos G Regional Water Plan* [2] included the following:

- Conservation for suppliers with projected municipal water use over 140 gallons per person per day (Cleburne, Grandview, Johnson County SUD, Mountain Peak SUD, and Johnson County-Other)

- Purchase water from Johnson County SUD (Bethany WSC, Parker WSC, Rio Vista, and Johnson County-Other)
- Purchase more water from Fort Worth (Bethesda WSC and Burleson)
- Purchase water from Brazos River Authority SWATS (Godley and Johnson County Freshwater Supply District No. 1/Joshua). Since the 2006 Plan, Johnson County Freshwater Supply District No. 1 has merged and become part of Johnson County SUD. Johnson County SUD now provides water supplies to the City of Joshua.
- Purchase from Midlothian (Mountain Peak SUD) or Midlothian via Venus (Alvarado)
- Participate in reuse projects (Cleburne and Johnson County SUD)

2.3 Local Studies

As part of the Four County Study, the regional water planning groups requested and obtained some local plans relevant to this study area. The findings and recommendations of these plans are summarized below.

BRA and TRWD: *Regional Water Supply and Wastewater Services Study for Johnson and Parker Counties, Phase I* [9]

This study was a combined effort of the Brazos River Authority (BRA) and the Tarrant Regional Water District (TRWD) to study the feasibility of developing regional facilities to meet the projected water needs for Parker and Johnson Counties. At the time of the study, BRA had available raw water supplies that could be made available from Possum Kingdom Lake for use in Parker and Johnson Counties. This water is high in total dissolved solids (TDS) and would required advanced water treatment to produce potable water supply. At the time of the study, TRWD needed additional water supplies to meet the projected water needs in the study area. This study considered developing regional water supply and wastewater treatment facilities to serve the projected need in the area.

This study used the population and demand projections that were approved for the 2006 regional water plans. However, a number of entities expressed concern that these projections were lower than others, such as the North Central Texas Council of Governments' projections. The recommended water management strategies in the Region C Water Plan (including Parker County) were temporary overdraft of the aquifer followed by the purchase of surface water supplies from TRWD. In the Brazos G Water Plan, the recommended strategies included

temporary overdraft of the aquifer (including Johnson County) and connection to the regional Surface Water Advanced Treatment System (SWATS) operated by BRA.

The 2004 report assumed that existing contracts would be fully utilized before water from an additional source was utilized. This report studied a number of potential water supply strategies, including those that might supply just one county and those that might supply both counties. The report also considered several regional strategies to meet wastewater treatment needs.

The report concluded that a regional water treatment plant could be beneficial to the study area if developed in northwest Johnson County and/or northeast Johnson County. The report recommended that a Phase II study be prepared looking at these two scenarios.

City of Midlothian: *Long Range Water Supply and Water and Wastewater Master Plan* [10]

In 2006, Freese and Nichols, Inc. prepared a long range water supply master plan for the City of Midlothian. This report looked at recent population estimates and projected population through 2025. Mountain Peak WSC and Sardis-Lone Elm WSC have certificates of convenience and necessity (CCN) for water service and provide retail service in some areas that are within the city limits of Midlothian. Thus, the population projections in the Midlothian Master Plan are representative of Midlothian's retail water service customers, not of the entire City.

The 2006 Midlothian Master Plan included retail water demand projections through buildout, which is beyond 2025. The demand projections were developed for the area within the city limits and for the service area. Midlothian provides retails water supplies to over 85 percent of its citizens, while Mountain Peak SUD and Sardis-Lone Elm WSC provide retail service to the remaining Midlothian citizens. Midlothian also provides treated water to wholesale customers:

- Rockett SUD
- Mountain Peak WSC (now Mountain Peak SUD)
- American National Power
- Sardis-Lone Elm WSC

The Master Plan also included water demand projections of Midlothian's wholesale customers.

The Master Plan recommended a water treatment plant expansion to be operational in the spring of 2009. (Currently, the water treatment plant improvements are being developed in phases, with the first phase expected to be complete in Summer/Fall 2010.) The plan also recommended a number of other distribution system improvements, as well as wastewater system improvements.

Johnson County SUD: *Evaluation of Additional Water Supplies from the Trinity and Brazos River Basins* [11]

In 2006, HDR, Inc. completed a water supply study for Johnson County Special Utility District (SUD). Johnson County Special Utility District (SUD) provides rural water supplies across a four county area in the Trinity and Brazos River Basins. While the majority of Johnson County SUD lies in the Brazos Basin, most of the future growth is expected to occur in the Trinity River Basin. The current supplies for Johnson County SUD include self-supplied groundwater wells, a small amount of treated surface water from the City of Mansfield, and treated surface water purchased from the Brazos River Authority's (BRA) Surface Water and Treatment System (SWATS) using water from Lake Granbury. The groundwater supplies are limited, and the BRA SWATS plant is near operational capacity. Jonson County SUD's water demand is projected to increase. Additional water supplies will be needed to meet the future demands. This study investigated potential water supply strategies to meet the future needs of Johnson County SUD.

The study considered population and water demand projections based on information from the SUD and from NCTCOG. The study looked at a potential merger of Johnson County SUD with Johnson County Fresh Water Supply District #1 (JCFWSD #1) and how this might affect demands and supplies. (Since then, Johnson County SUD has merged with JCFWSD #1 and has taken over the associated responsibilities.) Cost estimates were developed for the potential water supply strategies. The study considered purchasing treated water from the following potential suppliers: City of Mansfield, City of Grand Prairie, City of Midlothian, and Brazos River Authority SWATS upon the completion of additional infrastructure. Raw water supplies were considered from the Tarrant Regional Water District and the Trinity River Authority (Cedar Hill's interest in Joe Pool Lake). The study recommended that Johnson County SUD pursue additional water supplies from the City of Mansfield, Tarrant Regional Water

District, and/or City of Grand Prairie. The report also indicated that the Trinity River Authority might play a role in providing these potential supplies from the Trinity River Basin.

Sardis-Lone Elm WSC: *System Hydraulics* (12)

Sardis-Lone Elm Water Supply Corporation (WSC) retained Childress Engineers to review the entity's existing system, evaluate the system for projected growth, and recommend necessary improvements to the system. Sardis-Lone Elm WSC provides retail water service to the rural area of Ellis County between Midlothian, Ovilla, and Waxahachie. The extent of the service area is not expected to change significantly over the next ten years (by 2014), which was the time frame for the study. The population is expected to nearly double from 3,393 in 2004 to 6,070 in 2014.

The WSC obtains water from its own groundwater wells with a backup connection to Midlothian for use in times of emergency. Sardis has six wells in the Trinity aquifer. (Since the report was completed in 2004, Sardis has also drilled wells in the Woodbine aquifer.) While the Trinity wells have provided reliable water supply, their production rates have been declining. The reported concluded that surface water would eventually be needed, potentially from Dallas through Rockett SUD.

The report analyzed the water distribution system with the WaterCad software. The modeling effort included an analysis of average day and peak hour demands. The distribution system is in good condition and meets state requirements. The report recommended upgrades to the system to address customer concerns of water pressure, water loss, and other distribution issues. The storage capacity was determined to be adequate for the next ten years.

City of Arlington: Feasibility Study of Becoming a Wholesale Water Provider

The City of Arlington provided findings from their recent study regarding the feasibility of becoming a wholesale water provider. The City identified the top potential wholesale customers in their study. The potential wholesale customers include: Grand Prairie, Bethesda WSC, Fort Worth, and the Trinity River Authority in the near-term; Grand Prairie and Bethesda WSC in the intermediate-term; and a general understanding that a continuing need for supplies exists in southern Tarrant, southern Dallas, Ellis, and Johnson Counties for the long-term.

3. Input from Study Area Water Suppliers

3.1 Input Provided by Water User Groups and Wholesale Water Providers

Initial Meetings and Survey of Water User Groups and Wholesale Water Providers

The Region C and Brazos G consultants met with 19 water user groups and wholesale water providers in the study area and sent surveys to the remaining water user groups. Table 3.1 lists those entities that were met with and the entities that were sent a survey. Table 3.2 lists the participants at each meeting held with specific entities. The information obtained through the meetings and surveys was used to update recommended water management strategies presented in this report. Each meeting with local suppliers included the following elements:

- A discussion of population and demand projections
  - Review of projections in the 2006 regional water plans
  - Information on recent population estimates prepared by the North Central Texas Council of Governments (NCTCOG), the State demographer, the U.S. Census, and other available sources
  - Input from suppliers on population and demand projections
- A review of the current water supplies for each entity
  - Discussion of recommended water management strategies from the 2006 regional water plans
  - Discussion of possible adjustments to those recommendations
  - Discussion of new water supply plans
  - Discussion of interactions with other suppliers.

In most cases, the study area water suppliers plan to implement the recommended water management strategies presented in the 2006 plans, although the amount of water supplied by each strategy may change. In a few cases, the entities were pursuing other options to meet their future water needs.

A survey was sent to 26 entities in the study area, and 15 of the entities responded. A copy of the survey is provided in Appendix B. The survey covered topics similar to those discussed in the in-person meetings, including recent population estimates and demand information, population and demand projections, current sources of supply, and preferred water management strategies. The survey also covered water quality concerns, existing and potential wholesale customers, and regional water concerns.

Table 3.1
Water Suppliers Contacted through Meetings or Surveys

Entities Met with	Entities Surveyed – Responded	Entities Surveyed – No Response
Alvarado	Avalon Water and Sewer Service Company	Bardwell
Arlington	Bethany WSC	Brandon-Irene WSC
Bethesda WSC	Cleburne	Glenn Heights
Buena Vista-Bethel SUD	Community Water Company	Ellis County WCID #1
Burleson	Ferris	Godley
Cedar Hill	Files Valley WSC	Keene
Duncanville	Grandview	Nash-Forreston WSC
Ennis	Italy	Ovilla
Grand Prairie	Joshua	Palmer
Johnson County SUD	Maypearl	Rice WSC
Kennedale	Milford	Wilmer
Mansfield	Oak Leaf	
Midlothian	Parker WSC	
Mountain Peak SUD	Pecan Hill	
Red Oak	Rio Vista	
Rockett SUD		
Sardis-Lone Elm WSC		
Venus		
Waxahachie		

Table 3.2
Meetings with Water User Groups and Wholesale Water Providers

Date	Entity	Attendees
September 24, 2007	Alvarado	Mary Daly, Kristi Shaw, Stephanie Griffin
September 7, 2007	Arlington	Julie Hunt, Travis Andrews, Brian McDonald, Tom Gooch, Thomas Haster, Stephanie Griffin
September 24, 2007	Bethesda WSC	Dana Wells, Steve Seavers, Kristi Shaw, Stephanie Griffin
September 18, 2007	Buena Vista-Bethel SUD	Joe Buchanan, Stephanie Griffin
September 18, 2007	Burleson	David Smyth, David Dunn, Stephanie Griffin, Tom Gooch
September 17, 2007	Cedar Hill	Ruth Antebi-Guten, Trey Dibrell, Stephanie Griffin, Robert McGee
September 7, 2007	Duncanville	Joel Daugherty, Stephanie Griffin, David Sloan, Brian McDonald
September 19, 2007	Ennis	Steve Howerton, Stephanie Griffin, Rachel Ickert

Table 3.2, Continued

Date	Entity	Attendees
October 31, 2007	Fort Worth	Frank Crumb, Thomas Haster, Stephanie Griffin, Jessica Brown
September 7, 2007	Grand Prairie	Ron McCuller, Doug Cuny, Jim Siddall, Stephanie Griffin, Tom Gooch, Jessica Brown
September 18, 2007	Johnson County SUD	Terry Kelley, Jim Higgins, Stephanie Griffin, Tom Gooch, David Dunn
October 11, 2007	Kennedale	Mark White, Stephanie Griffin
September 21, 2007	Mansfield	Bud Ervin, Joe Smolinski, Kristi Shaw, Stephanie Griffin
September 24, 2007	Midlothian	Mike Adams, Thomas Haster, Stephanie Griffin
September 24, 2007	Mountain Peak SUD	Randel Kirk, Kristi Shaw, Stephanie Griffin
September 26, 2007	Red Oak	Gina Garcia, Stephanie Griffin
September 25, 2007	Rockett SUD	Kay Phillips, Bart Harrison, Ben Shanklin, Brian McDonald, Tom Gooch, Stephanie Griffin
September 19, 2007	Sardis-Lone Elm WSC	Paul Tischler, Stephanie Griffin, Rachel Ickert
August 28, 2007	Tarrant Regional Water District and Trinity River Authority	Wayne Owen, Bill Smith, Brian McDonald, Tom Gooch, Stephanie Griffin
September 21, 2007	Venus	Mayor Carolyn Welcher, Mearl Taylor, Jerry Reed, Stephanie Griffin, Kristi Shaw
September 18, 2007	Waxahachie	David Bailey, Gary Hendricks, Brian McDonald, Stephanie Griffin

Meetings with Major Wholesale Water Providers in the Study Area

On December 19, 2007, the consultants held a meeting with the major wholesale water providers to provide an overview of the study, update them on progress, and seek input. This meeting included representatives from the Brazos River Authority, the City of Dallas, the City of Fort Worth, the Trinity River Authority, the Tarrant Regional Water District, and consultants from the Brazos G and Region C Water Planning Groups. The consultants discussed potential adjustments to population and demand projections considering the information gathered through the meetings and surveys. The consultants highlighted some of the more significant changes in water supply strategies, including

- Grand Prairie and Johnson County SUD plan to sell water to each other.

- The Rockett SUD-Waxahachie-Red Oak project to purchase water from Dallas is no longer being actively pursued. Red Oak is independently developing a water supply from Dallas.
- Rockett SUD and Waxahachie are developing a shared water treatment plant which is currently planned to be supplied only from the Tarrant Regional Water District pipelines.
- Johnson County SUD would like to purchase additional treated water from Mansfield supplied by TRWD.

The participants discussed current supplies as compared to the proposed updated projected water demands. There was discussion of the potential impact that the increased demands might have on the regional water provider systems.

On October 20, 2008, the regional water providers in the study met to discuss this report. The regional water suppliers provided feedback regarding their water supply plans, clarification of water supply contracts, and potential future customers. Appendix I includes meeting notes, including names of participants, for each meeting held on December 19, 2007, and October 20, 2008.

Additional Contact with Water User Groups and Wholesale Water Providers

The consultant team tried to keep the study area participants informed of the water management strategies being considered for inclusion in this report. Prior to finalizing the population and demand projections for this study, draft projections were sent to each participating entity in the study area; their input was requested. The consultants made additional contacts with water user groups and wholesale water providers to verify information regarding current water supplies, contract amounts, and potential water management strategies.

On November 25, 2008, the consultants held a group workshop for the water user groups and wholesale water providers in the study area to present the draft recommendations for water management strategies for this study. Approximately 30 people attended the workshop. The meeting notes and the sign-in sheet for the November 25, 2008, workshop are included in Appendix I. The consultants presented the recommendations in the draft report. The attendees provided comments during the meeting and were invited to submit any additional comments to the consultants by December 8, 2008. These comments have been addressed in this report.

3.2 Contracting and Operational Issues for Tarrant Regional Water District

Tarrant Regional Water District (TRWD) is the largest wholesale water supplier in this study area. This section of the report discusses TRWD's contracting and operational issues with regard to the increasing water demand projections in the study area.

The Tarrant Regional Water District currently has contracts to supply roughly 29 million gallons per day (MGD) in average day demands to entities in the study area, as shown in Table 3.3. The Trinity River Authority (TRA) manages these contracts on behalf of the TRWD. These contracting entities also have approximately 25 MGD (average day) of additional local supplies available for use. Ideally, TRWD prefers that contracting entities make use of their local supplies to the extent practical before calling on the TRWD water. TRWD has waived the "take or pay" requirement in existing contracts to encourage the use of local supplies first. TRWD will specifically address the need to use local supplies in future contracts or requests for increases to the contract volume of water supplied by TRWD. The practical use of local supplies will be determined on a case-by-case basis. For example, an entity may commit to utilizing a certain amount of its local supply each year or commit to utilizing local supplies to a certain percentage of availability or storage in priority to TRWD supplies. Other provisions may be considered in determining the specifics of the entity's efficient water supply management.

TRWD plans to meet water needs in Ellis County and the Trinity Basin portion of Johnson County in the future. The current contracts that TRWD has in place were originally based on projected municipal water needs through the year 2030. The provisions of TRWD's contracts with its four primary customers (Fort Worth, Arlington, Mansfield, and the TRA Tarrant County Water Supply Project) prohibit the District from entering into contracts to supply demands beyond the time that a reliable supply is available for primary customers. TRWD available supply currently extends to 2030. TRWD will contract to meet projected 2030 demands in excess of local supplies for study area suppliers. Thus, if a current contract does not meet a reasonable projection of 2030 municipal demands in excess of local supplies, TRWD is willing to contract to supply this additional water. TRWD will also require that projected industrial demands be based on current contracts with industrial users and not be speculative in nature. As new supplies are added to the TRWD system and the projected reliable supply for the

system as a whole extends beyond 2030, TRWD will consider entering into contracts with study area entities for projected demands beyond 2030.

Table 3.3
Trinity River Authority Managed Contracts for Tarrant Regional Water District Supply in the Study Area

Entity	Average Day Contract Amount (MGD)	Average Contract Amount (Ac-Ft/Yr)
Avalon WSC (Ellis Co. Other)	0.600	673
Buena Vista-Bethel SUD	0.850	953
Ennis	3.560	3,991
Ferris	0.720	807
Italy	0.500	561
Maypearl	0.370	415
Midlothian*	9.330	10,459
Nash-Forreston WSC	0.250	280
Palmer	0.271	304
Red Oak	1.800	2,018
Rockett SUD	6.050	6,782
Waxahachie (through Ellis Co. WCID #1)	4.650	5,213
Total	**28.951**	**32,456**

Note: Midlothian's contract with TRA specifies that 2 MGD is for Grand Prairie and 1 MGD is for Venus.

In 1989, TRWD informally agreed to limit its water supply planning in Johnson County so as not to compete with the Brazos River Authority (BRA) SWATS program. BRA has indicated that they support jointly providing water in Johnson County. TRWD continues to consider the Trinity River Basin portion of Johnson County to be within its service area. However, TRWD will continue to coordinate water supply service it provides in Johnson County with the BRA.

Johnson County Special Utility District (SUD) accounts for about 30% of the municipal water demand in Johnson County. In 2006, Johnson County SUD developed a long range water supply plan that included an evaluation of additional water supplies from the Trinity and Brazos River Basins. During the study, JCSUD met with local and regional water providers. Based on information from meetings, potential future supplies from TRWD were identified (either directly

or indirectly through their primary customers) for projected demands in the Trinity Basin portion of Johnson County.

TRWD requires a system capacity buy-in for new or increased contract amounts. The cost of the buy-in is based on the value of the existing system components. TRWD's primary customers (Fort Worth, Arlington, Mansfield, and TRA Tarrant County Water Supply Project) have "all needs" contracts and do not pay system buy-in costs for increased use. This is due to their obligation to meet all system revenue requirements. Other customers pay a buy-in cost for new contract water volumes or increases in contract water volumes. The 2008 system buy-in cost is used in this report. TRWD reviews and updates its system buy-in costs annually. As of July 2008, TRWD's system buy-in cost is $613,567 per MGD of average day supply.

There is a potentially significant financial advantage to parties who contract for treated water from one of TRWD's primary wholesale customers as opposed to contracting with TRWD for raw water. TRWD additional party raw water customers are required to pay a system buy-in for initial or additional supply. Treated water customers of TRWD's primary wholesale customers are not required to pay a TRWD buy-in.

In 1989, the Trinity River Authority and local water suppliers developed a long range water supply plan for Ellis County [(5)]. The plan called for regional water treatment plants in the Midlothian, Waxahachie, and Ennis area using TRWD raw water and operated by a regional entity. Water supply service in Ellis County has not developed as outlined in the 1989 report. Water treatment plants are being developed by municipalities rather than a regional service provider, such as the Trinity River Authority.

Ellis County projected water demands have the potential to significantly impact the cost of operation of the TRWD supply system. Since Ellis County treated surface water provision has not developed from a regional service provision basis as planned, Ellis County lacks adequate strategies to protect itself from TRWD supply transmission interruptions. Approximately 70 percent of the water needed in Ellis County in 2030 is projected to be supplied by TRWD (managed by TRA).

Recent TRWD contracts for supplies to Ellis County include a 60 day shutdown clause that requires the contracting entity to operate for up to 60 days without deliveries from the

TRWD pipelines. This allows TRWD to perform routine maintenance on its facilities and also assures that customers can function during transmission service interruptions. Ellis County entities can operate without TRWD supplies by using local supplies, developing storage, connecting to an alternative supply, or interconnecting with neighboring treated water systems. TRWD intends to include this provision in future contracts, although the shutdown period may be reduced to 30 days after the proposed 3rd East Texas pipeline (planned for 2018) is completed.

A few water user groups and wholesale water providers that have requested additional TRWD water supplies currently have contracts to purchase treated water from Dallas. TRWD's policy is to not contract beyond an entity's projected water need in 2030. If an entity has a contract for treated water from Dallas, TRWD will consider the Dallas supply in determining the 2030 need for additional water.

This report recommends that the TRWD require Ellis County water user groups and wholesale water providers establish a regional approach to water supply, which should include interconnection to local supply sources to provide adequate backup capacity to allow TRWD to sustain extended transmission system interruptions for repair, maintenance or economic reasons. Development of this regional approach must be secured prior to TRWD contracting for additional water supply in this study area. Section 5 will discuss possible strategies to address this recommendation.

3.3 Assumptions for Planning

Based on TRWD policies, the following assumptions were adopted for this plan:

1. TRWD cannot enter into contracts to supply projected demands beyond the time that TRWD primary wholesale water customers' demands are projected to be met by existing TRWD supplies. At the current time, TRWD will not enter into contracts for demands in excess of projected 2030 demands. As additional supplies are developed by TRWD, commitments of supply to cover projected demands farther in the future will be considered.
2. TRWD will consider industrial demands based on existing contracts in its evaluation of projected 2030 demands. Municipal demands will be based on reasonable projections.

3. Water utility groups currently served by TRWD that request additional supplies and other water utility groups wishing to contract with TRWD for water from its pipelines must acknowledge the potential of TRWD transmission service interruption (60 days) and demonstrate the ability to manage raw water transmission service interruptions.

4. All current contracting entities requesting additional supplies and all future contracting entities that have local supplies will be required to effectively prioritize use of their local supplies to the extent practical before calling on TRWD water. In exchange for local supply priority use, TRWD will to waive the standard "take or pay" requirement in existing contracts.

5. All contracting parties will coordinate water system operations with TRWD.

6. Water utility groups contracting with TRWD must require water conservation practices consistent with those practices required of the primary wholesale water customers of TRWD.

4. Revised Population and Demand Projections

As discussed in Section 2, the population in Ellis and Johnson County has been growing more rapidly than was projected in the 2006 regional water plans. Population and demand projections were revised for this study based on other available projections and input from water user groups. Projection data for non-city utilities are limited. The State Demographer and the North Central Texas Council of Governments do not prepare projections for non-city utilities. Appendix C is a detailed discussion of population and demand projections.

4.1 Population Projections

Population projections from the previous regional water plans [1, 2] were compared to projections from the North Central Texas Council of Governments (NCTCOG) [4] and projections provided by water user groups in the study area. For this study, a range of populations for each supplier was developed and a recommended population projection through 2030 was adopted, based on input from water user groups. Figure 4.1 shows the high, low and recommended population projections for Ellis County compared to the projections in the *2006 Region C Water Plan* [1]. Figure 4.2 gives the same information for Johnson County (with the comparison being to the *Brazos G Regional Water Plan* [2]).

This study considered available population projections for water user groups within the study area. For each municipal water user group participating in the study, the historical population estimates and population projections were considered. The low population projection is typically the projection presented in the regional water plan. The high population projection tends to be the NCTCOG projection. The recommended projection is typically based on information provided by the entities. Water user groups that did not respond to the study survey were assumed to be in agreement with the population projections as presented in the 2006 regional water plans. Thus, no adjustments were made to the projections for these entities.

Figures 4.3 and 4.4 show the various population projections for Southern Dallas County and Southern Tarrant County, respectively. The NCTCOG does not distribute population by county for cities whose boundaries cross multiple county lines. Thus, the NCTCOG projections are not shown in Figures 4.3 and 4.4 because the available NCTCOG information is insufficient

Figure 4.1
Population Projections for Ellis County

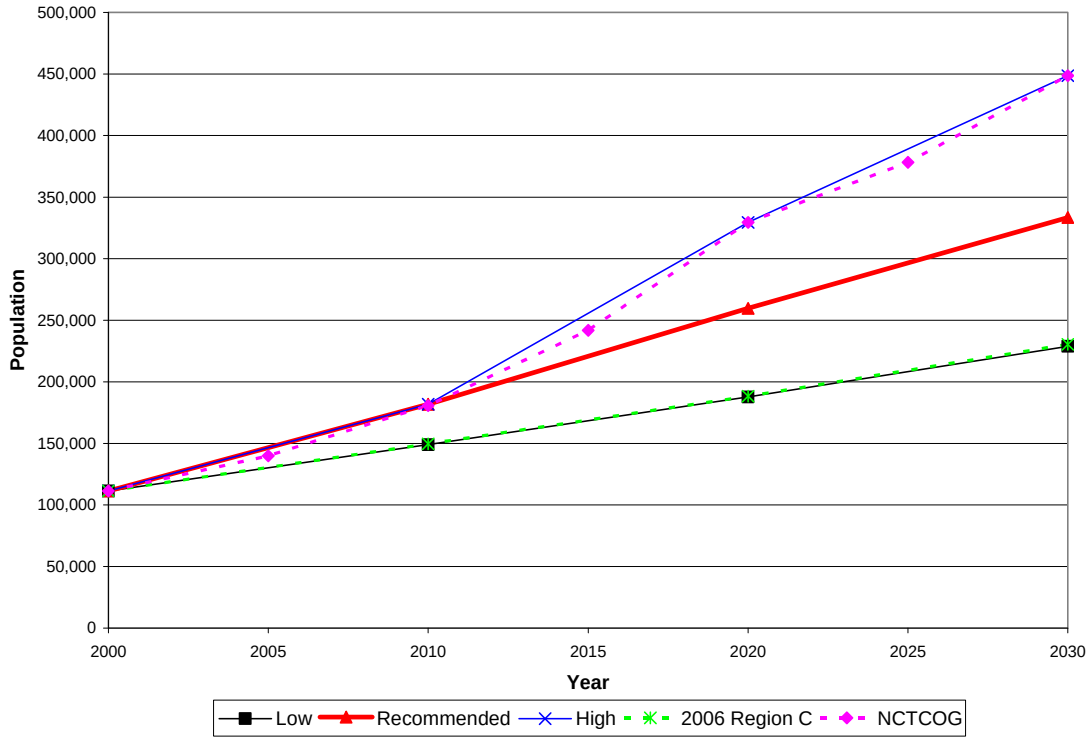


Figure 4.2
Population Projections for Johnson County

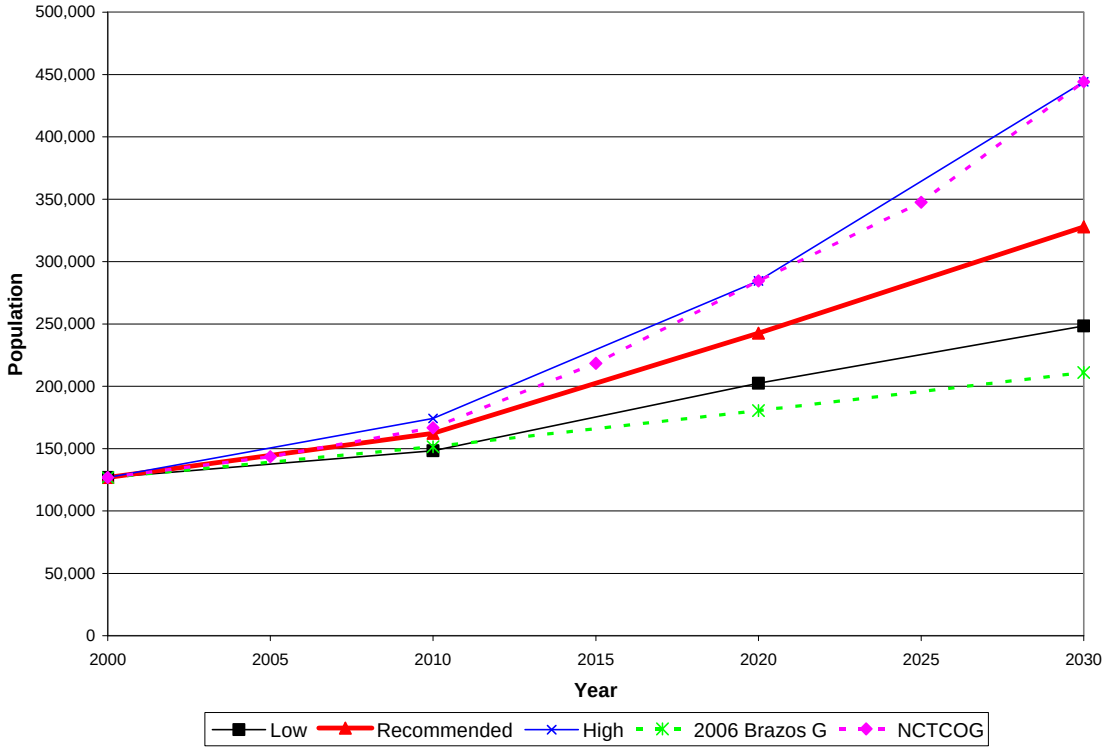


Figure 4.3
Population Projections for Southern Dallas County

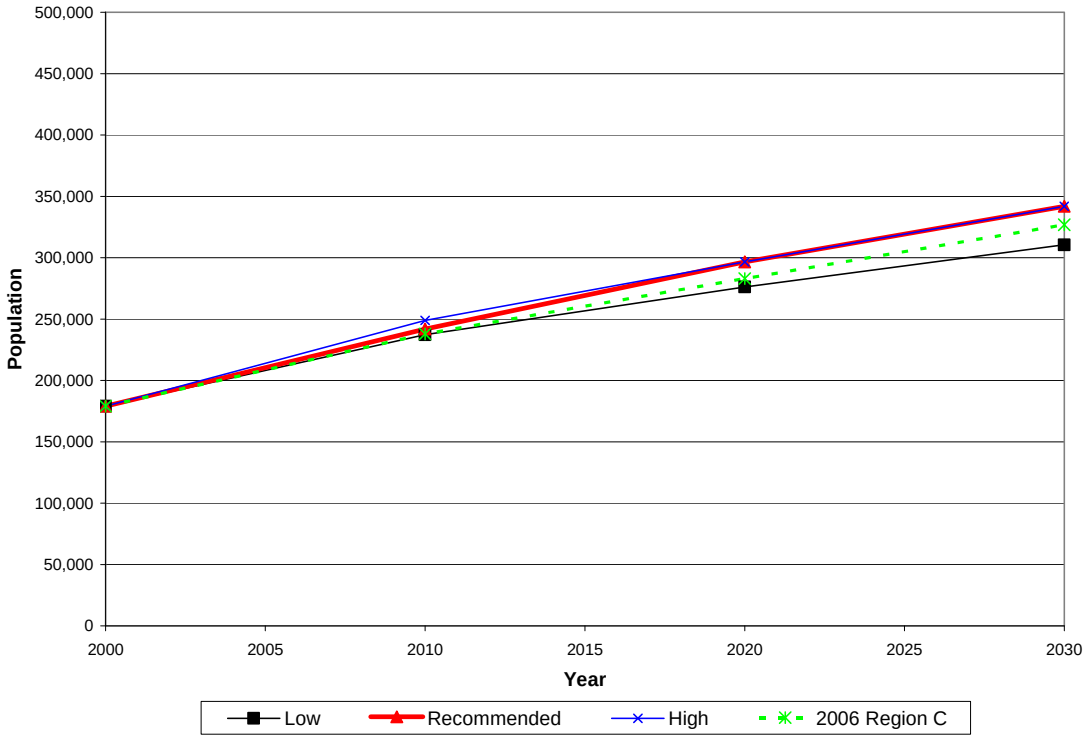
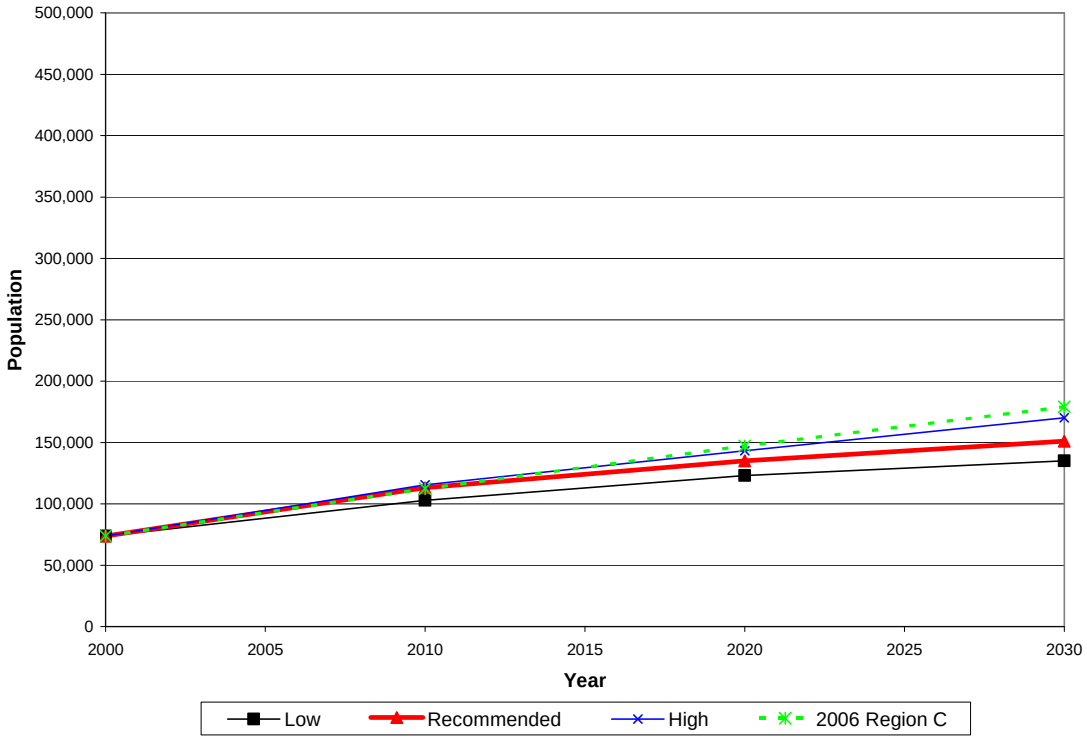


Figure 4.4
Population Projections for Southern Tarrant County



for analyzing a portion of these counties. Appendix C includes tables with population projections for each water user group that has recommended adjustments to population projections in the study area. Appendix D includes graphs showing various population projections for each water user group with adjusted demand projections in the study area. Population projections for this study are significantly higher than projections in the 2006 regional water plans.

4.2 Demand Projections

Projections of municipal demand were developed based on the population projections described above, historical per capita use, projections from the 2006 plans, and input from study area water suppliers. Some water user groups provided recent water use data, as well as water demand projections. The historical municipal per capita water use was calculated based on this information. Municipal per capita water use projections were recommended and then multiplied by the recommended population projection to determine the recommended demand for a water user group. Figures 4.5 and 4.6 show water demand projections for Ellis and Johnson Counties, respectively, compared to projections from the 2006 regional water plans. Figures 4.7 and 4.8 show the projected average day water demand scenarios for the Southern Dallas and Southern Tarrant County portions of the study area, respectively.

Projections of mining water use were taken from *Assessment of Groundwater Use in the Northern Trinity Aquifer due to Urban Growth and Barnett Shale Development* [(13)] and are higher in Ellis and Johnson Counties than in the 2006 plans. Increases are recommended for steam electric and manufacturing use in Johnson County based on input from Cleburne. Other non-municipal demands are unchanged from the 2006 plans. Although current and projected populations for Ellis and Johnson County are similar, the total water use is higher in Ellis County because of higher water use for steam electric power generation in the county.

Table 4.1 summarizes the recommended population and demand projections by county for the study area. In Ellis and Johnson Counties, the recommended population projections are greater than those in the 2006 regional water plans and less than the NCTCOG projections. In both counties, demand projections are higher than those in the 2006 regional water plans. In Southern Dallas County, the recommended population and demand projections are somewhat

Figure 4.5
Average Day Water Demand Projections for Ellis County

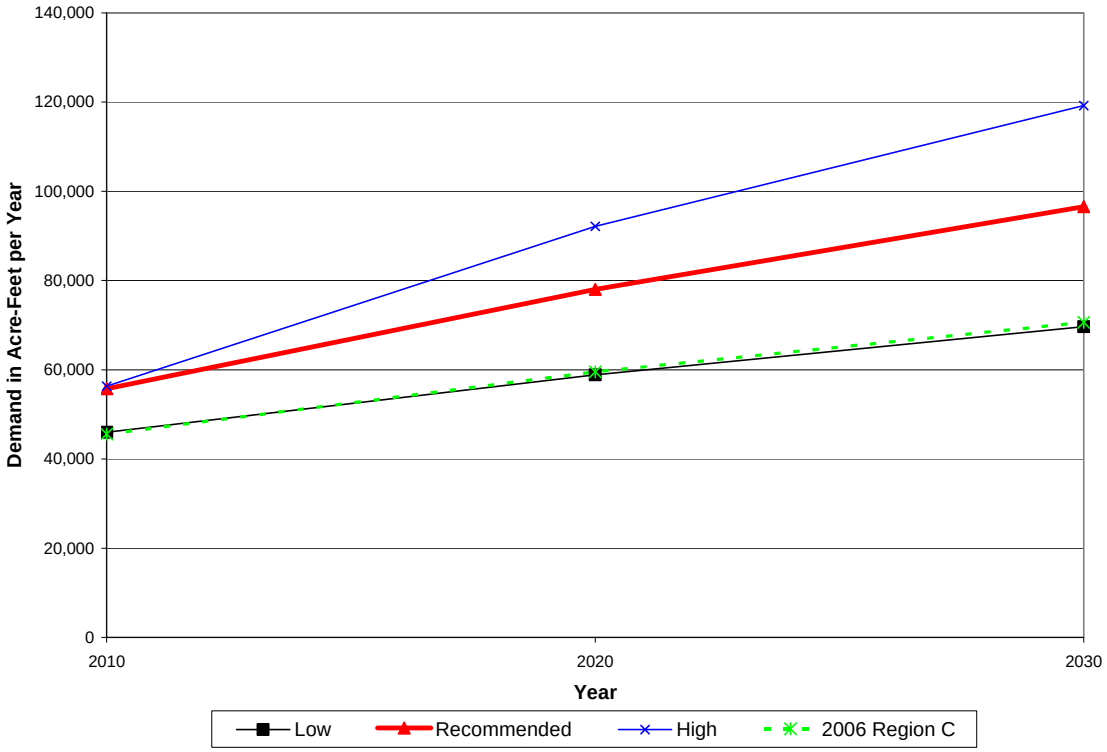


Figure 4.6
Average Day Water Demand Projections for Johnson County

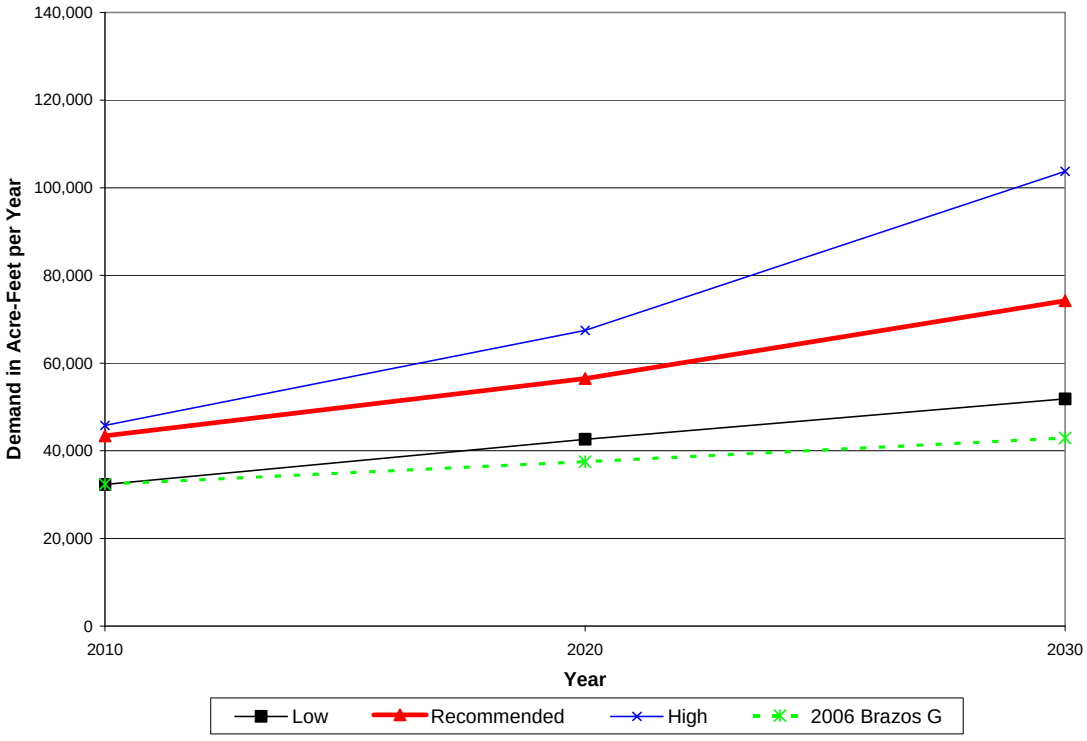


Figure 4.7
Average Day Water Demand Projections for Southern Dallas County

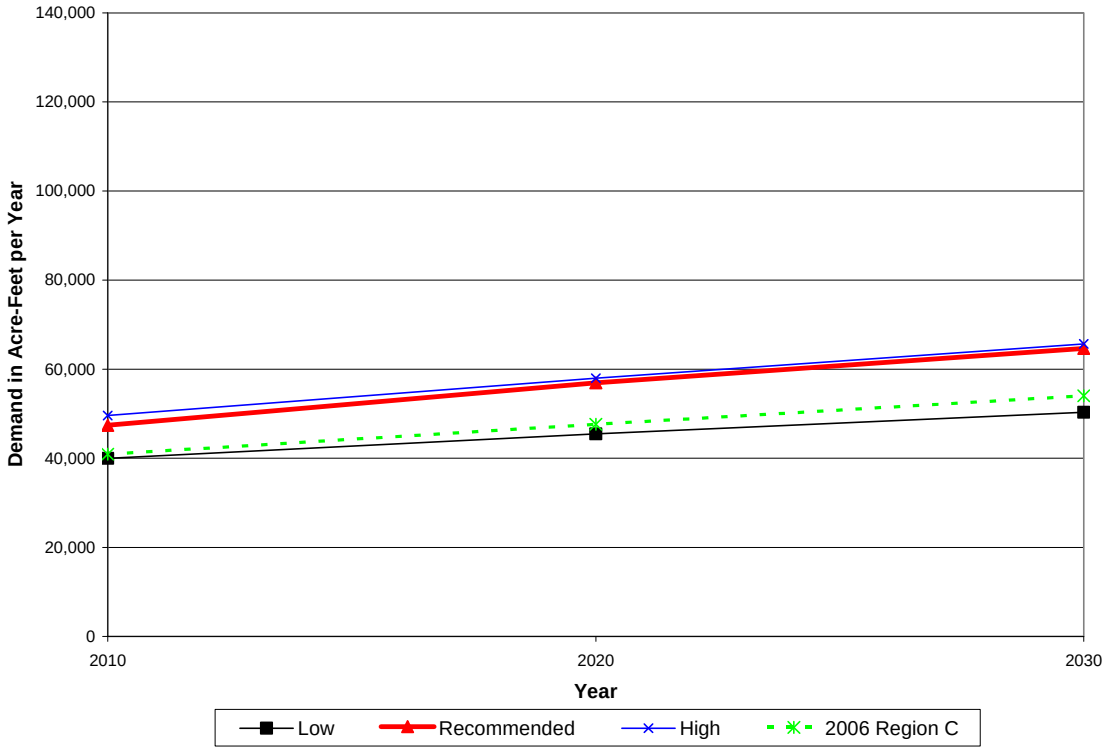
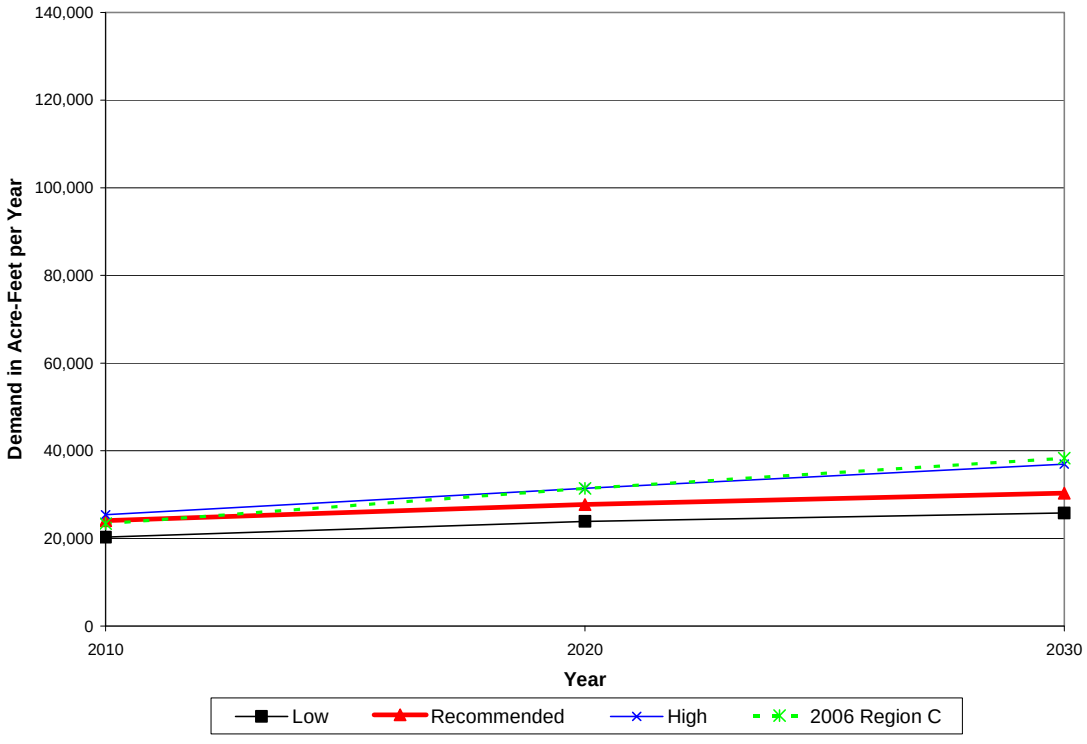


Figure 4.8
Average Day Water Demand Projections for Southern Tarrant County



higher than those in the *2006 Region C Water Plan.* The recommended projections for Southern Tarrant County are lower in this study than the 2006 regional water plan. This reduction is primarily due to the shifting of population within Mansfield from Tarrant County to Johnson County.

Table 4.1
Summary of Population and Demand Projections

	2000 Historical	2010	2020	2030
Ellis County Population Projections				
2006 Region C Water Plan	111,360	149,627	188,280	230,402
NCTCOG	111,360	180,617	329,476	448,588
Recommended	111,360	181,740	259,676	333,472
Ellis County Demand Projections				
2006 Region C Water Plan	25,469	46,567	59,550	70,648
Recommended	25,469	55,729	77,998	96,580
Johnson County Population Projections				
2006 Brazos G Regional Water Plan	126,811	151,468	180,509	211,020
NCTCOG	126,811	166,759	284,411	444,151
Recommended	126,811	162,236	242,627	327,898
Johnson County Demand Projections				
2006 Brazos G Regional Water Plan		32,407	37,478	42,911
Recommended		43,405	56,505	74,248
Southern Dallas County Population Projections				
2006 Region C Water Plan	*178,964*	*237,894*	*282,971*	*326,808*
Recommended	178,964	241,905	296,607	341,870
Southern Dallas County Demand Projections				
2006 Region C Water Plan		*40,885*	*47,630*	*54,017*
Recommended		47,380	56,940	64,645
Southern Tarrant County Demand Projections				
2006 Region C Water Plan	*73,711*	*112,282*	*147,231*	*179,046*
Recommended	73,711	113,181	135,022	151,119
Southern Tarrant County Demand Projections				
2006 Region C Water Plan		*23,389*	*31,425*	*38,289*
Recommended		24,046	27,714	30,315

Figures 4.9 and 4.10 show the recommended demand projections for Ellis and Johnson Counties by demand category. Because this study only considers a portion of Dallas and Tarrant Counties, similar figures cannot be established for these areas. The county-wide categories for non-municipal water use are not subdivided into smaller areas.

Figure 4.9
Average Day Water Demand Projections by Category for Ellis County

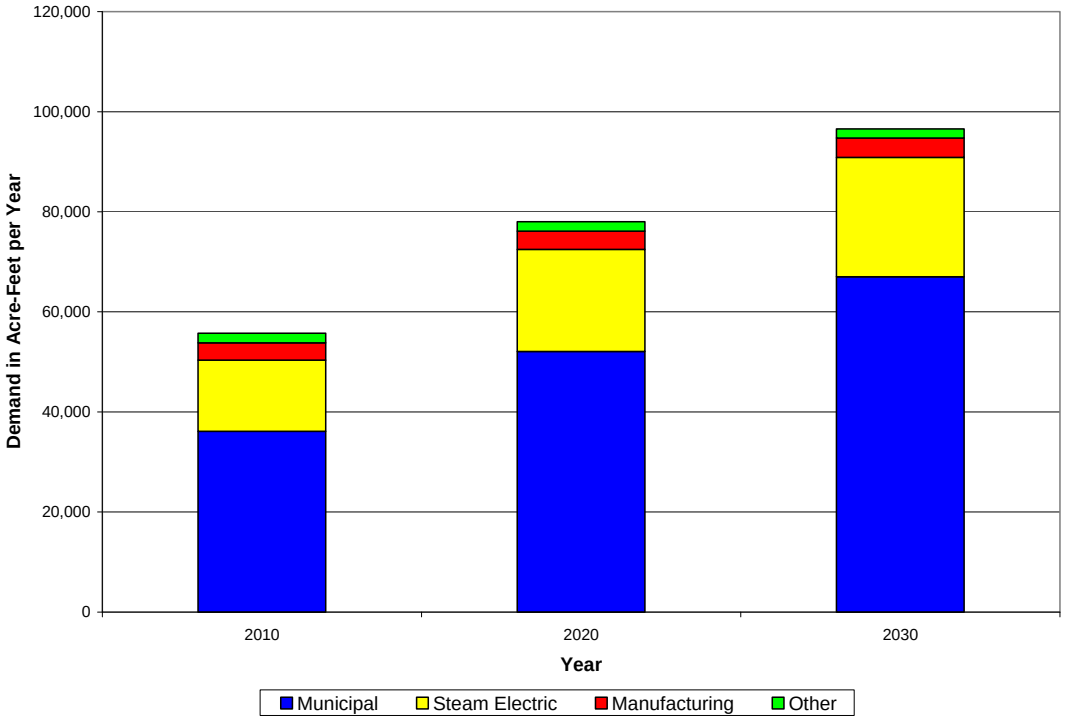
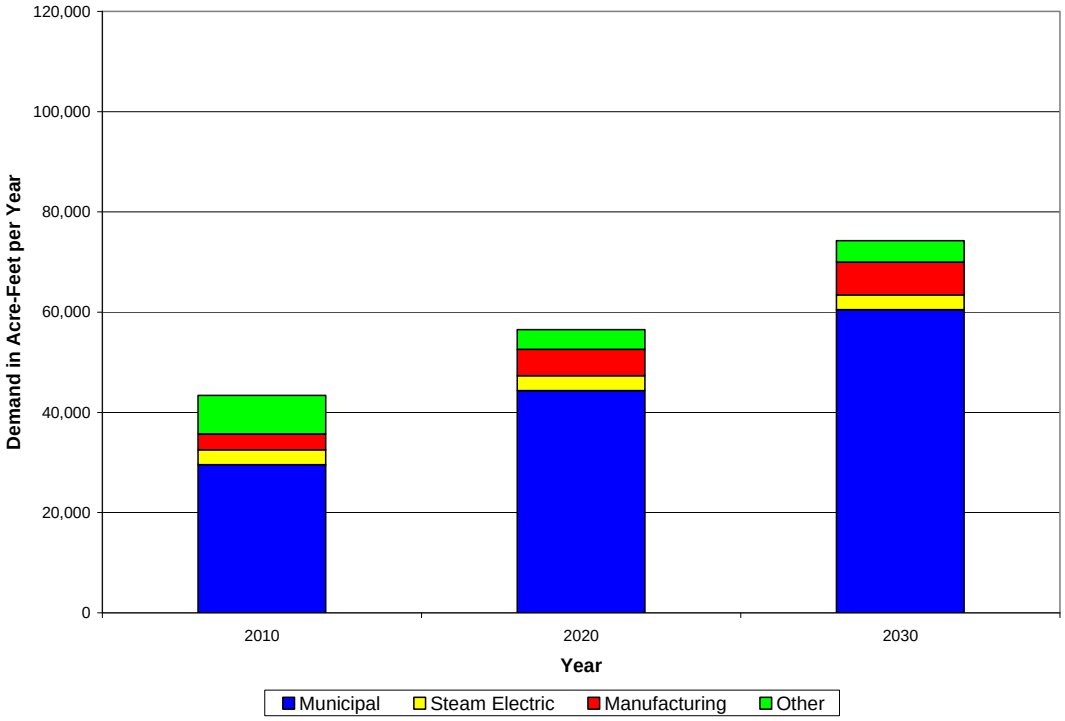


Figure 4.10
Average Day Water Demand Projections by Category for Johnson County



4.3 Demand for Wholesale Water Providers

The large regional wholesale water providers in the study area are the BRA, Dallas, Fort Worth, the TRWD, and the TRA. Arlington, Cleburne, Ennis, Fort Worth, Grand Prairie, Johnson County SUD, Mansfield, Midlothian, Rockett SUD, and Waxahachie either currently serve as local wholesale water providers or are planning to do so in the future. Table 4.2 includes the study area demand for each of these wholesale providers. Appendix C provides detailed tables showing the calculation of the demand for each wholesale water provider.

Table 4.2
Study Area Demand Projections for Current and Proposed Customers of Wholesale Water Providers (Acre-Feet per Year)

	2010	2020	2030	Comments
Regional Wholesale Providers				
Brazos River Authority	26,351	22,794	26,448	SWATS and system
Dallas	46,275	58,606	68,202	
Fort Worth	10,598	14,348	17,915	Raw water from TRWD
Tarrant Regional Water District	85,304	112,075	128,681	Raw water to Fort Worth and others
Trinity River Authority	67,713	68,330	69,058	Bardwell, Joe Pool, and Navarro Mills
Local Wholesale Providers				
Cleburne	12,970	16,317	19,533	
Ennis	7,280	9,483	11,767	
Grand Prairie	34,302	48,206	54,628	
Johnson County SUD	11,555	14,850	22,250	
Mansfield	19,029	29,078	35,998	
Midlothian	13,188	21,398	26,113	
Rockett SUD	11,524	13,080	14,907	
Waxahachie	13,951	19,019	23,874	

Note: These are demands for the study area, not total demands for the wholesaler. Details are given in Appendix C and Appendix F.

Appendix E includes graphs showing water demands for each water user group in the study area with adjusted water demand projections. The role of each regional and wholesale provider is discussed below.

Brazos River Authority (BRA). The Brazos River Authority owns and operates the BRA SWATS (Surface Water and Treatment System), which supplies treated water to water user

groups in Hood and Johnson Counties. The raw water from BRA SWATS comes from Lake Granbury and is treated at a 15.54 MGD design capacity desalination plant, of which 10.5 MGD is currently operational as discussed earlier. Current BRA SWATS customers in Johnson County include Acton MUD, Johnson County SUD (which supplies Joshua and a small amount to Alvarado) and Keene. Future potential customers of SWATS include Bethany WSC (through Keene), Godley, Grandview, Parker WSC, Rio Vista, and Johnson County-Other. BRA also provides raw water to Cleburne from Lake Aquilla and is contracted to provide additional raw water supplies from Lake Whitney to Cleburne. BRA provides raw water to Aquilla WSD which provides treated water to Brandon-Irene WSC and Files Valley WSC and (through Files Valley WSC) to Parker WSC and Milford. Through Cleburne, BRA water is used for Johnson County Steam Electric and Johnson County Manufacturing.

Dallas. Dallas treated water customers in the study area include Cedar Hill, Duncanville, Glenn Heights, Grand Prairie, Oak Leaf, and Ovilla. Red Oak and Wilmer are future customers in the study area. Dallas also has treated water contracts with Rockett SUD and Waxahachie, but those cities have no immediate plans to develop this supply.

Tarrant Regional Water District (TRWD). TRWD currently provides raw water directly or indirectly to Arlington, Bethesda WSC, Burleson, Community Water Company, Ennis, Fort Worth, Grand Prairie, Johnson County SUD, Mansfield, and Rice WSC and has contracts through TRA to provide water to many study area suppliers. Table 4.2 lists TRWD's current contractual commitments in Ellis and Johnson Counties. In addition to current customers, TRWD is expected to provide raw water that will be treated by others and used to supply Alvarado, Bardwell, Buena Vista-Bethel SUD, Ferris, Midlothian, Palmer, Pecan Hill, Red Oak, Rockett SUD, Sardis-Lone Elm WSC, Waxahachie, Ellis County Other, Ellis County Manufacturing, Bethesda WSC, and Kennedale.

Trinity River Authority (TRA). The Trinity River Authority holds the water rights in Lake Bardwell, Joe Pool Lake, and Navarro Mills Lake and provides water by contract to the following area water suppliers:

- Lake Bardwell
  - Waxahachie
  - Ennis

- Joe Pool Lake
  - Cedar Hill (not in use)
  - Duncanville (not in use)
  - Grand Prairie (used for irrigation)
  - Midlothian
- Navarro Mills Lake
  - Corsicana
  - Dawson
  - Post Oak WSC
  - Texas industries

Direct and indirect customers in the study area currently using water from the TRA reservoirs include Community WC, Ennis, Ferris, Grand Prairie, Lancaster (Dallas County), Midlothian, Mountain Peak SUD, Oak Leaf, Palmer, Pecan Hill, Red Oak, Rice WSC, Rockett SUD, Venus, and Waxahachie. The TRA also serves as a contracting agency for TRWD sales of raw water in Ellis and Johnson Counties, as discussed above. Buena Vista-Bethel SUD has a contract with TRA for raw water (assumed to be treated by Waxahachie) and plans to use this in the future. Additional future customers for water from TRA reservoirs and TRWD water are expected to include Alvarado, Bardwell, Buena Vista-Bethel SUD, and Sardis-Lone Elm WSC.

Table 4.3 lists the current and potential customers of the local wholesale water providers.

Arlington. Arlington does not currently have any wholesale customers but is planning to supply treated water to Bethesda WSC and Grand Prairie.

Cleburne. Cleburne supplies water for its municipal customers as well as Johnson County Steam Electric and a portion of Johnson County Manufacturing and Johnson County Mining. The steam electric use is for a Brazos Electric Power cooperative power plant and is primarily supplied from reuse. Cleburne currently supplies mining and manufacturing from treated water but is planning a project to expand reuse to those customers as well.

Ennis. Ennis currently provides water to Community WC, East Garrett WSC (part of Ellis County Other), Rice WSC, Ellis County Manufacturing, and Ellis County Steam Electric. Bardwell is a potential future wholesale customer of Ennis.

Table 4.3
Current and Proposed Customers of the Local Wholesale Water Providers

Supplier					
Ennis	**Fort Worth**	**Mansfield**	**Midlothian**	**Rockett SUD**	**Waxahachie**
Current Customers					
Community WC	Bethesda WSC	Johnson County SUD	Grand Prairie	Ennis	Rockett SUD
East Garrett WSC	Burleson		Mountain Peak SUD	Ferris	Ellis County-Other
Rice WSC	Kennedale		Rockett SUD	Palmer	Ellis County Manufacturing
Ellis County Manufacturing			Venus	Pecan Hill	
Ellis County Steam Electric			Ellis County Mining	Red Oak	
				Lancaster (Dallas County)	
				Oak Leaf	
				Waxahachie	
				Ellis County-Other	
Potential Future Customers					
Bardwell	None	Additional Johnson County SUD	Alvarado	Ellis County-Other (East Garrett WSC)	Buena Vista-Bethel SUD
		Grand Prairie	Additional Grand Prairie	Sardis-Lone Elm WSC	Italy
		Johnson County Mining			Maypearl
					Ellis County Steam Electric

Fort Worth. Fort Worth currently provides treated water to Bethesda WSC, Grand Prairie, and Burleson in the study area and has a contract to supply water to Kennedale. Fort Worth gets its raw water from the Tarrant Regional Water District.

Grand Prairie. Grand Prairie is negotiating a contract to supply treated water purchased from Mansfield to Johnson County SUD.

Johnson County SUD. Johnson County SUD supplies treated water to Joshua and provides a small amount of treated water to Alvarado. Johnson County SUD also serves a portion of Johnson County Mining. In the future, the district may also supply treated water to Bethany WSC and Grand Prairie (in 2010).**Mansfield.** Mansfield currently supplies a small amount of treated water to Johnson County SUD and is negotiating contracts to supply Grand Prairie and additional treated water to Johnson County SUD. In the future, Mansfield may serve a portion of Johnson County Mining.

Midlothian. Midlothian currently provides treated water to Grand Prairie, Mountain Peak SUD, Rockett SUD, Venus, and Ellis County Mining. Through Rockett SUD, Midlothian supplies the SUD's customers (part or all of Ennis, Ferris, Lancaster (Dallas County), Oak Leaf, Palmer, Pecan Hill, Red Oak, and Waxahachie). In the future, Alvarado is planning to purchase treated water from Midlothian (assuming Alvarado gets a raw water contract with Tarrant Regional Water District).

Rockett SUD. Rockett SUD currently supplies treated water to all or part of the following cities: Ennis, Ferris, Lancaster (Dallas County), Oak Leaf, Palmer, Pecan Hill, Red Oak, Waxahachie, and Ellis County-Other. As a participant with Waxahachie in the Sokoll Water Treatment Plant, Rockett SUD plans to provide treated water for Sardis-Lone Elm WSC as well.

Waxahachie. Waxahachie currently supplies treated water to Rockett SUD, as well as treated water for Ellis County Manufacturing and small municipal users included in Ellis County-Other. In the future, the city is expected to supply treated water to Buena Vista-Bethel WSC, Italy, Maypearl, and Ellis County Steam Electric.

4.4 Comparison of Contracted Supply to Projected Demands

Appendix F contains a comparison of projected demands with currently connected and contracted supplies for each water user group in the study area. The management strategies needed to connect regional supplies and meet the projected demands are discussed in Section 5.

5. Recommended Water Management Strategies

The recommended water management strategies within the study area are discussed in this section. Management strategies needed to make sufficient supplies available to regional wholesale suppliers that bring water into the study area (TRWD, TRA, BRA, Dallas, Fort Worth, and Arlington) are discussed in the 2006 regional water plans and will be updated in the 2011 regional water plans. They are not updated in this report. For this study, the assumption is that the regional water providers will continue to have water supply available when needed by study area water user groups.

Appendix F provides detailed summary tables of the population projections, currently contracted supplies, and recommended water management strategies for each of the water user groups and wholesale water providers within the study area, as well as graphs of supply versus demand. Appendix G includes detailed cost estimates for the recommended water management strategies.

5.1 Ellis County

Table 5.1 lists the recommended water management strategies for the water user groups in Ellis County. Figure 5.1 is a schematic diagram of the proposed municipal water supplies.

Waxahachie-Rockett SUD Project

One of the more significant water management strategies recommended for Ellis County is continued implementation of the TRA Ellis County Water Supply Project from the *2006 Region C Water Plan* [(1)]. This project involves a partnership among Waxahachie, Rockett SUD, and the Trinity River Authority to purchase and treat water from Tarrant Regional Water District (TRWD) sources. Waxahachie and Rockett SUD are jointly constructing the new Robert W. Sokoll Water Treatment Plant. The plant will have an initial maximum day capacity of 20 million gallons per day (MGD) and an eventual maximum day capacity of 80 MGD. Waxahachie and Rockett SUD are working with other Ellis County water user groups to develop this project to meet the needs of the Central and Eastern portions of Ellis County. The cost of the initial water treatment plant is estimated to be $49,006,000. In addition, transmission lines from the new plant to Buena Vista-Bethel SUD and to Sardis-Lone Elm WSC are also needed at an additional cost of $8,138,000 and $18,929,000, respectively.

Table 5.1
Summary of Recommended Water Management Strategies for Ellis County

Water User Group	Currently Contracted Supplies	Recommended Strategies
Bardwell	Woodbine aquifer	Additional Woodbine aquifer (new wells), Purchase from Ennis (TRWD water through TRA)
Brandon-Irene WSC	Aquilla WSD (Lake Aquilla), Trinity aquifer (Hill County)	None
Buena Vista-Bethel SUD	Trinity aquifer, Waxahachie (TRWD water through TRA)	Additional Waxahachie (TRWD through TRA), additional Trinity aquifer (existing wells)
Cedar Hill (mostly in Dallas County)	Dallas, Trinity aquifer, TRA Joe Pool (not in use)	Additional Dallas water
Community WC	Ennis (TRA Lake Bardwell)	Additional Ennis (TRWD water through TRA)
Ennis	TRWD water through TRA, TRA (Bardwell Lake), direct reuse (sold to Steam Electric Power)	Treatment plant expansions, indirect reuse
Ferris	Woodbine aquifer, Rockett SUD (TRWD water through TRA)	None
Files Valley WSC	Aquilla WSD (Lake Aquilla)	TRWD water through TRA (from Buena Vista-Bethel SUD through Waxahachie)
Glenn Heights	Trinity aquifer, Dallas	None
Grand Prairie (mostly in Dallas and Tarrant Counties)	Trinity aquifer, Dallas, Fort Worth (TRWD), TRA Joe Pool Lake, Midlothian	Johnson Co SUD (2010 only), Mansfield (TRWD), Arlington (TRWD), Dallas water passed through Cedar Hill, additional Midlothian
Italy	Trinity aquifer, Woodbine aquifer, Waxahachie (TRWD water through TRA)	Additional Woodbine aquifer
Johnson County SUD (mostly in Johnson County)	Trinity aquifer, Brazos River Authority SWATS (Lake Granbury), Mansfield (TRWD)	Temporary overdraft of Trinity aquifer in 2010, additional Mansfield (TRWD), Grand Prairie (Mansfield)
Mansfield (mostly in Tarrant County)	Tarrant Regional Water District	Treatment plant expansions
Maypearl	Trinity aquifer, Woodbine aquifer, Waxahachie (TRWD water through TRA)	Additional Woodbine aquifer (existing and new wells)

Table 5.1, Continued

Water User Group	Currently Contracted Supplies	Recommended Strategies
Midlothian	TRA (Joe Pool Lake), TRWD water through TRA, Sardis-Lone Elm WSC (retail customers)	Additional TRWD water through TRA, treatment plant expansions
Milford	Woodbine aquifer, Files Valley WSC (Lake Aquilla)	None
Mountain Peak SUD	Trinity aquifer, Midlothian	Additional Trinity aquifer (new wells), Woodbine aquifer (new wells)
Oak Leaf	Glenn Heights (Dallas), Rockett SUD (retail customers)	None
Ovilla	Woodbine aquifer, Dallas, Sardis-Lone Elm WSC (retail customers)	Additional Dallas water
Palmer	Woodbine aquifer, Rockett SUD (TRWD water through TRA)	None
Pecan Hill	Rockett SUD	None
Red Oak	Woodbine aquifer, Dallas Sources, Rockett SUD (retail customers), TRWD water through TRA (not in use)	None
Rice WSC	Lake Bardwell (Ennis), Navarro Mills Reservoir (Corsicana)	TRWD through Ennis, additional Corsicana water
Rockett SUD (mostly in Ellis County)	Midlothian, TRWD water through TRA, Dallas (not in use)	Additional TRWD water through TRA, treatment plant expansions
Sardis-Lone Elm WSC (mostly in Ellis County)	Trinity aquifer, Woodbine aquifer	Temporary overdraft of Trinity aquifer (new wells), Rockett SUD (TRWD water through TRA)
Waxahachie	Lake Bardwell (TRA), Lake Waxahachie, TRWD water through TRA, Reuse, Dallas (not in use)	Additional TRWD through TRA, treatment plant expansions
Ellis County-Other	Lake Bardwell (Ennis), Waxahachie Sources, Rockett SUD sources, Trinity aquifer, Woodbine aquifer	Additional Trinity aquifer (new wells), Woodbine aquifer (new wells), TRWD Sources (from Rockett SUD and Waxahachie)

Table 5.1, Continued

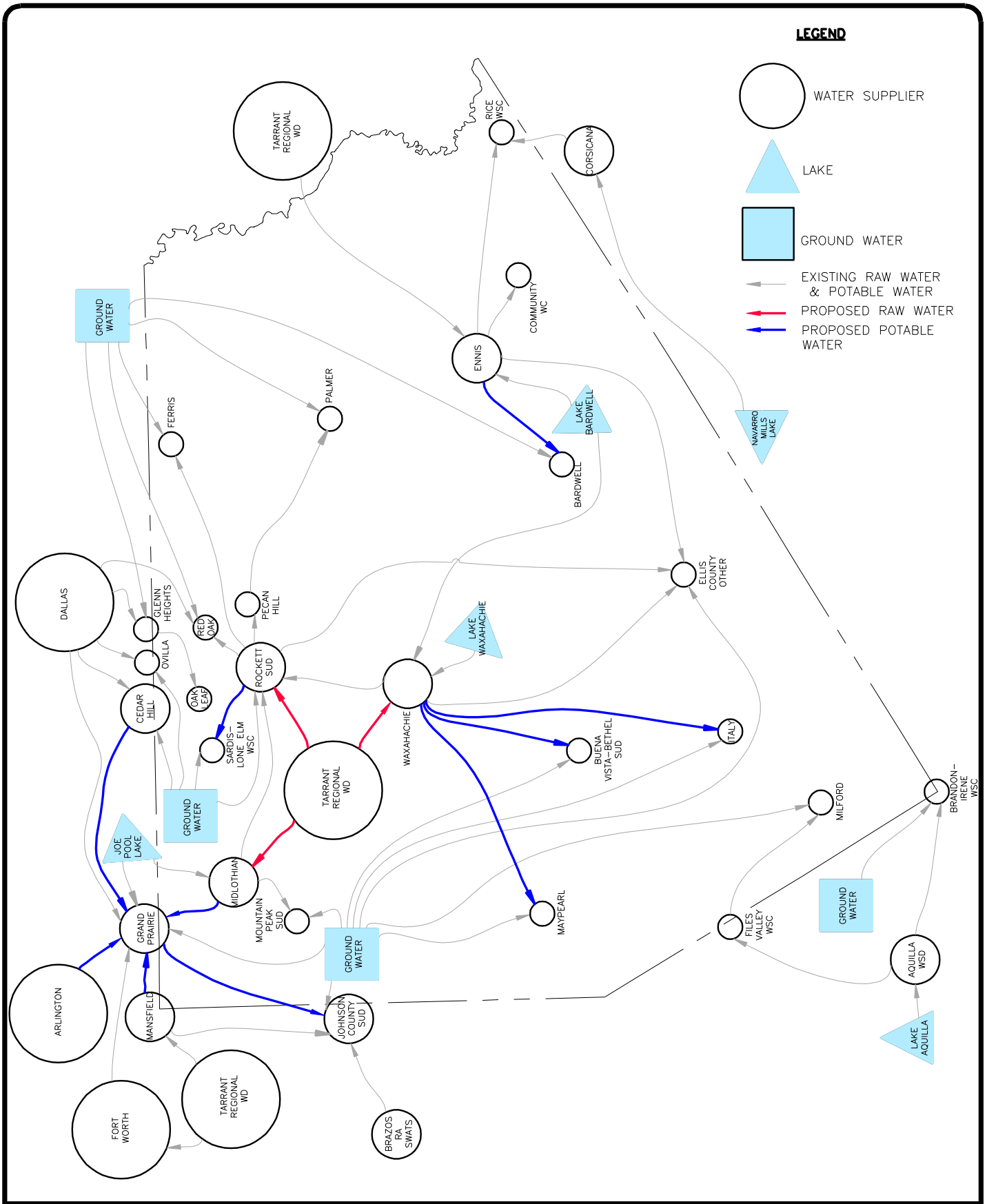
Water User Group	Currently Contracted Supplies	Recommended Strategies
Ellis County Irrigation	Trinity aquifer, Local Supply	Woodbine aquifer, Trinity Ellis County Direct Reuse
Ellis County Livestock	Local Supply, Woodbine aquifer	
Manufacturing	Trinity aquifer, Woodbine aquifer, Midlothian, Waxahachie, Ennis (TRA Bardwell Lake)	TRWD Sources (from Rockett SUD and Waxahachie), Midlothian, Reuse
Ellis County Mining	Woodbine aquifer	None
Ellis County Steam Electric	Ennis direct reuse, Midlothian (TRA Joe Pool Lake)	Midlothian, TRA Direct Reuse, Waxahachie

Notes: a. All municipal water user groups have conservation as a strategy.
b. All water user groups with groundwater supplies have supplemental wells as a strategy.
c. Additional supplies from a source already providing water are not listed as a recommended strategy unless a water management strategy (larger contract, facility construction) is needed.

Rockett SUD currently provides treated water to residents in Ennis, Ferris, Lancaster (Dallas County), Oak Leaf, Palmer, Pecan Hill, Red Oak, Waxahachie, and Ellis County-Other, either as retail customers or by wholesale contracts with other suppliers. Rockett SUD plans to provide wholesale treated water to East Garrett WSC (Ellis County-Other) and Sardis-Lone Elm WSC in the future. Waxahachie also currently provides wholesale water to Ellis County-Other and Ellis County Manufacturing. Waxahachie plans to provide wholesale treated water to Buena Vista-Bethel SUD, Italy, and Maypearl in the future. Waxahachie may also provide water for Ellis County Steam Electric Power.

Wholesale Water Providers

The wholesale water providers in Ellis County include Ennis, Midlothian, Rockett SUD and Waxahachie. (Other suppliers, including Arlington, Dallas, and TRWD bring or will bring wholesale supplies into the county.) Table 5.2 is a summary of Ennis' projected demands and supplies. Based on current contracts, Ennis has a sufficient water supply through 2030. For demands beyond 2030, Ennis may pursue additional supplies from TRWD, Dallas, or some other source. Table 5.3 is a summary of the recommended water management strategies for Ennis.



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NORTH

SCHEMATIC DIAGRAM OF EXISTING & PROPOSED MUNICIPAL WATER SUPPLIES FOR ELLIS COUNTY

FIGURE 5.1

Table 5.2
Projected Demand and Supply for Ennis

	2010	2020	2030
Existing Customer Demand (Acre-Feet)			
In-City Municipal Demand	4,573	6,217	7,774
Community WC (Ellis County)	133	133	133
East Garrett WSC (Ellis County Other)	56	56	56
Rice WSC	50	50	50
Ellis County Manufacturing	347	367	384
Ellis County Steam Electric	2,098	2,615	3,302
Potential Customer Demand (Acre-Feet)			
Bardwell	23	45	68
TOTAL DEMAND	**7,280**	**9,483**	**11,767**
Currently Contracted Supplies (Acre-Feet)			
Lake Bardwell (TRA)	4,712	4,485	4,257
Direct Reuse (Steam Electric Only)	2,098	2,615	2,915
Indirect Reuse from Lake Bardwell	189	494	972
TRWD (through TRA)	3,991	3,991	3,991
TRWD (TRA through Rockett SUD)	17	17	17
Water Conservation – Basic Package	110	266	384
Water Conservation – Expanded Package	28	91	183
TOTAL SUPPLY	**11,145**	**11,959**	**12,719**
SURPLUS	**3,865**	**2,476**	**952**

Note: Ennis will require plant expansions to meet the projected demands.

Table 5.3
Water Management Strategies for Ennis

Management Strategy	Decade Assumed in Place	Capital Cost	Supply Provided (ac-ft/yr)
3 MGD treatment plant expansion	2020	$10,091,000	0
3 MGD treatment plant expansion	2030	$10,091,000	0
Lake Bardwell Indirect Reuse	2030	$30,883,000	972
Water Conservation – Basic Package	ongoing	-	384
Water Conservation – Expanded Package	ongoing	-	183

Table 5.4 summarizes the demands and supplies for Midlothian, including the recommended strategies of connecting raw water supplies from TRWD, building a new water treatment plant and purchasing additional water from TRA's Joe Pool Lake. With currently contracted supplies, Midlothian has a projected shortage of 8,565 acre-feet per year as of 2030. Midlothian is seeking additional Joe Pool Lake supplies to meet part of that shortage, but it is not clear that those supplies would be available. Midlothian has indicated that it will need additional commitments of raw water from TRWD before it will sell water to Alvarado or sell additional water to Grand Prairie. It is assumed that TRWD will make additional water equal to the projected 2030 shortage available for Midlothian and its customers. For demands beyond 2030, Midlothian may pursue additional supplies from TRWD, Joe Pool Lake, or some other source. Table 5.5 is a summary of the recommended water management strategies for Midlothian.

Table 5.4
Projected Demand and Supply for Midlothian

	2010	2020	2030
Existing Customer Demand (Acre-Feet)			
In-City Municipal Demand	5,297	9,558	13,356
Grand Prairie	2,242	2,242	2,242
Mountain Peak SUD	816	1,304	1,865
Rockett SUD	1,544	1,682	1,682
Venus	263	493	858
Ellis County Steam Electric	224	224	224
Ellis County Mining	280	280	280
Potential Customer Demand (Acre-Feet)			
Alvarado	0	561	561
Additional Grand Prairie	2,522	5,045	5,045
TOTAL DEMAND	**13,188**	**21,389**	**26,113**
Currently Contracted Supplies (Acre-Feet)			
Joe Pool Lake (TRA)	6,670	6,496	6,156
TRWD (through TRA)	10,459	10,459	10,459
Sardis-Lone Elm WSC	242	243	244
Water Conservation – Basic Package	89	248	421
Water Conservation – Expanded Package	21	94	268
TOTAL CURRENT SUPPLIES	**17,481**	**17,540**	**17,548**
SURPLUS OR SHORTAGE (-)	**4,293**	**-3,849**	**-8,565**

Table 5.4, Continued

Recommended Supply Strategies (Ac-Ft)	2010	2020	2030
TRWD (through TRA) for Alvarado	0	561	561
TRWD (through TRA) for Grand Prairie	2,522	5,045	5,045
Additional TRWD (through TRA)	7,007	3,923	3,923
TOTAL RECOMMENDED SUPPLY STRATEGIES	**9,529**	**9,529**	**9,529**
TOTAL SUPPLY	**27,010**	**27,069**	**27,077**
SURPLUS WITH RECOMMENDED STRATEGIES	**13,822**	**5,680**	**964**

Notes: a. Midlothian plans to build a new water treatment plant to use TRWD water and will require plant expansions to meet the projected demands.
b. Additional TRWD is amount needed to address projected 2030 shortage with current supplies.
c. Midlothian is seeking 4.5 MGD of Joe Pool water, if available.

Table 5.5
Water Management Strategies for Midlothian

Management Strategy	Decade Assumed in Place	Capital Cost	Supply Provided (ac-ft/yr)
Connection to TRWD and 9 MGD new water treatment plant	2011	$25,626,000	6,725
Contract for additional water from TRWD[a] (3.5 MGD to Midlothian, 4.5 MGD to Grand Prairie and 1 MGD to Alvarado)	2010	-	0
3 MGD treatment plant expansion	2014	$10,166,000	0
6 MGD treatment plant expansion	2020	$15,801,000	0
Additional Joe Pool water	after 2030	$812,000	362
Water Conservation – Basic Package	ongoing	-	421
Water Conservation – Expanded Package	ongoing	-	268

Note: a. Amount shown includes TRA contract for Alvarado and Grand Prairie.

Rockett SUD is actively participating in the development of the Robert W. Sokoll Water Treatment Plant with Waxahachie. Rockett SUD plans to use TRWD water (contracting through TRA) to meet projected water needs. Some of the TRWD water is contracted for specific customers of Rockett SUD and is available only to meet these customers' demands. Table 5.6 summarizes the demands and supplies for Rockett SUD. A significant potential new customer for Rockett SUD is Sardis-Lone Elm WSC (5.8 MGD). It is assumed that TRWD will provide

Table 5.6
Projected Demand and Supply for Rockett SUD

	2010	2020	2030
Existing Customer Demand (Acre-Feet)			
Service Area Outside Cities (Dallas County)	380	505	659
Service Area Outside Cities (Ellis County)	2,396	3,299	4,609
Ennis	17	17	17
Ferris	401	474	561
Palmer	239	250	259
Pecan Hill	160	183	205
Red Oak	601	1,010	1,250
Lancaster (Dallas County)	90	90	91
Oak Leaf	55	55	56
Waxahachie	613	616	619
Ellis County Other	70	70	70
Potential Customer Demand (Acre-Feet)			
Ellis County Other (East Garrett WSC)	0	9	9
Sardis-Lone Elm WSC	6,502	6,502	6,502
TOTAL DEMAND	**11,524**	**13,080**	**14,907**
Currently Contracted Supplies (Acre-Feet)			
Midlothian sources	1,544	1,682	1,682
TRWD (through TRA)	6,782	6,782	6,782
TRWD (through TRA) for Ferris	807	807	807
TRWD (through TRA) for Palmer	304	304	304
Lake Waxahachie (Waxahachie)	0	0	0
Trinity Aquifer (Ellis County)	0	0	0
Dallas Sources (not in use)	1,592	841	34
Water Conservation - Basic Package	63	239	280
TOTAL CURRENT SUPPLIES	**11,092**	**10,655**	**9,889**
SURPLUS OR SHORTAGE (-)	**-432**	**-2,425**	**-5,018**
Recommended Supply Strategies (Ac-Ft)			
Additional TRWD (through TRA)	224	224	224
Additional TRWD (through TRA) for Sardis-Lone Elm WSC [b]	6,502	6,502	6,502
TOTAL RECOMMENDED SUPPLY STRATEGIES	**6,726**	**6,726**	**6,726**
TOTAL SUPPLY	**17,818**	**17,381**	**16,615**

Table 5.6, Continued

	2010	2020	2030
REMAINING EXISTING CONTRACT BALANCES COMMITTED TO SPECIFIC ENTITIES	**471**	**387**	**291**
SURPLUS WITH RECOMMENDED STRATEGIES	**5,823**	**3,914**	**1,417**

Notes: a. Rockett SUD is cooperating on the Sokoll Plant with Waxahachie and will need plant expansions to meet future needs.
b. Additional TRWD is the amount planned for 2030 supply to Sardis-Lone Elm WSC.
c. Rockett SUD currently has a contract for water from Dallas but has no plans to use it.

the additional water to meet the projected 2030 needs for Sardis-Lone Elm WSC. The total Rockett SUD shortage in 2030 is projected to be 5,018 acre-feet. A summary of capital costs and overall supply from recommended water management strategies for Rockett SUD and Waxahachie is included in Table 5.8.

Rockett SUD currently has a contract with Dallas to purchase treated water. They do not have a plan to use this supply at this time. TRWD has a policy to not contract for projected demands beyond the year 2030. With the contracted supply from Dallas, Rockett SUD may be limited in the amount of additional water supplies it might obtain from TRWD through TRA.

Table 5.7 summarizes the demands and supplies for Waxahachie. In addition to the new treatment plant being developed jointly with Rockett SUD, Waxahachie plans to expand its existing water treatment plant to provide a maximum day supply of 27 MGD by 2020. Other treatment plant expansions will be needed in the future, including an upgrading study to complete the 3 MGD expansion in 2010. The cost of these plant expansions is $14,821,200. Waxahachie may also connect its existing water treatment plant to the new Sokoll plant by using an existing 30-inch pipeline that currently transports treated water but could transport raw water instead.

Waxahachie plans to meet its future water needs by purchasing water from TRWD through TRA. Waxahachie currently has a contract with Dallas to purchase treated water but does not have current plans to use this contracted water. TRWD has a policy to not contract for more water than what is needed beyond the year 2030. With the contracted supply from Dallas, Waxahachie will be limited in the amount of additional water supplies that it might obtain from

Table 5.7
Projected Demand and Supply for Waxahachie

	2010	2020	2030
Existing Customer Demand (Acre-Feet)			
In-City Municipal Demand	8,255	12,155	16,009
Ellis County Other	242	240	237
Ellis County Manufacturing	970	1,028	1,075
Potential Customer Demand (Acre-Feet)			
Buena Vista-Bethel SUD	0	934	1,567
City of Italy	0	140	362
City of Maypearl	0	38	140
Ellis County Steam Electric Power	4,484	4,484	4,484
TOTAL DEMAND	**13,951**	**19,019**	**23,874**
Currently Contracted Supplies (Acre-Feet)			
Lake Bardwell (TRA)	3,855	3,668	3,483
Lake Waxahachie	2,667	2,573	2,480
TRWD (through TRA)	5,213	5,213	5,213
TRWD (through TRA) for Buena Vista-Bethel SUD	953	953	953
TRWD (through TRA) for Maypearl	415	415	415
TRWD (through TRA) for Avalon WSC (County-Other)	673	673	673
TRWD (through TRA) for Italy	561	561	561
TRWD (through TRA) for Nash-Forreston WSC (County-Other)	280	280	280
Reuse	4,128	5,128	5,128
Dallas Supplies	0	13,452	13,452
Water Conservation – Basic Package	229	580	823
Water Conservation – Expanded Package	3	25	135
TOTAL CURRENT SUPPLIES	**18,977**	**33,521**	**33,596**
Recommended Supply Strategies (Ac-Ft)			
Additional TRWD (through TRA)	4,484	4,484	4,484
Additional TRWD (through TRA) for Buena Vista-Bethel SUD	0	146	785
TOTAL RECOMMENDED SUPPLY STRATEGIES	**4,484**	**4,630**	**5,269**
TOTAL SUPPLY	**23,461**	**38,151**	**38,865**
REMAINING EXISTING CONTRACT BALANCES COMMITTED TO SPECIFIC ENTITIES	**2,640**	**1,530**	**1,190**
SURPLUS WITH RECOMMENDED STRATEGIES	**6,870**	**17,602**	**13,801**

Notes: a. Waxahachie is building the Sokoll Plant in cooperation with Rockett SUD and will need additional plant expansions to meet future needs.
b. Waxahachie has a contract for water from Dallas but has not plans to use it.

TRWD through TRA. Waxahachie is projected to have a surplus of 9,722 acre-feet in 2030. Table 5.8 is a summary of the recommended water management strategies for Rockett SUD and Waxahachie.

Table 5.8
Water Management Strategies for Rockett SUD and Waxahachie

Management Strategy	Decade Assumed in Place	Capital Cost	Supply Provided (ac-ft/yr)
Waxahachie Additional TRA/Waxahachie Indirect Reuse	2010	$27,374,000	3,112
20 MGD Sokoll Plant and connection to TRWD pipelines	2010	$49,006,000	0
20 MGD expansion to Sokoll Plant	2020	$48,677,000	0
20 MGD expansion to Sokoll Plant	2030	$49,335,000	0
3 MGD upgrading study to Waxahachie South WTP	2010	$7,200	0
9 MGD expansion to Waxahachie South WTP	2020	$14,814,000	0
Waxahachie contract for 5,269 acre-feet per year from TRWD[a]	2010	$0	5,213
Pump station to pump water from Tarrant County to Sokoll Plant (backup supply)	2012	$5,135,000 - $10,810,000	22,420
Pipeline to connect Waxahachie South WTP to new Sokoll WTP		minimal	0
Rockett SUD Water Conservation – Basic Package	ongoing	-	280
Waxahachie Water Conservation – Basic Package	ongoing	-	823
Waxahachie Water Conservation – Expanded Package	ongoing	-	135

Note: a. Amount includes contractual commitment to Buena Vista-Bethel SUD.

Backup Supplies for the Sokoll Plant

As discussed in Section 3, the Tarrant Regional Water District requires Ellis County customers to make backup supply provisions for a 60-day shutdown of supplies from its pipelines. TRWD intends to include a similar clause in future contracts and expansions of contracts (although the required shut-down may be reduced in the future to 30 days). In Ellis County, this requirement would be significant to the entities with water treatment plants – Ennis, Midlothian, Waxahachie, and the partnership of Waxahachie and Rockett SUD (for the proposed

Sokoll Plant). The existing Ennis, Midlothian, and Waxahachie plants meet the requirement by having local supplies available to use during shutdowns. The proposed Midlothian plant will be located so that it can receive supplies from Lake Benbrook in Tarrant County during a shutdown. The Sokoll plant will need to develop a management strategy to operate during a shutdown of the TRWD pipelines. Alternatives that would allow continued operation of the plant include the following:

- A pipeline from Joe Pool Lake
- A pump station to bring water from Tarrant County to the Sokoll Plant during a TRWD pipeline shutdown
- Delivery of sufficient treated water from the Waxahachie south plant
- Delivery of sufficient raw water from Lake Waxahachie
- Development of adequate terminal storage at or near the Sokoll Plant.

Based on the size of the Sokoll Plant and the expected cost of the alternatives, the first two seemed most promising, and costs were developed for this study. The pump station to bring water from Tarrant County to the Sokoll Plant during a TRWD pipeline shutdown was the most cost-effective, and it is included as a recommended strategy for Rockett SUD and Waxahachie. Detailed cost estimates for each of these alternatives is included in Appendix G.

We recommend that TRWD require a regional plan to develop a backup supply capability before contracting to provide additional supply in the Ellis and Johnson County area.

Other Ellis County Water Management Strategies

Table 5.9 summarizes the cost and supply for recommended water management strategies for Ellis County. The total cost of the recommended strategies is approximately $583 million, and they make approximately 72,700 acre-feet per year available for suppliers in Ellis County.

5.2 Johnson County

The recommended water management strategies for Johnson County water user groups are shown in Table 5.10. Figure 5.2 is a schematic of future water supplies in Johnson County. In general, the strategies call for small water user groups to develop additional groundwater and connect to major suppliers. Most of the large water user groups purchase treated water from others, with Cleburne continuing to treat raw water from Lake Pat Cleburne and raw water

supplies purchased from BRA (Lake Aquilla, Lake Whitney through BRA system operations).

Table 5.9
Cost and Supply for Recommended Water Management Strategies for Ellis County

Water Supplier	Water Management strategy	Approximate Date	Cost	Supply Available (Ac-Ft/Yr)
All Groundwater Users	Supplemental Wells	Varies	$81,197,000	0
Bardwell	Woodbine Wells	2010	$3,525,000	170
Buena Vista-Bethel SUD	Connection to Waxahachie	2010	$8,138,000	1,682
Ennis	All strategies (Table 5.3)	Varies	$51,065,000	1,539
Files Valley WSC Italy Maypearl Ellis County-Other	South Ellis County Supply Line from Rockett SUD and Waxahachie new Sokoll WTP	2010	$10,327,000	1,682
Grand Prairie	See Dallas and Tarrant County - Table 5.20			
Italy	Woodbine Wells	2010	$1,083,000	249
Johnson County SUD	See Johnson County – Table 5.16			
Mansfield	See Dallas and Tarrant County - Table 5.20			
Maypearl	Woodbine Wells	2010	$331,000	11
Midlothian	All strategies (Table 5.5)	Varies	$52,405,000	7,776
Mountain Peak SUD	Trinity Wells	2010	$4,946,000	300
	Woodbine Wells	2010	$2,282,000	50
Rockett SUD Waxahachie	All strategies (Table 5.8)	Varies	$189,213,200 (excludes backup options)	6,451
Sardis-Lone Elm WSC	Connection to Rockett SUD	2010	$18,929,000	5,045
	Temporary overdraft of Trinity aquifer (new wells)	2010	$3,124,000	531
Ellis County-Other	Trinity Wells	2010	$3,506,000	201
	Woodbine Wells	2010	$9,096,000	919
Ellis County Irrigation	Woodbine Wells	2010	$3,747,000	563
	Connection to TRA	2010	$950,000	250

Table 5.9, Continued

Water Supplier	Water Management strategy	Approximate Date	Cost	Supply Available (Ac-Ft/Yr)
Ellis County Manufacturing	Woodbine Wells	2010	$1,516,000	101
Ellis County Steam Electric	Connection to Midlothian	2010	$0	160
	Connection to Waxahachie	2010	$4,925,000	4,484
	Connection to TRA	2010	$127,016,000	40,000

Table 5.10
Summary of Recommended Water Management Strategies for Johnson County

Water User Group	Currently Contracted Supplies	Recommended Strategies
Acton MUD	Trinity aquifer, BRA SWATS	None
Alvarado	Trinity aquifer, Johnson County SUD	Temporarily Overdraft Trinity aquifer, Midlothian (TRWD water through TRA), additional Johnson County SUD (Mansfield, TRWD)
Bethany WSC	Trinity aquifer	Keene (BRA SWATS), Johnson County SUD
Bethesda WSC	Fort Worth (TRWD), Trinity aquifer	Arlington (TRWD), additional Fort Worth (TRWD), supplemental wells
Burleson	Fort Worth (TRWD)	None
Cleburne	Lake Pat Cleburne, BRA Lake Aquilla, BRA Lake Whitney (not yet connected), Trinity aquifer, Reuse (for Steam Electric Power)	Additional reuse, development of Lake Whitney supply from BRA System Operations
Godley	Trinity aquifer	BRA SWATS (possibly through JCSUD)
Grandview	Woodbine aquifer	BRA SWATS (possibly through JCSUD)
Johnson County SUD	BRA SWATS, Trinity aquifer, Mansfield (TRWD)	Temporary overdraft of the Trinity aquifer in 2010, Grand Prairie (Mansfield), additional Mansfield (TRWD)
Joshua	Johnson County SUD	None
Keene	BRA SWATS, Trinity aquifer	Temporary overdraft of the Trinity aquifer in 2010

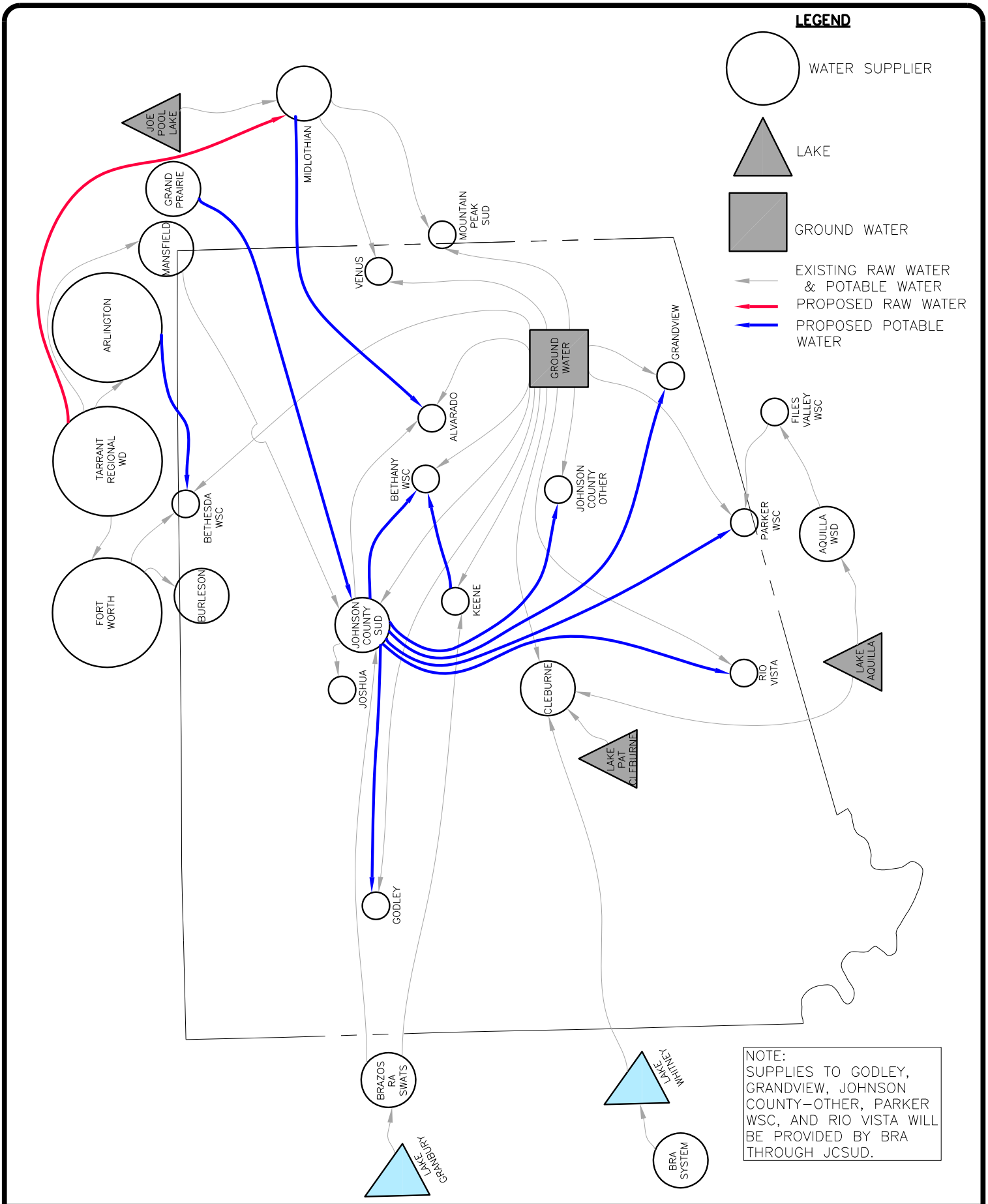
Table 5.10, Continued

Water User Group	Currently Contracted Supplies	Recommended Strategies
Mansfield (mostly in Tarrant County)	Tarrant Regional Water District	Treatment plant expansions
Mountain Peak SUD	Trinity aquifer, Midlothian	Additional Trinity aquifer (new wells), Woodbine aquifer (new wells)
Parker WSC	Trinity aquifer, Files Valley WSC (Aquilla WSD)	BRA SWATS (possibly through Johnson County SUD), supplemental wells in Trinity aquifer
Rio Vista	Trinity aquifer	Temporary overdraft of the Trinity aquifer in 2010, BRA SWATS (possibly through Johnson County SUD)
Venus	Midlothian (TRWD), Woodbine aquifer, Trinity aquifer	None
Johnson County-Other	Trinity aquifer, Woodbine aquifer	Brazos River Authority Main Stem Lake/Reservoir (possibly through JCSUD)
Johnson County Manufacturing	Cleburne, Trinity aquifer	Direct Reuse
Johnson County Steam Electric	Cleburne	Direct Reuse
Johnson County Mining	Local Supplies, Trinity aquifer, Cleburne	Brazos River Authority Main Stem Lake/Reservoir, Mansfield
Johnson County Irrigation	Local Supplies, Trinity aquifer	None
Johnson County Livestock	Local Supplies, Trinity aquifer	None

Notes: a. All municipal water user groups have conservation as a strategy.
b. Additional supplies from a source already providing water are not listed as a recommended strategy unless a water management strategy (larger contract, facility construction) is needed.

Wholesale Water Providers

The Brazos River Authority is the major wholesale water provider in Johnson County. Cleburne does not wholesale water to other municipal suppliers, but it provides significant manufacturing, industrial, steam electric and mining supplies for Johnson County. Table 5.11 summarizes the projected demands and contractual supplies for Cleburne. These contractual supplies will become available upon completion of necessary transmission and treatment facilities. Cleburne plans to develop additional reuse and a desalination treatment plant and transmission system to treat and deliver Lake Whitney and BRA system water. Table 5.12 summarizes Cleburne's planned water management strategies.



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NORTH

SCHEMATIC DIAGRAM OF EXISTING & PROPOSED MUNICIPAL WATER SUPPLIES FOR JOHNSON COUNTY

FIGURE 5.2

Table 5.11
Projected Demand and Contractual Supply for Cleburne

	2010	2020	2030
Existing Customer Demand (Acre-Feet)			
In-City Municipal Demand	6,244	7,802	9,753
Johnson County Industrial	2,758	4,883	6,148
Johnson County Steam Electric	2,959	2,959	2,959
Johnson County Mining	1,009	673	673
TOTAL DEMAND	**12,970**	**16,317**	**19,533**
Currently Contracted Supplies (Acre-Feet)			
Lake Pat Cleburne	5,183	5,104	5,025
BRA Lake Aquilla	4,790	4,280	3,770
BRA Lake Whitney	9,700	9,700	9,700
Reuse for Steam Electric	1,344	1,344	1,344
Trinity Aquifer	1,120	1,120	1,120
Conservation (recommended in 2006 Plan)	229	515	454
TOTAL CURRENT SUPPLIES	**22,366**	**22,063**	**21,413**
SURPLUS OR SHORTAGE (-)	**9,396**	**5,746**	**1,880**
Recommended Supply Strategies (Ac-Ft)			
Reuse	2,375	3,058	4,682
BRA System	0	1,020	1,530
TOTAL RECOMMENDED SUPPLY STRATEGIES	**2,375**	**4,078**	**6,212**
TOTAL SUPPLY	**24,741**	**26,141**	**27,625**
SURPLUS WITH RECOMMENDED STRATEGIES	**11,771**	**9,824**	**8,092**

Notes:
a. Cleburne is going to build a desalination plant and delivery system to use water from Lake Whitney and the BRA system. The supply available from Lake Whitney will increase over time as the treatment plant is expanded to meet the City's needs. The treated water supply from the desalination plant will be less than the raw water supply. It is estimated that approximately 30% of the raw water supply will be discharged as reject water.
b. The projected industrial, steam electric, and mining demands shown are all higher than assumed in the *2006 Brazos G Regional Water Plan*. We recommend that the Johnson County Industrial, Steam Electric, and Mining demands be increased.
c. The supply from the Trinity aquifer is for Johnson County Manufacturing. This supply was not included in the 2006 Brazos G Plan because the supplies in the plan were allocated according to use and aquifer availability. The supply indicated in the above table may result in short-term overdrafting of the Trinity aquifer in excess of the aquifer's availability depending on local pumping conditions. The available Trinity aquifer supply to Cleburne may be different in the 2011 Plan.

Table 5.12
Water Management Strategies for Cleburne

Water Management Strategy	Assumed Date	Capital Cost	Average Day Supply Made Available (Acre-Feet per Year)
West Loop Reuse Pipeline	2010	$8,589,000	3,027
5 MGD Treatment Plant Expansion	2013	$12,025,000	0
1.9 MGD Lake Whitney Desalination Plant	2015	$36,910,000	2,129
1.9 MGD Lake Whitney Desalination Plant Expansion (3.8 MGD total)and Pipeline to Cleburne	2020	$23,618,000	2,129

Table 5.13 summarizes the demands and supplies for the Johnson County SUD. Since the completion of the *2006 Brazos G Regional Water Plan* [(3)], Johnson County SUD has taken over retail service to Joshua, replacing the Johnson County Freshwater Supply District. Potential new Johnson County SUD customers may include Bethany WSC and Grand Prairie (Year 2010). Johnson County SUD currently gets its water from the BRA SWATS plant, Mansfield, and local groundwater supplies. The SUD plans to purchase additional water from Mansfield (TRWD sources) and Grand Prairie (Mansfield from TRWD sources) to meet demands through 2030 and is currently negotiating contracts with those suppliers. The SUD plans to seek other supplies to meet demands beyond 2030. An alternative strategy for Johnson County SUD is to purchase water from Dallas. However, this strategy is not actively being pursued. At the present time, the SUD does not plan to develop a reuse project through Joe Pool Lake, which was the recommended strategy in the 2006 regional water plans. Table 5.14 summarizes the recommended water management strategies for Johnson County SUD from this study

Other Johnson County Water Management Strategies

Acton MUD, Burleson, Joshua, Keene, Mansfield, Venus, Johnson County Irrigation, and Johnson County Livestock are not projected to have any water shortages or require additional water management strategies based on the assumption that existing contracted supplies will be available for these entities when needed. Grand Prairie currently has extraterritorial jurisdiction (ETJ) in Johnson County. However, the current city limits are not in Johnson County. Grand

Table 5.13
Projected Demand and Supply for Johnson County SUD

	2010	2020	2030
Existing Customer Demand (Acre-Feet)			
Ellis County	27	52	82
Hill County	20	39	61
Johnson County	5,963	11,571	18,100
Tarrant County	263	511	800
Alvarado	11	11	11
Johnson County FWSD (Joshua)	804	1,114	1,566
Johnson County Mining	561	561	561
TOTAL EXISTING CUSTOMERS	**7,649**	**13,859**	**21,181**
Potential Customer Demand (Acre-Feet)			
Additional Alvarado	458	1,019	1,019
Bethany WSC	112	224	336
Grand Prairie	3,363	0	0
Potential Loss of Ellis County Connections	-27	-52	-82
Potential Loss of Connections to Fort Worth	0	-100	-102
Potential Loss of Connections to Burleson	0	-100	-102
TOTAL DEMAND	**11,555**	**14,850**	**22,250**
Currently Contracted Supplies (Acre-Feet)			
BRA SWATS (Region C)	231	231	231
BRA SWATS (Region G)	6,381	9,555	9,555
Trinity Aquifer (Region C)	1	0	0
Trinity Aquifer (Region G)	428	427	427
Water Conservation (Region C)	5	20	27
Water Conservation (Region G)	423	1,307	1,883
Mansfield (TRWD)	307	0	0
TOTAL CURRENT SUPPLIES	**7,776**	**11,540**	**12,123**
SURPLUS OR SHORTAGE (-)	**-3,779**	**-3,299**	**-10,116**
Recommended Supply Strategies (Ac-Ft)			
Temporary overdraft of Trinity aquifer	723	0	0
Mansfield (TRWD)	3,056	2,802	6,165
Potential Supply for Alvarado from Mansfield (TRWD)	0	561	561
Grand Prairie (Mansfield, TRWD)	0	6,726	6,726
TOTAL RECOMMENDED SUPPLY STRATEGIES	**3,779**	**10,089**	**13,452**

Table 5.13, Continued

	2010	2020	2030
TOTAL SUPPLY	**11,555**	**21,629**	**25,575**
SURPLUS WITH RECOMMENDED STRATEGIES	**0**	**6,779**	**3,325**

Notes: Johnson County SUD is currently negotiating contracts for water with Mansfield and Grand Prairie. Parker WSC, Godley, Grandview, and Rio Vista may purchase water directly from BRA SWATS in the future. Johnson County SUD may provide water treatment for these entities. Based on recent discussions among Alvarado, Mansfield, and Johnson County SUD, the potential contract amount of 6 MGD from Mansfield to Johnson County SUD might include an additional 1 MGD for Alvarado.

Table 5.14
Water Management Strategies for Johnson County SUD

Management Strategy	Date Assumed in Place	Cost	Supply Made Available
Connection to Mansfield (6 MGD)[a]	2010	$24,999,000	6,726
Connection to Grand Prairie [b]	2020	$32,716,000	3,363
Conservation	on going	-	1,910

Notes: a. The connection from Mansfield to Johnson County SUD is a 24-inch pipeline. It may need to be upsized to accommodate additional water for Alvarado, depending on the final contract agreement.
b. Grand Prairie and Johnson County SUD will share the cost of developing this connection. The total cost is shown here.

Prairie's city limits could extend into Johnson County after 2030, which is the end of the time frame considered in this study. A portion of Mansfield's southern ETJ boundary extends into Johnson County southwest of the City limits with a portion overlapping JCSUD service area. According to Mansfield, the TWDB population and water demand projections used in the 2006 Plans are underestimating Mansfield's current and future growth anticipated in Johnson County. In the 2011 Region C and Brazos G Plans, the projected population and water demand for Grand Prairie and Mansfield should reflect the likely movement and growth in the Johnson County portion of the city after 2030.

As mentioned in Section 2, the Brazos River Authority supplies much of the surface water to Johnson County entities through the BRA SWATS (Surface Water and Treatment System). The BRA SWATS project includes a 15.54 (design capacity) MGD water treatment plant that desalinates raw water from Lake Granbury, of which 10.5 MGD is currently operational. Proposed new participants in the BRA SWATS include Bethany WSC (through

Keene or JCSUD), and Godley, Grandview, Parker WSC, and Rio Vista (with contracts assumed to be directly with BRA and supplies provided through Johnson County SUD). Table 5.15 summarizes the current contracts and projected demands in the study are that are attributed to BRA. BRA raw water supplies are recommended for Cleburne, Johnson County-Other, and Johnson County Mining.

Table 5.15
Summary of Current Contracts and Projected Demands
Attributed to BRA in Johnson County

Brazos River Authority	2010	2020	2030
Demands (Based on meeting needs when they occur)			
Existing Customer Demand (Acre-Feet)			
Acton MUD	1,126	1,618	2,073
Aquilla WSD & Customers			
Brandon-Irene WSC	188	191	195
Files Valley WSC and Customers	609	618	639
Cleburne	14,490	13,980	13,470
Johnson County SUD	6,612	3,007	6,461
Keene	524	609	702
TOTAL EXISTING CUSTOMERS	**23,549**	**20,023**	**23,540**
Potential Customer Demand (Acre-Feet)			
Bethany WSC (through Keene)	271	169	77
Parker WSC*	0	0	0
Godley	141	180	224
Grandview	100	151	212
Rio Vista	54	61	69
Johnson County-Other	2,236	2,210	2,326
TOTAL POTENTIAL CUSTOMERS	**2,802**	**2,771**	**2,908**
TOTAL NON-SWATS DEMAND	**15,287**	**14,789**	**14,304**
SWATS Demands (for Existing Customers)	***8,262***	***5,234***	***9,236***
SWATS Demands (for Existing and Proposed Customers)	***11,064***	***8,005***	***12,144***
TOTAL DEMAND	**26,351**	**22,794**	**26,448**
Demands (Generally based on maximum need from 2010-2030 for potential customers and contracts for existing customers)	**2010**	**2020**	**2030**
Existing Customer Demand (Acre-Feet)			
Acton MUD	3,098	4,585	4,585
Aquilla WSD & Customers			
Brandon-Irene WSC	293	270	248
Files Valley WSC and Customers	1,063	985	907

Table 5.15, Continued

Brazos River Authority	**2010**	**2020**	**2030**
Cleburne	19,673	19,084	18,495
Johnson County SUD	6,612	9,786	9,786
Keene	757	1,121	1,121
TOTAL EXISTING CUSTOMERS DEMAND	**31,496**	**35,831**	**35,142**
Potential Customer Demand (Acre-Feet)			
Bethany WSC (through Keene)	271	271	271
Parker WSC*	181	181	181
Godley	224	224	224
Grandview	212	212	212
Rio Vista	69	69	69
Johnson County-Other	2,326	2,326	2,326
TOTAL POTENTIAL CUSTOMER DEMAND	**3,283**	**3,283**	**3,283**
TOTAL NON-SWATS DEMAND	**21,029**	**20,339**	**19,650**
SWATS Demands (for Existing Customers)	***10,467***	***15,492***	***15,492***
SWATS Demands (for Existing and Proposed Customers)	***13,750***	***18,775***	***18,775***
TOTAL DEMAND	**34,779**	**39,114**	**38,425**
Currently Contracted Raw Water Supplies (Acre-Feet)	**2010**	**2020**	**2030**
Lake Aquilla (Cleburne)	5,300	5,300	5,300
Lake Aquilla (Aquilla WSD)	5,953	5,953	5,953
Lake Whitney (Cleburne)	9,700	9,700	9,700
Lake Granbury (Johnson County SUD)	13,210	13,210	13,210
Lake Granbury (Acton MUD)	7,000	7,000	7,000
Lake Granbury (Keene)	2,040	2,040	2,040
TOTAL NON-SWATS SUPPLIES	**20,953**	**20,953**	**20,953**
TOTAL SWATS SUPPLIES	***22,250***	***22,250***	***22,250***
TOTAL SUPPLIES	**43,203**	**43,203**	**43,203**
BRA SWATS Treated Water Contracts (Johnson County only)	**Current Production (Acre-Feet per Year)**		**Design Capacity**
	Average	**Maximum**	
Acton MUD	3,098	3,835	4,585
JCSUD	6,612	8,187	9,786
Keene	757	938	1,121
Total	**10,467**	**12,960**	**15,492**

Table 5.15, Continued

Surplus or Shortage (Based on meeting needs when they occur)	**2010**	**2020**	**2030**
BRA Non-SWATS Customers	5,666	6,164	6,649
BRA SWATS Current and Potential Customers			
With Average Current Production	-597	2,462	-1,677
With Maximum Current Production	1,896	4,955	816
With Design Capacity Production	4,428	7,487	3,348
Surplus or Shortage (Based on maximum needs from 2010 to 2030 and Contracts)	**2010**	**2020**	**2030**
BRA Non-SWATS Customers	-76	614	1,303
BRA SWATS Current and Potential Customers			
With Average Current Production	-3,283	-8,308	-8,308
With Maximum Current Production	-790	-5,815	-5,815
With Design Capacity Production	1,742	-3,283	-3,283

* Parker WSC has sufficient supplies from other sources to meet demands.

Alvarado is planning to purchase water from Tarrant Regional Water District through Johnson County SUD (Mansfield) and/or Midlothian. Bethesda WSC is planning to purchase additional water from Fort Worth and new supplies from Arlington. Mansfield, Midlothian, and Arlington will get raw water for these strategies from TRWD. Mansfield will sell treated water to Johnson County SUD, which would then be sold to Alvarado. Midlothian has indicated that they want Alvarado to purchase raw water from TRWD, so Midlothian does not have to commit its limited raw water resources to supply Alvarado. (Since Arlington is one of the TRWD's four primary customers, it has an "all needs met" contract with TRWD, which includes water for its wholesale customers. As a result, Bethesda WSC will probably purchase water directly from Arlington without a raw water contract with TRWD.) Grandview might consider purchasing water from TRWD sources in the future, as it is located in the Trinity Basin portion of Johnson County. The Trinity River Authority (TRA) acts as the contracting agent for TRWD water supplies in Ellis County, and TRWD supports TRA acting in the same capacity for wholesale contracts with Johnson County entities. TRA is agreeable to this arrangement.

Table 5.16 summarizes the cost and supplies for recommended water management strategies for Johnson County. The total cost of the strategies is approximately $253 million, and they make almost 49,000 acre-feet per year of supply available for Johnson County.

Table 5.16
Cost and Supply for Recommended Water Management Strategies for Johnson County

Water Supplier	Water Management Strategy	Date Assumed	Cost	Supply
Alvarado	Temporary overdraft of Trinity aquifer (new wells)	2010	$1,890,000	444
	Connection to Midlothian	2020	$7,794,000	561
	Connection to JCSUD (Mansfield, TRWD)	2020	$525,000	561
Bethany WSC	Connection to Keene	2010	$3,952,000	275
	Connection to Johnson County SUD	2010	$4,360,000	336
Bethesda WSC	See Dallas and Tarrant County – Table 5.20			
Burleson	Additional Connection to Ft Worth	Before 2020	$24,530,000	-
Cleburne	All Strategies (Table 5.12)	Various	$81,142,000	7,285
Godley	Connection to SWATS (through JCSUD)	2010	$3,638,000	224
Grandview	Connection to SWATS (through JCSUD)	2010	$3,600,000	212
Johnson County SUD	All strategies (Table 5.14)	Various	$57,715,000	11,999
Mountain Peak SUD	See Johnson County - Table 5.9			
Parker WSC	Connection to SWATS (through JCSUD)	2010	$3,467,000	181
Rio Vista	Connection to Johnson County SUD	2010	$3,087,000	69
	Temporary overdraft of Trinity aquifer (new well)	2010	$905,000	54
Johnson County-Other	Connection to SWATS (through JCSUD)	2010	$13,827,000	2,326

5.3 Portions of Southern Dallas and Southern Tarrant Counties in Study Area

The portions of Dallas and Tarrant Counties within the study area are primarily served by the City of Dallas and the Tarrant Regional Water District. Dallas plans to continue providing service to its current customers, and to extend service to Wilmer. Duncanville will need to increase its contracted amount of supply purchased from Dallas. Table 5.17 summarizes the projected demands and contractual supplies for Grand Prairie. Grand Prairie has a number of water management strategies to meet its future water needs, as shown in Table 5.18.

Table 5.17
Projected Demand and Supply for Grand Prairie

	2010	2020	2030
Existing Customer Demand (Acre-Feet)			
In City, Ellis County Portion	88	410	1,008
In City, Dallas County Portion	27,070	32,281	37,209
In City, Tarrant County Portion	7,144	8,789	9,685
Potential Customer Demand (Acre-Feet)			
Johnson County SUD (Mansfield, TRWD)	0	6,726	6,726
TOTAL DEMAND	**34,302**	**48,206**	**54,628**
Currently Contracted Supplies (Acre-Feet)			
Dallas Sources	25,772	31,119	36,522
Trinity Aquifer	1,637	1,637	1,637
Fort Worth	1,121	1,121	1,121
Joe Pool Lake (TRA)	1,794	1,794	1,794
Midlothian Sources	2,242	2,242	2,242
Supplemental wells in Trinity aquifer	0	0	0
Water Conservation - Basic Package	899	1,994	2,661
Water Conservation - Expanded Package	21	207	434
TOTAL CURRENT SUPPLIES	**33,486**	**40,114**	**46,411**
SURPLUS OR SHORTAGE (-)	**-816**	**-8,092**	**-8,217**
Recommended Supply Strategies (Ac-Ft)			
Additional Midlothian	2,522	5,045	5,045
Johnson County SUD Supplies	3,363	0	0
Mansfield (TRWD Sources)	0	6,726	6,726
Arlington (TRWD Sources)	2,242	2,242	2,242
Cedar Hill (Dallas Sources)	3,363	3,363	3,363
TOTAL RECOMMENDED SUPPLY STRATEGIES	**11,490**	**17,376**	**17,376**
TOTAL SUPPLY	**44,976**	**57,490**	**63,787**
SURPLUS WITH RECOMMENDED STRATEGIES	**10,674**	**9,284**	**9,159**

Table 5.18
Water Management Strategies for Grand Prairie

Management Strategy	Date Assumed in Place	Cost	Supply Made Available
Additional Midlothian	2010	$7,296,000	5,044
Johnson County SUD Supplies*	2010	See Table 5.14	
Mansfield (TRWD Sources)	2010	$18,029,000	6,726
Additional Mansfield (TRWD Sources)	2030	$8,014,000	3,363
Arlington (TRWD Sources)	2010	$2,673,000	2,242
Cedar Hill (Dallas Sources)	2010	$4,285,000	3,363

Note: The cost for the connection between Grand Prairie and Johnson County SUD will be shared. The total cost is included in Table 5.14.

Tarrant Regional Water District will continue providing water to its current customers in the Tarrant County area. Bethesda WSC currently purchases water from Fort Worth (TRWD). A new strategy for Bethesda WSC is to purchase water from Arlington (also originating from TRWD) to supplement the supply to the east side of their service area.

The small portions of Sardis-Lone Elm WSC and Rockett SUD that extend into Dallas County will obtain water from projects in Ellis County, as described in detail in Section 6.1 of this report. Table 5.19 summarizes the recommended strategies for the water user groups in the southern portion of Dallas and Tarrant Counties that are included in this study. Table 5.20 summarizes the costs associated with the recommended strategies in Dallas and Tarrant Counties.

Table 5.19
Recommended Water Management Strategies in Southern Dallas and Southern Tarrant Counties

Water User Group	Currently Contracted Supplies	Recommended Strategies
Bethesda WSC	Fort Worth (TRWD), Trinity aquifer	Arlington (TRWD), additional Fort Worth (TRWD)
Burleson	Fort Worth (TRWD)	None
Cedar Hill	Dallas, Trinity aquifer, TRA Joe Pool Lake (not in use)	Additional Dallas water
Duncanville	Dallas TRA Joe Pool Lake (not in use)	Additional Dallas water
Glenn Heights	Trinity aquifer, Dallas	None

Table 5.19, Continued

Water User Group	Currently Contracted Supplies	Recommended Strategies
Grand Prairie (mostly in Dallas and Tarrant Counties)	Trinity aquifer, Dallas, Fort Worth (TRWD), TRA Joe Pool Lake, Midlothian	Johnson Co SUD (2010 only), Mansfield (TRWD), Arlington (TRWD), additional Dallas water passed thru Cedar Hill, additional Midlothian
Kennedale	Trinity aquifer, Fort Worth (TRWD)	None
Mansfield	TRWD	None
Ovilla	Woodbine aquifer, Dallas, Sardis-Lone Elms WSC (retail customers)	Additional Dallas water
Rockett SUD (mostly in Ellis County)	Midlothian, TRWD water through TRA, Dallas (not in use)	Additional TRWD water through TRA, treatment plant expansions
Sardis-Lone Elm WSC (mostly in Ellis County)	Trinity aquifer, Woodbine aquifer	Temporary overdraft of Trinity aquifer (new wells), Rockett SUD (TRWD water through TRA)
Wilmer	Trinity aquifer	Purchase water from Dallas, temporary overdraft of the Trinity aquifer in 2010

Notes:
a. All municipal water user groups have conservation as a strategy.
b. All water user groups with groundwater supplies have supplemental wells as a strategy.
c. Additional supplies from a source already providing water are not listed as a recommended strategy unless a water management strategy (larger contract, facility construction) is needed.

Table 5.20
Cost and Supply for Recommended Water Management Strategies for Southern Dallas and Southern Tarrant counties

Water Supplier	Water Management Strategy	Date Assumed	Cost	Supply
All Groundwater Users	Supplemental Wells	Varies	$23,405,000	0
Bethesda WSC	Connection to Arlington	2010	$15,494,000	2,803
Grand Prairie	All Strategies Table 5.18	Varies	$40,297,000	20,738
Mansfield	15 MGD WTP Expansion	2010	$28,053,000	0
Rockett SUD	See Ellis County Table 5.9			
Sardis Lone Elm WSC	See Ellis County Table 5.9			

Table 5.20, Continued

Water Supplier	Water Management Strategy	Date Assumed	Cost	Supply
Wilmer	Temporary Connection to Hutchins for Dallas water	2010	$2,492,000	1,095
	Connection to Dallas	2020	$3,478,000	0

Table 5.21 summarizes the recommended demand projections, the currently contracted water supplies, and the recommended water management strategies for the study area.

Table 5.21
Summary of Projected Demand, Currently Contracted Supplies, and Water Management Strategies within the Study Area

Description	2010	2020	2030
Recommended Demand	170,560	219,157	265,788
Current Supply Based on Existing Contracts	167,473	220,963	246,794
Surplus/Shortage	*-3,087*	*1,806*	*-18,994*
Water Management Strategies	36,632	39,890	45,884
Final Surplus/Shortage	**33,544**	**41,696**	**26,891**

6. Implementation Plan for Recommended Strategies

The implementation plan for the strategies recommended in this plan includes both surface water and groundwater sources. The implementation of surface water supplies includes the following components:

- Obtain water rights and/or develop new or expand existing water supply contracts
- Obtain required permits
- Design and construct required facilities

The implementation plan for groundwater strategies includes the following components:

- Obtain required permits
- Design and construct required facilities

Table 6.1 summarizes the recommended water management strategies and the approximate in-service date for each.

Table 6.1
Implementation Plan for Recommended Water Management Strategies

Owner	Project	Approximate In-service Year
Ellis County		
Bardwell	New Well in Woodbine Aquifer	2010
Bardwell	Purchase Water from Ennis (TRWD Sources)	2010
Buena Vista-Bethel SUD	TRA Ellis County Water Supply Project (TRWD Sources) Conveyance – Phase 1	2020
Buena Vista-Bethel SUD	TRA Ellis County Water Supply Project (TRWD Sources) Conveyance – Phase 2	2030
Ennis	Indirect Reuse through Lake Bardwell	2010
Ennis	Water Treatment Plant Expansion of 3 MGD	2020
Ennis	Water Treatment Plant Expansion of 3 MGD	2030
Files Valley WSC, Italy, Maypearl, Ellis County-Other	South Ellis County Water Supply Line – Phase 1 (TRWD Sources)	2020
Files Valley WSC, Italy, Maypearl, Ellis County-Other	South Ellis County Water Supply Line – Phase 2 (TRWD Sources)	2030
Italy	New Wells in Trinity Aquifer	2010
Maypearl	New Wells in Woodbine Aquifer	2010

Table 6.1, Continued

Owner	Project	Approximate In-service Year
Midlothian	Ellis County Water Supply Project – Phase 1 (TRWD Sources)	2020
Midlothian	Ellis County Water Supply Project – Phase 2 (TRWD Sources)	2030
Midlothian	Water Treatment Plant Expansion of 3 MGD	2020
Midlothian	Water Treatment Plant Expansion of 6 MGD	2030
Midlothian	Additional Joe Pool Lake	After 2030
Mountain Peak SUD	New Wells in Trinity Aquifer	2010
Mountain Peak SUD	New Wells in Woodbine Aquifer	2010
Ovilla	Additional Water from Dallas – 16" pipeline	2010
Rockett SUD and Waxahachie	Sokoll WTP of 20 MGD	2010
Rockett SUD and Waxahachie	Sokoll WTP Expansion of 20 MGD	2020
Rockett SUD and Waxahachie	Sokoll WTP Expansion of 20 MGD	2030
Sardis-Lone Elm WSC	Connection to Rockett SUD (TRWD Sources) – Phase 1	2010
Sardis-Lone Elm WSC	Connection to Rockett SUD (TRWD Sources) – Phase 2	2020
Sardis-Lone Elm WSC	Connection to Rockett SUD (TRWD Sources) – Phase 3	2030
Sardis-Lone Elm WSC	New Wells in Trinity Aquifer	2010
Waxahachie	Additional TRA/Waxahachie Indirect Reuse	2020
Waxahachie	Southern WTP Expansion of 3 MGD	2010
Waxahachie	Southern WTP Expansion of 6 MGD	2030
Ellis County-Other	New Wells in Trinity Aquifer	2010
Ellis County-Other	New Wells in Woodbine Aquifer	2010
Ellis County Irrigation	New Wells in Woodbine Aquifer	2010
Ellis County Irrigation	TRA Reuse for Dallas and Ellis County Irrigation from 10-Mile Creek Project	
Ellis County Manufacturing	New Wells in Woodbine Aquifer	2010
Ellis County Steam Electric Power	TRA Ellis County SEP Reuse	2010
Ellis County Steam Electric Power	Connection to Waxahachie	2010

Table 6.1, Continued

Owner	Project	Approximate In-service Year
Johnson County		
Alvarado	Connection to JCSUD (Mansfield, TRWD Sources)	2020
Alvarado	New Wells in Trinity Aquifer	2010
Alvarado	Connection to Midlothian (TRWD Sources)	2020
Bethany WSC	Connection to Keene (BRA SWATS)	2010
Bethany WSC	Connection to JCSUD	2010
Bethesda WSC	Connection to Arlington	2010
Cleburne	Water Treatment Plant Expansion of 5 MGD	2013
Cleburne	West Loop Reuse Pipeline	2010
Cleburne	WTP Expansion of 1.9 MGD and Pipeline	2020
Cleburne	Lake Whitney Diversion of 1.9 MGD	2015
Godley	Purchase WTP Capacity from JCSUD	2010
Grandview	Connection to BRA SWATS (Purchase BRA Supply through JCSUD)	2010
Grandview, Rio Vista and Parker WSC	Pipeline from BRA SWATS to Johnson County SUD for Grandview, Rio Vista and Parker WSC	2010
Johnson County SUD	Connection to Mansfield	2010
Johnson County SUD	Connection to Grand Prairie	2020
Parker WSC	Connection to BRA SWATS	2010
Rio Vista	Connection to BRA SWATS	2010
Johnson County-Other	Connection to BRA SWATS	2010
Johnson County-Other	BRA Mainstem	2010
BRA	SWATS Plant Expansion (Total Capacity of 15.5 MGD)	2010
BRA	SWATS Plant Expansion (Total Capacity of 20 MGD)	2020
Southern Dallas County		
Grand Prairie and Johnson County SUD	Connection to Send Water from JCSUD to Grand Prairie in 2010 and then from Grand Prairie to JCSUD after 2010	2010
Grand Prairie	Connection to Midlothian	2010
Grand Prairie	Connection to Mansfield (TRWD Sources)	2010
Grand Prairie	Additional Connection to Mansfield (TRWD Sources)	2030
Grand Prairie	Connection to Arlington (TRWD Sources)	2010
Grand Prairie	Connection to Cedar Hill (Dallas Sources)	2010

Table 6.1, Continued

Owner	Project	Approximate In-service Year
Wilmer	Connection to DWU	2020
Wilmer	Connection to DWU through Hutchins	2010
Dallas and Johnson County Steam Electric Power	TRA Reuse	2010
Southern Tarrant County		
Arlington	WTP Expansion of 32 MGD	2010
Burleson	Connection to Fort Worth	2010
Mansfield	WTP Expansion of 15 MGD	2010

7. Alternative Water Management Strategies

Most of the water user groups that participated in this study provided their preferred water management strategies for consideration and inclusion in this report. Four strategies that were included in the *2006 Region C Water Plan* have been added as alternative water management strategies in this report:

- Joint Project of Rockett SUD, Red Oak, and Waxahachie to Purchase Water from Dallas
- Johnson County SUD – Purchase Water from Dallas
- Mountain Peak SUD – Purchase Additional Water from Midlothian
- Mountain Peak SUD – Purchase Water from Rockett SUD

A cost estimate for each of these alternatives is included in Appendix H.

As discussed in Section 3.1, the joint venture by Rockett SUD, Red Oak, and Waxahachie to purchase water from Dallas is not longer being pursued. Red Oak has constructed its own pipeline to Dallas to purchase water. Rockett SUD and Waxahachie are jointly constructing the Sokoll Water Treatment Plant as discussed in Section 5.1. Rockett SUD and Waxahachie are planning to purchase raw water from Tarrant Regional Water District for treatment at the Sokoll plant. An alternative strategy for these entities would be to jointly develop a pipeline to purchase water from Dallas.

Johnson County SUD's preferred water management strategy is to purchase treated water from Tarrant Regional Water District customers. An alternative strategy for Johnson County SUD could be the purchase of treated water from Dallas. The pipeline from Dallas would be lengthy and maintaining water quality could be problematic considering the distance that the water would travel. Additional study of this strategy is suggested before pursuing this alternative strategy.

Mountain Peak SUD prefers to stay on groundwater. They currently obtain a small amount of treated water from Midlothian. Should Mountain Peak SUD decide to increase the surface water supply in their system, they could purchase additional treated surface water supplies from Midlothian or they could purchase treated water supplies from Rockett SUD.

8. Recommendations

The updated population and demand projections in the study area are greater than the projections in the *2006 Region C Water Plan* and the *2006 Brazos G Water Plan*. A number of entities within the study area that have traditionally relied on groundwater are seeking contracts with local wholesale water providers for surface water sources. In turn, some of these local wholesale water providers are seeking additional water supplies from the regional water providers, particularly the Brazos River Authority (BRA) and Tarrant Regional Water District (TRWD). Table 8.1 shows current and future sources of water supply for water user groups in the study area.

The Brazos River Authority is in the process of obtaining a Texas Commission on Environmental Quality permit for system operation, which will allow additional water to be contracted. Currently, the BRA SWATS project is fully contracted. As additional supplies become available, BRA will consider contracting these supplies.

The Tarrant Regional Water District has received a number of requests for additional water supply contracts. Because of contract restrictions, TRWD can not contract for projected water needs after 2030 at this time. Table 8.2 lists TRWD's current contractual commitments in the study area and recommendations for new and increased water supply contracts.

The recommended changes from the 2006 regional water plans [1, 2] include:

- Higher projections of supply and demand for water user groups in the study area
- Reclassification of the Rockett SUD-Waxahachie-Red Oak project that was slated to use treated Dallas water from a recommended strategy to an alternative strategy
- Inclusion of the Waxahachie-Rockett SUD water treatment plant to provide treated water supplies in Ellis County and potential customers to be supplied by the plant
- Red Oak connection to Dallas planned to be in service in 2008
- Kennedale connection to Fort Worth completed
- New water management strategies for Alvarado, Bethany WSC, Grand Prairie, Grandview, and Johnson County SUD
- Arlington considers becoming a wholesale water provider
- Updated cost estimates for all water management strategies in the study area.

Table 8.1
Current and Future Supplies for Study Area Water User Groups

Water User Group	Primary County	Other Counties	New Sources for Future?	Water Supply Sources													Comments
				Ground-water	Own Surface Water	TRA Reser-voirs	TRWD		Dallas		BRA SWATS		Other BRA		Reuse	Surface from Other Suppliers	Local Supplies	
							Direct	Through Others	Direct	Through Others	Direct	Through Others	Direct	Through Others				
Cedar Hill	Dallas	Ellis		▲		▲			▲									Does not have plans to use TRA contract for Joe Pool Lake in near future.
Duncanville	Dallas					▲			▲									Does not have plans to use TRA contract for Joe Pool Lake in near future.
Grand Prairie	Dallas	Tarrant, Ellis	■	▲		▲		▲	▲	▼								May get water from Dallas through Cedar Hill and TRWD through Arlington, Mansfield, and Midlothian.
Wilmer	Dallas		■	▲						▼								May get Dallas water through Hutchins or Lancaster.
Bardwell	Ellis		■	▲				▼										Will get TRWD water through Waxahachie.
Buena Vista-Bethel SUD	Ellis		■	▲				▼										Will get TRWD water through Waxahachie.
Community Water Company	Ellis							▲								▲		Supplies are from Ennis.
Ennis	Ellis					▲	▲								▲			
Ferris	Ellis		■	▲				▼								▲		Will get TRWD water through Rockett SUD.
Glenn Heights	Ellis	Dallas		▲					▲									
Italy	Ellis		■	▲				▼										Will get TRWD water through Waxahachie.
Maypearl	Ellis		■	▲				▼										Will get TRWD water through Waxahachie.
Midlothian	Ellis		■			▲	▼											Will build plant to treat TRWD water.
Milford	Ellis			▲										▲				
Mountain Peak SUD	Ellis	Johnson	■	▲												▲	▼	Plans to drill Woodbine wells.
Oak Leaf	Ellis		■					▼		▲						▲		May get TRWD water through Rockett SUD.
Ovilla	Ellis	Dallas		▲					▲									
Palmer	Ellis		■	▲				▼								▲		Will get TRWD water through Rockett SUD.
Pecan Hill	Ellis		■					▲								▲		Rockett SUD currently provides all water supply to Pecan Hill.
Red Oak	Ellis		■	▲				▼	▲							▲		Will get TRWD water through Rockett SUD for portion of city located in Rockett SUD's CCN. Red Oak is purchasing wholesale treated water from Dallas.
Rockett SUD	Ellis	Dallas	■	▲			▼									▲		Will connect to TRWD with Sokoll plant.
Sardis-Lone Elm WSC	Ellis	Dallas	■	▲				▼										May get TRWD water through Rockett SUD.
Waxahachie	Ellis		■		▲	▲	▼								▲			Will connect to TRWD with Sokoll plant.
Ellis County-Other	Ellis		■	▲			▼											May get TRWD water through Rockett SUD and Wax.
Ellis County Irrigation	Ellis		■	▲											▼		▲	
Ellis County Livestock	Ellis																▲	
Ellis County Manufacturing	Ellis			▲		▲		▲								▲		Ennis, Midlothian, Waxahachie
Ellis County Mining	Ellis			▲													▲	
Ellis County Steam Electric Power	Ellis					▲									▲	▲		Ennis and Midlothian now. Waxahachie and TRA reuse future.
Brandon-Irene WSC	Hill	Ellis												▲				BRA Lake Aquilla from Aquilla WSC.
Files Valley WSC	Hill	Ellis												▲				Lake Aquilla water through Aquilla WSC.
Acton MUD	Hood	Johnson		▲						▲								
Alvarado	Johnson		■	▲				▼										May get TRWD water through Midlothian
Bethany WSC	Johnson		■	▲				▼										May get BRA SWATS water through Keene or JCSUD.
Bethesda WSC	Johnson	Tarrant	■	▲				▲										Has TRWD water through Fort Worth, will get from Arlington.
Burleson	Johnson	Tarrant						▲										TRWD water through Fort Worth.
Cleburne	Johnson		■	▲	▲								▲		▲			Will develop desalination to use BRA water from Whitney.
Godley	Johnson		■	▲								▼						May get BRA SWATS water through JCSUD.
Grandview	Johnson		■	▲								▼						May get BRA SWATS water through JCSUD.
Johnson County SUD	Johnson	Tarrant, Ellis	■	▲				▲			▲							Additional TRWD water via Mansfield. Will get Grand Prairie water.
Joshua	Johnson		■	▲				▲				▲						Supplied by Johnson County SUD.
Keene	Johnson			▲							▲							
Parker WSC	Johnson	Hill	■	▲								▼		▲				Will get BRA SWATS water through JCSUD.
Rio Vista	Johnson		■	▲								▼						May get BRA SWATS water through JCSUD.
Venus	Johnson			▲				▼								▲		TRWD water from Midlothian.
Johnson County-Other	Johnson		■	▲								▼		▼				Will get BRA SWATS water through JCSUD.
Johnson County Irrigation	Johnson			▲													▲	
Johnson County Livestock	Johnson			▲													▲	
Johnson County Manufacturing	Johnson		■	▲										▲	▼	▲		Cleburne reuse.
Johnson County Mining	Johnson		■	▲									▼				▲	Cleburne reuse.
Johnson County Steam Electric	Johnson			▲										▲	▲	▲		
Rice WSC	Navarro	Ellis						▲								▲		
Kennedale	Tarrant		■	▲				▼										TRWD water through Fort Worth.
Mansfield	Tarrant	Johnson, Ellis					▲											

Current sources shown with Blue Triangle = ▲
Future sources shown with Red Triangle = ▼

Table 8.2
Recommended New and Additional TRWD Contracts in the Study Area

Entity	Current Average Day Contract Amount (MGD)	Recommended Increase (MGD)	Recommended Contract Amount (MGD)
Alvarado (through Midlothian)	0.000	0.500	0.500
Avalon WSC (Ellis Co. Other)	0.600	0.000	0.600
Buena Vista-Bethel SUD	0.850	0.700	1.550
Ennis	3.560	0.000	3.560
Ferris	0.720	0.000	0.720
Grand Prairie (through Midlothian)	2.000	4.500	6.500
Italy	0.500	0.000	0.500
Maypearl	0.370	0.000	0.370
Midlothian	6.330	3.500	9.830
Nash-Forreston WSC	0.250	0.000	0.250
Palmer	0.271	0.000	0.271
Red Oak	1.800	0.000	1.800
Rockett SUD	6.050	0.200	6.250
Sardis-Lone Elm WSC	0.000	5.800	5.800
Venus (through Midlothian)	1.000	0.000	1.000
Waxahachie	4.650	4.000	8.650
Total	**28.951**	**19.200**	**48.151**

Notes: a. Grand Prairie will also have contracts for TRWD water from Arlington, Fort Worth, and Mansfield. Johnson County SUD is also seeking an additional contract, which may partially supply Alvarado, for TRWD water from Mansfield. Arlington, Fort Worth, and Mansfield have "all needs met" contracts with TRWD. Any entity seeking supplies directly from one of these contracting parties is not expected to contract for raw water from TRWD.

b. Additional amounts for Alvarado and Grand Prairie will be supplied through Midlothian.

c. Additional amount for Buena Vista-Bethel SUD will be supplied through Waxahachie.

d. Additional amount for Sardis-Lone Elm WSC will be supplied through Rockett SUD.

APPENDIX A

REFERENCES

Appendix A
References

(1) 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.

(2) HDR Engineering, Inc., Freese and Nichols, Inc., R.W. Harden and Associates, Inc., Hicks and Company, Inc., and Fletcher Communications: *Brazos G Regional Water Plan*, prepared for the Brazos G Regional Water Planning Group, January 2006.

(3) Texas Water Development Board: *Water for Texas 2007,* Austin, December 2006.

(4) North Central Texas Council of Governments: 2007 Population Estimates by City and County, [Online], Available URL: http://www.nctcog.org/ris/demographics/population.asp, September 2007.

(5) Espey, Huston & Associates, Inc., Alan Plummer & Associates, Inc., and Rone Engineers: Regional Water Study for Ellis County and Southern Dallas County, prepared for the Trinity River Authority of Texas and the Texas Water Development Board, September 1989.

(6) 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.

(7) United States Census Bureau: Census Data for the State of Texas: Population by County, Population by Place, [Online], Available URL: http://www.census.gov/census2000/states/tx.html, September 2007.

(8) Texas State Data Center and Office of the State Demographer: 2007 Population Estimates for Texas Places, [Online], Available URL: http://txsdc.utsa.edu/tpepp/2006_txpopest_place.php, September 2007.

(9) Freese and Nichols, Inc., *Regional Water Supply and Wastewater Services Study for Johnson and Parker Counties, Phase I*, prepared for the Brazos River Authority and Tarrant Regional Water District, April 2004.

(10) Freese and Nichols, Inc., *Long Range Water Supply and Water and Wastewater Master Plan*, prepared for the City of Midlothian, October 2006.

(11) HDR, Inc., *Evaluation of Additional Water Supplies from the Trinity and Brazos River Basins*, prepared for the Johnson County Special Utility District, November 2006.

(12) Childress Engineers, *System Hydraulics*, prepared for Sardis-Lone Elm Water Supply Corporation, March 2004.

(13) R.W. Harden & Associates, Inc., Freese and Nichols, Inc., and Bureau of Economic Geology: *Northern Trinity/Woodbine Aquifer Groundwater Availability Model Assessment of Groundwater Use in the Northern Trinity Aquifer Due To Urban Growth and Barnett Shale Development*, prepared for the Texas Water Development Board, January 2007.

APPENDIX B

SAMPLE SURVEY

REGION C WATER PLANNING GROUP

Senate Bill One Third Round of Regional Water Planning - Texas Water Development Board

October 17, 2007

Mr. Wade Rhodes
Water & Sewer Director
City of Bardwell
P. O. Box 271
Bardwell, TX 76101

Subject: Regional Water Planning – Regional System Implementation Plans

Dear Mr. Rhodes:

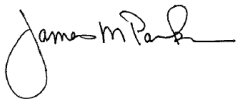
The Region C Water Planning Group has begun the third round of regional water planning, as required by Senate Bill One, passed by the Legislature in June 1997. A few weeks ago you, or one of your coworkers, received a survey regarding conservation and water reuse strategies. This first survey was sent to water providers in the sixteen counties that comprise Region C.

This second survey, attached herein, is more focused on water supplies in your area. More specifically, the Texas Water Development Board is funding a study that will evaluate the regional water supply delivery in Ellis County and portions of Southwest Dallas County, Southeast Tarrant County, and Johnson County. This survey is being sent to only a select group of water providers; thus your input is critical to the identification and evaluation of regional water supply delivery concepts. Please complete the attached survey and return it by November 9, 2007 to:

Rick Shaffer
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200, Dallas, TX 75235
FAX: (214) 638-3723

If you have any questions or want additional information as you review these data and fill out the questionnaire, please call Rick Shaffer at (214) 638-0500. We greatly appreciate your attention and cooperation in this matter, which will help shape long-range water supply planning in Region C.

Sincerely,



James (Jim) M. Parks
Chair, Region C Water Planning Group

Cc: Dr. Scott Mack, Chair Brazos G Planning Group

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

Region C Water Planning Group
Regional System Implementation Plan Survey
Please Return by November 9, 2007

Name of Supplier: City of Bardwell
Contact Person: _____

Telephone Number: _____ FAX: _____

Email Address: _____

Mailing Address: _____

1. The tables below present the population and water use projections adopted for each decade through 2060 by the Texas Water Development Board (in 2003) and used in the 2006 regional water plans. Are these projections reasonable? If not, please provide updated projections that should be used for planning.

Year	TWDB Population Projections	Your Updates to Population Projections
2000 (Census)	583	
2005	Not Projected	
2010	838	
2015	Not Projected	
2020	1,075	
2025	Not Projected	
2030	1,308	
2035	Not Projected	
2040	1,546	
2050	1,813	
2060	2,107	

Year	TWDB Water Use Projections (acre-ft)	Your Water Use Projections	
		Projections	Units
2010	103		
2015	Not Projected		
2020	130		
2025	Not Projected		
2030	155		
2035	Not Projected		
2040	182		
2050	213		
2060	248		

2. If you provided alternative population and water use projections above, please explain your methodology (so that we can discuss updates with the TWDB). Please feel free to attach a separate page.

_____

_____

_____

3. The following table summarizes the current water supply sources (as of Spring 2005) for your utility in the 2006 regional water plans. Are the sources of water supply and amounts listed on the table representative of your current supply? If not, please update as appropriate and note specific amounts of water that may be associated with each supply (contract amount or groundwater well capacity).

	Supplies shown in the 2006 Regional Water Plans (acre-ft/yr)			**Updates for your utility's supplies (acre-ft/yr)**				
Current Supplies	**2010**	**2020**	**2030**	**2010**	**2015**	**2020**	**2025**	**2030**
Woodbine Aquifer	78	78	78					
Add unlisted currently connected supplies here:								
Total Current Supply	**78**	**78**	**78**					

4. Upon what information are the supplies in #3 based? (well capacity, contract, treatment plant limitations, etc.)

_____

_____

_____

5. Describe any special conditions of your utility's current water supply system

- ☐ Difficulty meeting peak day demands ☐ Water quality issues
- ☐ Cost of existing supplies are increasing and becoming too high
- ☐ Other (please specify): _____
- ☐ No special conditions. We expect good water quality and sufficient quantity through at least Year _____ (insert future year)

6. Select the growth pattern than describes your utility best (please check all that apply).

- ☐ Uniform growth over service area
- ☐ Rapid growth in localized areas
- ☐ Planned *expansion* of service areas
- ☐ Planned *reduction* of service areas
- ☐ No noticeable growth patterns
- ☐ Other (please specify): _____

7. The 2006 regional water plans recommend the following water supply strategies to meet your future water demands. Do these strategies represent your current plans?

☐ Yes ☐ No

Water Supply Strategies	**Amount of Supply from the 2006 Plans (acre-ft/yr)**		
	2010	**2020**	**2030**
Water Conservation - Basic Package	2	7	9
Additional Woodbine Aquifer (New Wells)	34	58	84
Supplemental Wells in Woodbine Aquifer	0	0	0
Total Supply Strategies	**36**	**65**	**93**

Note: "Supplemental Wells" refers to the replacement of existing wells, or installation of new wells, for the purpose of maintaining existing groundwater supplies. This is because production from existing wells is expected decline over time due to siltation, declining water levels, and aging materials. Although the supply values for supplemental wells are shown as 0 in the "Water Supplies Strategy" table, this strategy is considered necessary in order to maintain the constant level of aquifer supplies shown in the "Current Supplies" table.

8. Please describe other potential sources of water supply, and indicate if these are being considered or actively pursued. (Attach additional sheets if necessary.)

Other Water Strategies, not previously listed	**Expected Supply (acre-ft/yr)**					**Indicate: Considered (C) or Actively pursued (A)**
	2010	**2015**	**2020**	**2025**	**2030**	

9. Do you currently supply water to any other entities on a wholesale basis? If so, please list the wholesale customers you supply and the contract amount for each. (Use additional sheets if necessary)

Wholesale Customer	Contracted Supply	Units

10. Do you plan to add or remove any wholesale customers in the next two years? If so, please list potential changes and possible amounts of water associated with the potential new contracts.

Potential New Wholesale Customers	Potential Contract Amounts	Units

11. Are you interested in becoming a wholesale provider? If so, to whom might you consider supplying water? _____

_____

_____

12. Other than the 2007 State Water Plan, *2006 Region C Water Plan,* and the *2006 Brazos G Regional Water Plan*, are you aware of any other water supply studies for your area? (Please provide a copy of any available reports or studies, or suggest where we might obtain one.)

_____

_____

_____

13. Are you interested in becoming a regional water supplier, or participating in a regional water supply system? ☐ Yes ☐ No

If yes, would you like someone to contact you to discuss? ☐ Yes ☐ No

Please return completed survey by November 9, 2007 to: Rick Shaffer, Chiang, Patel and Yerby, Inc.,1820 Regal Row, Suite 200,Dallas, TX 75235 FAX: (214) 638-3723

WUG	Title	First Name	Last Name	Job Title	Region	County	Address1	Address2	City	State	Postal Code
City of Bardwell	Mr.	Wade	Rhodes	Water & Sewer Director	C	Ellis	P. O. Box 271		Bardwell	TX	76101
Bethany WSC	Mr.	John	Daniel	General Manager	G	Johnson	133 S. County Road 810		Alvarado	TX	76009-8409
Brandon-Irene WSC	Mrs.	Mary	Cox		C&G	Ellis / Navarro / Hill	P.O. Box 87		Brandon	TX	76628-0087
City of Cleburne	Mr.	Chester	Nolen	City Manager	G		P.O. Box 677		Cleburne	TX	76033
Community Water Company	Mr.	Steve	Stroube		C	Ellis / Navarro	P.O. Box 730		Corsicana	TX	75151
City of Ferris	Mr.	Charlie	James	Water Director	C	Ellis	100 Town Plaza		Ferris	TX	75125
Files Valley WSC	Mr.	Kent	Smith	Water Superintendent	C&G	Ellis/Hill	P.O. Box 127		Itasca	TX	76055
City of Glenn Heights	Mr.	Larry	Pennington	Water Superintendent	C	Dallas / Ellis	1938 South Hampton Road		Glenn Heights	TX	75154
City of Godley	Mr.	Jim	Sinclair	Water Utility Manager	G		P.O. Box 27		Godley	TX	76044
City of Grandview	Mr.	David	Bowman	Water Utility Manager	G	Johnson	304 East Criner	P.O. Box 425	Grandview	TX	76050
City of Italy	Mr.	Bruce	Kuykendall		C	Ellis	P.O. Box 840		Italy	TX	76651
City of Joshua	Ms.	Paulette	Hartman	City Manager	G	Johnson	101 S. Main St.		Joshua	TX	76058
City of Keene	Mr.	Mike	Baze	Public Works Director	G	Johnson	100 N. Mockingbird		Keene	TX	76059
City of Maypearl	Mayor	Medford	Marion		C	Ellis	P.O. Box 400		Maypearl	TX	76064
City of Milford	Mr.	Larry	Bumpus	Director, Public Works	C	Ellis	P. O. Box 538		Milford	TX	76670-0538
City of Oak Leaf	Mayor	Paul	Klooster		C	Ellis	301 Locust Dr.		Oak Leaf	TX	75154
City of Ovilla	Mr.	Tony	Bumpus	Director of Public Works	C	Dallas / Ellis	105 S. Cockrell Hill Rd. #2		Ovilla	TX	75154
City of Palmer	Mr.	Stephen	Sparks	Director of Operations	C	Ellis	P.O. Box 489		Palmer	TX	75152
Parker WSC	Mr.	Marty	Smith	Public Works Director	G	Hill / Johnson	7001 County Road 1200		Cleburne	TX	76031
City of Pecan Hill	Mayor	Richard	Blake		C	Ellis	1094 S. Lowrance Rd.		Pecan Hill	TX	75154
Rice WSC	Mr.	James	Fortson	President	C	Ellis/Navarro	1612 Elmwood Ave		Corsicana	TX	75110
City of Rio Vista	Mr.	James	Lyles		G		P.O. Box 129		Rio Vista	TX	76093
City of Wilmer	Mr.	Earl (Roy E)	Kendrick	Water Works Superintendant	C	Dallas	128 North Dallas Ave.		Wilmer	TX	75172
Avalon Water and Sewer Service Corporation	Mr.	Kent	Smith	Operations Manager			c/o Hillco H2O Operator	P.O. Box 127	Itasca	TX	76055
Ellis County WCID #1	Mr.	Paul	Stevens				P.O. Box 757		Waxahachie	TX	75165
Nash-Forreston Water Supply	Mr.	Leland	Calvert	President			947 Forreston Road		Waxahachie	TX	75165

APPENDIX C

POPULATION AND DEMAND PROJECTIONS MEMORANDUM

Freese and Nichols

MEMORANDUM TO FILE

FROM: Stephanie W. Griffin, P.E. [NTD07286]T:\Study 4A - Four County Study\Memo_Population & Demands.doc

SUBJECT: Population and Demand Projections for the Four County Study Including Ellis, Johnson, Southern Dallas, and Southern Tarrant Counties

DATE: April 23, 2009

The 2007-08 regional water planning effort includes special projects funded by the Texas Water Development Board (TWDB). The goal of these studies is to bring the recommended water management strategies closer to implementation. The Four County Study is one of these projects. While the regional water plans have a 50 year planning period, this study focuses on the 2010 through 2030 time frame.

The study area includes Ellis County, Johnson County, southern Dallas County, and southern Tarrant County. Johnson County is part of the Brazos G Water Planning Group. Thus, Region C and Brazos G are working together on this study.

The study area is currently experiencing rapid growth. Recent growth appears to be greater than what was projected in the *2006 Region C Water Plan* and the *2006 Brazos G Water Plan*. This memorandum summarizes the analysis and recommendations for population and demand projections for water user groups in the Four County Study area.

Meetings to Collect Data

Freese and Nichols, Inc. (FNI) met with twenty water user groups and wholesale water providers in the study area. HDR, Inc. participated in the meetings that involved entities located in Johnson County. At each meeting, we presented the population and demand projections as shown in the regional water plans. We discussed the current population and water use estimates of the specific entity, as well as those of their existing and/or potential future customers. Many entities provided information related to recent water use and numbers of connections.

We reviewed our understanding of the current water supply for each entity. We discussed the recommended water management strategies as presented in the regional water plans and any suggested adjustments to those recommendations. In most cases, the entities plan to implement the recommended strategies, although the amounts of supply may change. In a few cases, the entities were pursuing other options for water supply to meet their future needs.

The information obtained in these meetings was used to develop updated population and demand projections presented in this memorandum. This updated information related to water supply will be used to supplement or update management strategies.

Survey

Freese and Nichols, Inc. mailed surveys to 26 entities in the study area with which we did not meet in person. The consultant team attempted to contact those from which survey responses not received. Of the 26 survey recipients, 15 (58 percent) responded to the survey and/or the follow-up phone call. Of those, three respondents indicated that they did not wish to participate in the study.

The survey covered topics similar to those discussed in the meetings described above. The survey showed the population and demand projections as presented in the 2006 regional water plans and sought input as to other projections preferred by the responding entity. We provided a table summarizing our understanding of their current water supplies based on the 2006 Plans and sought clarification if the supplies were not correct. We asked questions as to water service issues, such as water quality, water pressure, and water supply. We provided a table that showed the recommended water management strategies and asked if these strategies were representative of the entity's future water plans. We inquired about wholesale water customers and contract amounts. We also asked about regional water concerns.

The information obtained from the survey responses helped establish the recent growth, as well as expected changes to growth through 2030. All of the information provided was considered when developing the projected demands that are recommended to be used in this study.

Population

Freese and Nichols, Inc. collected available historical and projected population data for each entity through the in-person meetings or by survey. FNI gathered historical population data from the Texas State Data Center, the U.S. Census, and the North Central Texas Council of Governments (NCTCOG). None of these three agencies prepares population estimates for non-city utilities.

FNI also gathered population projections that were provided by entities with whom we met or surveyed, the population projections developed by the North Central Texas Council of Governments, and those approved by the Texas Water Development Board for regional water planning. The NCTCOG does not prepare population projections for non-city utilities.

The population information was used to review growth in the cities. In general, the population in Ellis and Johnson Counties is growing faster than what was projected in the regional water plans. However, the population projections prepared by the North Central Texas Council of Governments appears to be higher than what many of these entities are projecting. This information was considered when establishing the recommended demands in this analysis. The low population projection is typically the projection presented in the regional water plan. This high projection tends to be the NCTCOG projection. The recommended projection is typically based on information provided by the entities, which is usually more that the regional water plan projections and less than the NCTCOG projection.

Table 1 presents a range of population projections for each water user group in the study area, including the recommended projection used for this study. Figures 1, 2,3 and 4 show the population projections for Ellis County, Johnson County, Southern Dallas County and Southern Tarrant County, respectively. Figure 5 shows the population projections for the entire study area. Table 2 presents the total population projections for the water user groups that are split by county and/or basin to provide a complete picture of growth for each of these entities. Johnson County FWSD#1 is included

Table 1
Population Projections in Study Area

Water User Group	County	Basin	Low			High			Recommended		
			2010	2020	2030	2010	2020	2030	2010	2020	2030
Ellis County											
Bardwell [1]	Ellis	Trinity	838	1,075	1,308	838	1,075	1,308	838	1,075	1,308
Brandon-Irene WSC* [1]	Ellis	Trinity	79	89	99	79	89	99	79	89	99
Buena Vista – Bethel SUD [2]	Ellis	Trinity	2,938	3,620	3,970	4,144	5,423	6,925	4,144	5,423	6,925
Cedar Hill [2, 3]	Ellis	Trinity	46	59	70	49	67	78	49	67	78
Community Water Company [1]	Ellis	Trinity	1,134	1,414	1,690	1,134	1,414	1,690	1,134	1,414	1,690
Ennis [2, 3]	Ellis	Trinity	19,933	26,290	33,655	21,600	30,000	37,922	21,600	30,000	37,922
Ferris [2]	Ellis	Trinity	2,175	2,175	2,175	2,631	3,183	5,500	2,631	3,183	3,851
Files Valley WSC* [2]	Ellis	Trinity	778	830	881	778	830	881	778	830	881
Glenn Heights [1]	Ellis	Trinity	2,660	3,638	4,602	2,660	3,638	4,602	2,660	3,638	4,602
Grand Prairie [2]	Ellis	Trinity	458	2,036	4,851	481	2,166	5,422	450	2,166	5,422
Italy [1]	Ellis	Trinity	2,376	2,731	3,081	2,376	2,731	3,081	2,376	2,731	3,081
Johnson County SUD* [2]	Ellis	Trinity	148	255	313	199	281	428	146	281	428
Mansfield [2]	Ellis	Trinity	383	451	482	460	550	655	460	474	483
Maypearl [1]	Ellis	Trinity	746	746	746	746	746	746	746	746	746
Midlothian [2]	Ellis	Trinity	13,600	21,700	32,100	19,682	35,962	50,466	19,682	35,962	50,466
Milford [1, 2]	Ellis	Trinity	685	685	685	685	685	685	685	685	685
Mountain Peak SUD [2]	Ellis	Trinity	6,691	7,509	7,964	7,639	9,669	11,767	7,639	9,669	11,767
Oak Leaf [1, 2]	Ellis	Trinity	1,502	1,774	2,042	1,502	1,860	2,042	1,502	1,774	2,042
Ovilla [1]	Ellis	Trinity	4,983	6,681	8,354	4,983	6,681	8,354	4,983	6,681	8,354
Palmer [1]	Ellis	Trinity	1,924	2,063	2,200	1,924	2,063	2,200	1,924	2,063	2,200
Pecan Hill [1]	Ellis	Trinity	813	943	1,072	813	943	1,072	813	943	1,072
Red Oak [2]	Ellis	Trinity	5,833	7,254	8,655	12,500	21,000	26,000	12,500	21,000	26,000
Rice WSC* [1]	Ellis	Trinity	1,027	1,377	1,722	1,027	1,377	1,722	1,027	1,377	1,722
Rockett SUD [2]	Ellis	Trinity	30,202	37,154	40,696	33,188	43,366	55,279	33,188	43,366	55,279

Table 1, Continued

Water User Group	County	Basin	Low			High			Recommended		
			2010	2020	2030	2010	2020	2030	2010	2020	2030
Sardis-Lone Elm WSC [2]	Ellis	Trinity	8,029	8,273	8,327	16,099	24,892	31,862	16,099	24,892	31,862
Waxahachie [2]	Ellis	Trinity	28,281	36,202	46,342	32,900	48,440	63,800	32,900	48,440	63,800
Ellis County-Other [4]	Ellis	Trinity	10,707	10,707	10,707	10,707	80,345	124,002	10,707	10,707	10,707
Ellis County Total			**148,969**	**187,731**	**228,789**	**181,824**	**329,476**	**448,588**	**181,740**	**259,676**	**333,472**
Johnson County											
Acton MUD* [1]	Johnson	Brazos	133	171	211	133	171	211	133	171	211
Alvarado [2, 3]	Johnson	Trinity	3,595	3,957	4,337	4,439	7,535	10,766	4,439	7,535	10,766
Bethesda WSC [1, 2]	Johnson	Trinity	19,035	24,199	29,625	19,035	24,199	29,625	19,035	24,199	29,625
Bethany WSC [2]	Johnson	Trinity	3,373	3,813	4,275	4,300	4,500	4,750	4,300	4,500	4,750
Burleson [2, 3]	Johnson	Trinity	20,150	23,845	27,702	27,206	42,037	52,747	27,206	42,037	52,747
Cleburne [2]	Johnson	Brazos	29,158	32,872	36,774	31,368	42,625	58,786	30,946	38,683	48,353
Godley [1]	Johnson	Brazos	1,136	1,439	1,757	1,136	1,439	1,757	1,136	1,439	1,757
Grandview [2, 3]	Johnson	Trinity	1,388	1,562	1,678	1,600	2,000	2,500	1,600	2,000	2,500
Johnson County SUD* [2]	Johnson	Brazos	9,801	16,930	20,758	13,166	18,627	28,362	9,684	18,627	28,362
Johnson County SUD* [2]	Johnson	Trinity	22,868	39,504	48,436	30,719	43,463	66,178	22,597	43,463	66,178
Joshua [2, 3]	Johnson	Brazos	2,915	3,309	3,723	3,148	4,500	6,480	3,148	4,500	6,480
Joshua [2, 3]	Johnson	Trinity	2,199	2,496	2,808	2,375	3,395	4,889	2,375	3,395	4,889
Keene [1]	Johnson	Brazos	841	989	1,144	841	989	1,144	841	989	1,144
Keene [1]	Johnson	Trinity	5,041	5,928	6,860	5,041	5,928	6,860	5,041	5,928	6,860
Mansfield [2]	Johnson	Trinity	9,027	22,274	37,825	10,833	27,174	51,430	10,833	23,472	37,827
Mountain Peak SUD [2]	Johnson	Trinity	1,733	2,360	3,019	1,979	3,039	4,460	1,979	3,039	4,460
Parker WSC* [2]	Johnson	Brazos	1,973	2,156	2,233	2,080	2,384	2,819	2,080	2,156	2,233
Parker WSC* [2]	Johnson	Trinity	219	240	248	231	265	313	231	240	248
Rio Vista [1, 2]	Johnson	Brazos	751	863	981	751	863	981	751	863	981
Venus [2]	Johnson	Trinity	1,892	1,892	1,892	2,766	3,795	5,425	2,766	3,795	5,425

Table 1, Continued

Water User Group	County	Basin	Low			High			Recommended		
			2010	2020	2030	2010	2020	2030	2010	2020	2030
Johnson County-Other [4]	Johnson	Brazos	854	888	924	854	3,639	8,294	854	888	924
Johnson County-Other [4]	Johnson	Trinity	10,261	10,708	11,178	10,261	41,844	95,384	10,261	10,708	11,178
Johnson County Total			**148,343**	**202,395**	**248,388**	**174,262**	**284,411**	**444,161**	**162,236**	**242,627**	**327,898**
Southern Dallas County											
Cedar Hill [2, 3]	Dallas	Trinity	46,209	59,065	69,857	48,637	66,612	77,958	48,637	66,612	77,958
Duncanville [1, 2]	Dallas	Trinity	36,503	36,912	37,714	38,400	38,800	38,988	38,400	38,800	38,988
Glenn Heights [1]	Dallas	Trinity	7,332	8,919	10,390	7,332	8,919	10,390	7,332	8,919	10,390
Grand Prairie [2]	Dallas	Trinity	138,871	160,075	179,450	145,959	170,517	200,098	138,883	170,517	200,098
Ovilla [1]	Dallas	Trinity	368	540	792	368	540	792	368	540	792
Rockett SUD [2]	Dallas	Trinity	2,470	3,095	3,467	2,713	3,611	4,706	2,713	3,611	4,706
Sardis-Lone Elm WSC [2]	Dallas	Trinity	36	36	36	72	108	138	72	108	138
Wilmer [1]	Dallas	Trinity	5,500	7,500	8,800	5,500	7,500	8,800	5,500	7,500	8,800
Dallas County (Study Area) Total			**237,289**	**276,142**	**310,506**	**248,981**	**296,607**	**341,870**	**241,905**	**296,607**	**341,870**
Southern Tarrant County											
Bethesda WSC [1, 2]	Tarrant	Trinity	10,585	13,110	15,707	10,585	13,110	15,707	10,585	13,110	15,707
Burleson [2, 3]	Tarrant	Trinity	5,038	5,961	6,926	6,801	10,509	13,187	6,801	10,509	13,187
Grand Prairie [2]	Tarrant	Trinity	36,658	43,587	46,710	38,529	46,424	52,085	36,654	46,424	52,085
Johnson County SUD* [2]	Tarrant	Trinity	1,444	2,494	3,057	1,939	2,744	4,177	1,426	2,744	4,177
Kennedale [2, 3]	Tarrant	Trinity	7,509	9,064	10,114	7,715	10,720	13,412	7,715	10,720	13,412
Mansfield [2]	Tarrant	Trinity	41,676	48,897	52,554	50,000	59,651	71,456	50,000	51,515	52,551
Tarrant County (Study Area) Total			**102,910**	**123,113**	**135,068**	**115,569**	**143,158**	**170,024**	**113,181**	**135,022**	**151,119**
Total Study Area			**637,511**	**789,381**	**922,751**	**720,636**	**1,053,652**	**1,404,643**	**699,062**	**933,932**	**1,154,359**

Notes: * Indicates the entity is partially located in a county outside of the study area. The amount shown in this table is only the amount allocated to the specified county, not the total for the entity.

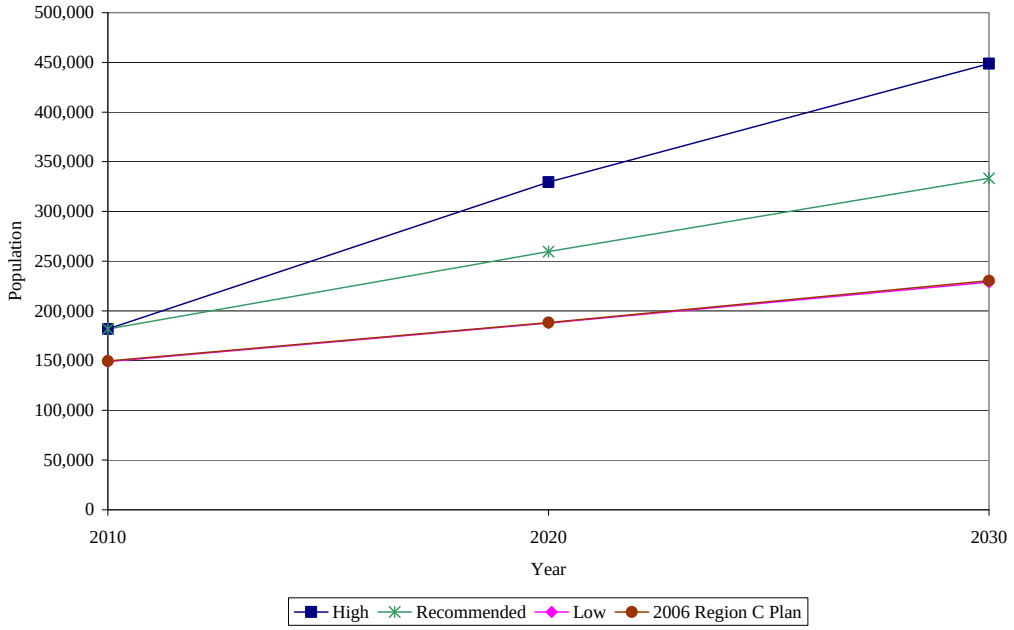
1 Indicates that the recommended projection is the same as the approved projection in the 2006 regional water plans.

2 Indicates that the recommended projection is based on input provided by the water user group and/or its wholesale water provider.

3 Indicates that the recommended projection is equivalent to the NCTCOG projection.

4 Indicates that the consultants adjusted the population projection.

Figure 1
Population Projections for Ellis County



*****Low projection is the same as 2006 Region C Plan

Figure 2
Population Projections for Johnson County

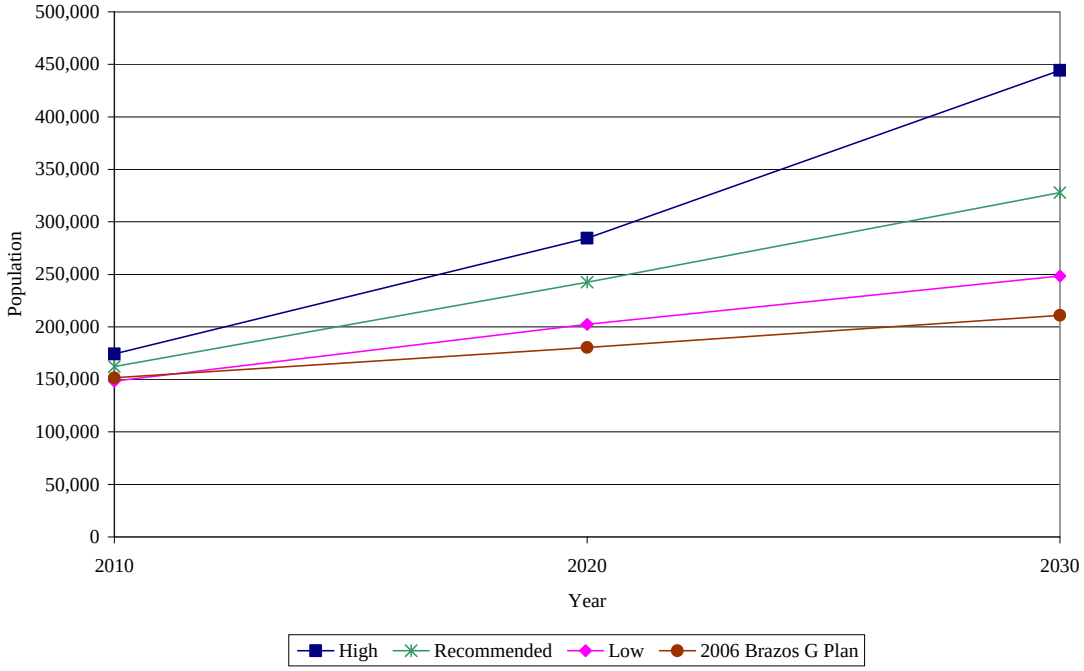


Figure 3
Population Projections for Southern Dallas County

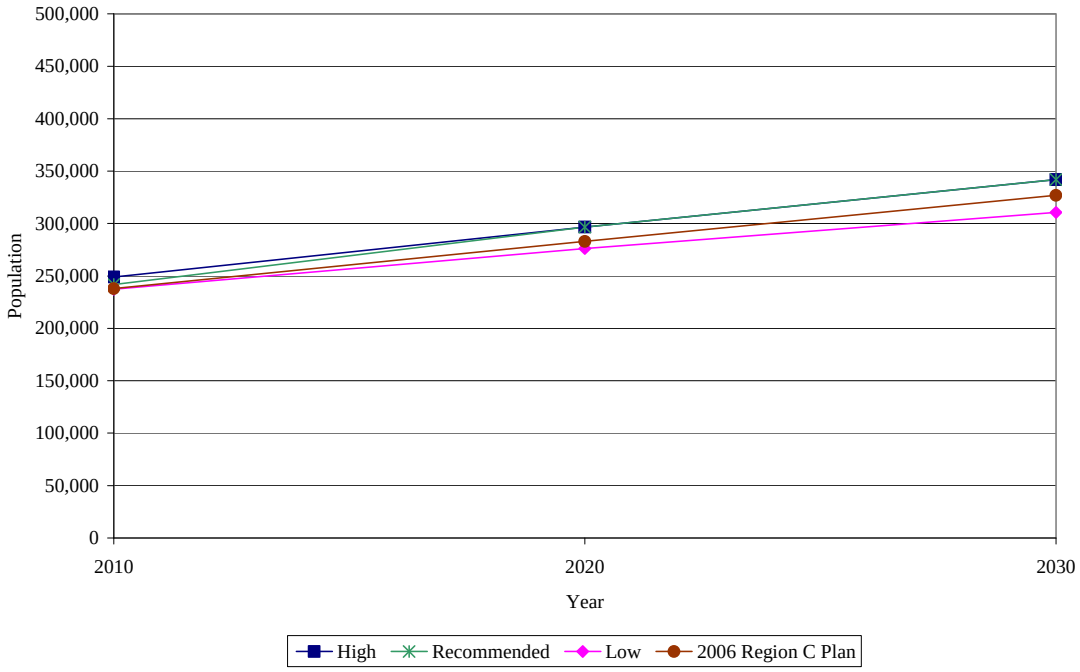


Figure 4
Population Projections for Southern Tarrant County

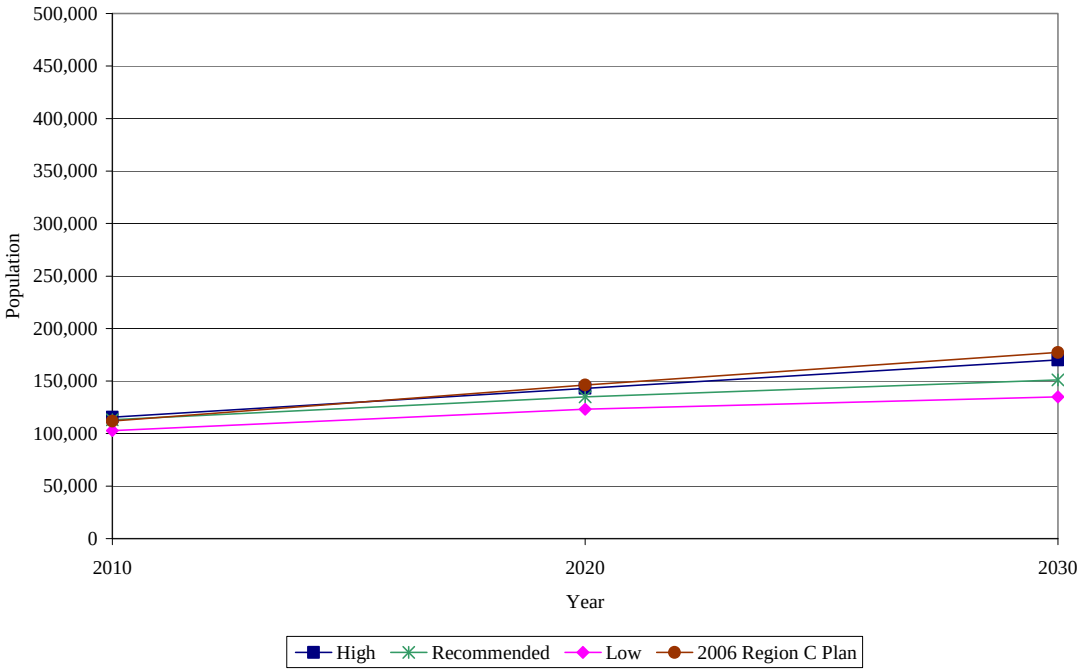
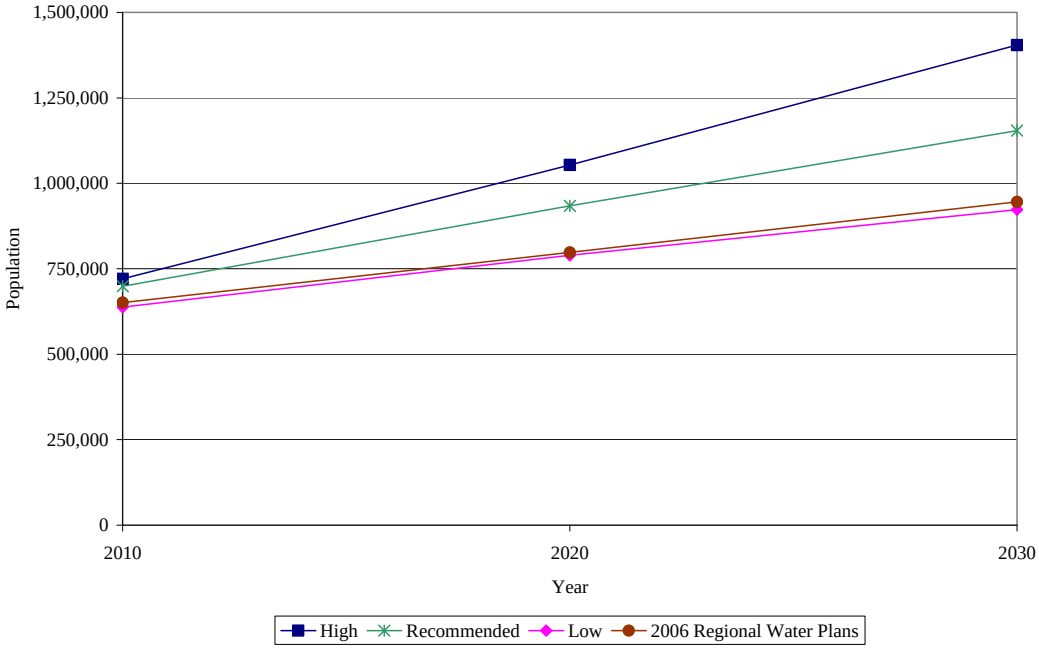


Figure 5
Population Projections for Study Area



in the Johnson County SUD projections. Table 3 compares the population projections from the *2006 Region C Water Plan* to those being recommended in this study.

Sixteen of the 44 water user groups in the study area have the same projections listed in the "low", "high", and "recommended" columns. (Although Files Valley WSC projection in Ellis County has not changed, the entity expects the Hill County portion of their service area to grow. Thus, the total projection for Files Valley WSC changes.) Fifteen of these 16 water user groups did not respond to the survey. Therefore, we assumed that these entities were in agreement with the projections as recommended in the 2006 regional water plans. One of these sixteen entities, Bethesda WSC, met with the consultants in person and indicated that the 2006 regional water plan projections are appropriate for their utility and did not see the need to adjust the projections. In all sixteen cases, the "low", "high", and "recommended" were set equal to the projections approved in the 2006 regional water plan. Table 1 also includes information regarding the source of the recommended projections.

Water Demands

Freese and Nichols, Inc. reviewed the historical and projected water demands. A number of entities provided recent water use data. Some entities provided water demand projections for consideration as well.

FNI obtained the municipal per capita water use from the 2006 regional water plans. Municipal per capita water use is the sum of residential, commercial and institutional water use divided by the population served by the entity. We considered the recent municipal per capita water use information provided by the water user groups and made recommendations to adjust the municipal per capita water use projection when necessary. Table 4 summarizes the municipal per capita water use projections for this study.

Table 2
Population Projections for Entities Split by Basin and/or County [1]

Water User Group	Low			High			Recommended		
	2010	2020	2030	2010	2020	2030	2010	2020	2030
Acton MUD [2]	15,169	18,606	21,810	15,169	18,606	21,810	15,169	18,606	21,810
Bethesda WSC	29,620	37,309	45,332	29,620	37,309	45,332	29,620	37,309	45,332
Brandon-Irene WSC	2,359	2,455	2,562	2,359	2,455	2,562	2,359	2,455	2,562
Burleson	25,188	29,806	34,628	34,007	52,546	65,934	34,007	52,546	65,934
Cedar Hill	46,255	59,124	69,927	48,686	66,679	78,036	48,686	66,679	78,036
Files Valley WSC	2,685	2,796	2,913	3,039	3,087	3,159	3,039	3,087	3,159
Glenn Heights	9,992	12,557	14,992	9,992	12,557	14,992	9,992	12,557	14,992
Grand Prairie	175,987	205,698	231,011	184,969	219,107	257,605	175,987	219,107	257,605
Johnson County SUD	34,371	59,373	72,797	46,171	65,324	99,464	33,962	65,324	99,464
Joshua	5,114	5,805	6,531	5,523	7,895	11,369	5,523	7,895	11,369
Keene	5,882	6,917	8,004	5,882	6,917	8,004	5,882	6,917	8,004
Mansfield	51,086	71,622	90,861	61,293	87,375	123,541	61,293	75,461	90,861
Mountain Peak SUD	8,424	9,869	10,983	9,618	12,708	16,227	9,618	12,708	16,227
Ovilla	5,351	7,221	9,146	5,351	7,221	9,146	5,351	7,221	9,146
Parker WSC	2,578	2,819	2,919	2,719	3,116	3,684	2,719	2,819	2,919
Rice WSC	7,667	9,734	11,867	7,667	9,734	11,867	7,667	9,734	11,867
Rockett SUD	32,672	40,249	44,163	35,901	46,977	59,985	35,901	46,977	59,985
Sardis-Lone Elm WSC	8,065	8,309	8,363	16,171	25,000	32,000	16,171	25,000	32,000

[1] The total shown is for the entire entity, including that portion of the entity located outside of the study area.
[2] Acton MUD is primarily located in Hood County and was not included in the survey of entities.

Table 3
Comparison of Population Projections Recommended in the 2006 Regional Water Plans and Those Recommended in This Study

Water User Group	County	Basin	2006 Regional Water Plans			Recommended		
			2010	2020	2030	2010	2020	2030
Ellis County								
Bardwell	Ellis	Trinity	838	1,075	1,308	838	1,075	1,308
Brandon-Irene WSC	Ellis	Trinity	79	89	99	79	89	99
Buena Vista - Bethel SUD	Ellis	Trinity	2,938	3,620	3,970	4,144	5,423	6,925
Cedar Hill	Ellis	Trinity	49	49	49	49	67	78
Community Water Company	Ellis	Trinity	1,134	1,414	1,690	1,134	1,414	1,690
Ennis	Ellis	Trinity	20,539	26,290	33,655	21,600	30,000	37,922
Ferris	Ellis	Trinity	2,175	2,175	2,175	2,631	3,183	3,851
Files Valley WSC	Ellis	Trinity	688	751	813	778	830	881
Glenn Heights	Ellis	Trinity	2,660	3,638	4,602	2,660	3,638	4,602
Grand Prairie	Ellis	Trinity	450	2,105	5,269	450	2,166	5,422
Italy	Ellis	Trinity	2,376	2,731	3,081	2,376	2,731	3,081
Johnson County SUD	Ellis	Trinity	217	283	348	146	281	428
Mansfield	Ellis	Trinity	460	991	1,729	460	474	483
Maypearl	Ellis	Trinity	746	746	746	746	746	746
Midlothian	Ellis	Trinity	13,600	21,700	32,100	19,682	35,962	50,466
Milford	Ellis	Trinity	685	685	685	685	685	685
Mountain Peak SUD	Ellis	Trinity	6,691	7,509	7,964	7,639	9,669	11,767
Oak Leaf	Ellis	Trinity	1,502	1,774	2,042	1,502	1,774	2,042
Ovilla	Ellis	Trinity	4,983	6,681	8,354	4,983	6,681	8,354
Palmer	Ellis	Trinity	1,924	2,063	2,200	1,924	2,063	2,200
Pecan Hill	Ellis	Trinity	813	943	1,072	813	943	1,072
Red Oak	Ellis	Trinity	5,833	7,254	8,655	12,500	21,000	26,000
Rice WSC	Ellis	Trinity	1,027	1,377	1,722	1,027	1,377	1,722
Rockett SUD	Ellis	Trinity	30,203	37,155	40,698	33,188	43,366	55,279
Sardis-Lone Elm WSC	Ellis	Trinity	8,029	8,273	8,327	16,099	24,892	31,862
Waxahachie	Ellis	Trinity	28,281	36,202	46,342	32,900	48,440	63,800
Ellis County-Other	Ellis	Trinity	10,707	10,707	10,707	10,707	10,707	10,707
Ellis County Total			**149,627**	**188,280**	**230,402**	**181,740**	**259,676**	**333,472**
Johnson County								
Acton MUD	Johnson	Brazos	133	171	211	133	171	211
Alvarado	Johnson	Trinity	3,595	3,957	4,337	4,439	7,535	10,766

Table 3, Continued

Water User Group	County	Basin	2006 Regional Water Plans			Recommended		
			2010	2020	2030	2010	2020	2030
Bethesda WSC	Johnson	Trinity	19,035	24,199	29,625	19,035	24,199	29,625
Bethany WSC	Johnson	Trinity	3,373	3,813	4,275	4,300	4,500	4,750
Burleson	Johnson	Trinity	20,303	23,588	27,039	27,206	42,037	52,747
Cleburne	Johnson	Brazos	29,158	32,872	36,774	30,946	38,683	48,353
Godley	Johnson	Brazos	1,136	1,439	1,757	1,136	1,439	1,757
Grandview	Johnson	Trinity	1,452	1,562	1,678	1,600	2,000	2,500
Johnson County SUD	Johnson	Brazos	11,484	14,803	18,290	9,684	18,627	28,362
Johnson County SUD	Johnson	Trinity	26,062	33,594	41,507	22,597	43,463	66,178
Johnson County FWSD #1[1]	Johnson	Brazos	6,437	7,750	9,129	0	0	0
Joshua	Johnson	Brazos	2,872	3,260	3,668	3,148	4,500	6,480
Joshua	Johnson	Trinity	2,242	2,545	2,863	2,375	3,395	4,889
Keene	Johnson	Brazos	841	989	1,144	841	989	1,144
Keene	Johnson	Trinity	5,041	5,928	6,860	5,041	5,928	6,860
Mansfield	Johnson	Trinity	626	631	636	10,833	23,472	37,827
Mountain Peak SUD	Johnson	Trinity	1,733	2,360	3,019	1,979	3,039	4,460
Parker WSC	Johnson	Brazos	1,977	2,438	2,923	2,080	2,156	2,233
Parker WSC	Johnson	Trinity	210	259	310	231	240	248
Rio Vista	Johnson	Brazos	751	863	981	751	863	981
Venus	Johnson	Trinity	1,892	1,892	1,892	2,766	3,795	5,425
Johnson County-Other	Johnson	Brazos	854	888	924	854	888	924
Johnson County-Other	Johnson	Trinity	10,261	10,708	11,178	10,261	10,708	11,178
Johnson County Total			**151,468**	**180,509**	**211,020**	**162,236**	**242,627**	**327,898**
Southern Dallas County								
Cedar Hill	Dallas	Trinity	46,206	59,075	69,878	48,637	66,612	77,958
Duncanville	Dallas	Trinity	37,100	38,069	38,988	38,400	38,800	38,988
Glenn Heights	Dallas	Trinity	7,332	8,919	10,390	7,332	8,919	10,390
Grand Prairie	Dallas	Trinity	138,883	165,711	194,459	138,883	170,517	200,098
Ovilla	Dallas	Trinity	368	540	792	368	540	792
Rockett SUD	Dallas	Trinity	2,469	3,094	3,465	2,713	3,611	4,706
Sardis-Lone Elm WSC	Dallas	Trinity	36	36	36	72	108	138
Wilmer	Dallas	Trinity	5,500	7,500	8,800	5,500	7,500	8,800
Dallas County (Study Area) Total			**237,894**	**282,944**	**326,808**	**241,905**	**296,607**	**341,870**
Southern Tarrant County								
Bethesda WSC	Tarrant	Trinity	10,585	13,110	15,707	10,585	13,110	15,707
Burleson	Tarrant	Trinity	4,885	6,218	7,589	6,801	10,509	13,187
Grand Prairie	Tarrant	Trinity	36,654	45,116	50,617	36,654	46,424	52,085

Table 3, Continued

Water User Group	County	Basin	2006 Regional Water Plans			Recommended		
			2010	2020	2030	2010	2020	2030
Johnson County SUD	Tarrant	Trinity	2,189	2,732	3,290	1,426	2,744	4,177
Kennedale	Tarrant	Trinity	7,509	9,064	10,114	7,715	10,720	13,412
Mansfield	Tarrant	Trinity	50,000	70,000	90,000	50,000	51,515	52,551
Tarrant County (Study Area) Total			**111,822**	**146,240**	**177,317**	**113,181**	**135,022**	**151,119**
Total Study Area			**650,811**	**797,973**	**945,547**	**699,062**	**933,932**	**1,154,359**

[1] The recommended population projection associated with Johnson County FWSD #1 has been added to Johnson County SUD.

Table 4
Municipal Per Capita Water Use Projections in Gallons per Person per Day

Water User Group	Low			High			Recommended		
	2010	2020	2030	2010	2020	2030	2010	2020	2030
Acton MUD	143	141	139	143	141	139	143	141	139
Alvarado	121	117	115	121	117	115	121	117	115
Bardwell	110	108	106	110	108	106	110	108	106
Bethany WSC	96	93	90	98	95	94	98	95	94
Bethesda WSC	129	126	124	129	126	124	129	126	124
Brandon-Irene WSC	113	110	99	113	110	99	113	110	99
Buena Vista - Bethel SUD	168	165	163	207	204	202	207	204	202
Burleson	146	142	140	165	161	159	165	161	159
Cedar Hill	154	151	150	200	197	196	200	197	196
Cleburne	176	173	170	180	180	180	180	180	180
Community Water Company	91	108	106	91	108	106	91	108	106
Duncanville	172	169	165	191	193	189	172	169	165
Ellis County-Other	168	167	165	168	167	165	168	167	165
Ennis	152	148	146	189	185	183	189	185	183
Ferris	118	118	118	160	160	160	136	133	130
Files Valley WSC	185	182	179	214	234	250	214	214	214
Glenn Heights	110	108	106	110	108	106	110	108	106
Godley	131	128	127	131	128	127	131	128	127
Grand Prairie	148	145	143	174	169	166	174	169	166
Grandview	116	98	82	128	125	122	128	125	122
Italy	106	108	105	106	108	105	106	108	105
Johnson County-Other	223	221	219	223	221	219	223	221	219
Johnson County SUD	164	166	170	164	166	171	164	166	171
Joshua	130	126	123	130	126	123	130	126	123
Keene	94	91	89	94	91	89	94	91	89
Kennedale	160	157	155	177	174	172	177	174	172
Mansfield	220	218	216	236	244	242	220	218	216
Maypearl	174	170	168	174	170	168	174	170	168
Midlothian	186	183	182	240	237	236	240	237	236

Table 4, Continued

Water User Group	Low			High			Recommended		
	2010	2020	2030	2010	2020	2030	2010	2020	2030
Milford	112	109	106	112	109	106	112	109	106
Mountain Peak SUD	134	135	134	161	159	158	149	147	146
Oak Leaf	201	198	196	201	198	196	201	198	196
Ovilla	182	180	178	182	180	178	182	180	178
Palmer	111	108	105	111	108	105	111	108	105
Parker WSC	93	95	107	117	114	111	117	114	111
Pecan Hill	176	173	171	176	173	171	176	173	171
Red Oak	140	137	135	169	171	169	140	137	135
Rice WSC	110	107	106	110	107	106	110	107	106
Rio Vista	84	80	77	84	80	77	84	80	77
Rockett SUD	118	115	113	125	125	125	125	125	125
Sardis-Lone Elm WSC	186	184	182	186	184	182	186	184	182
Venus	133	131	128	170	170	170	170	170	170
Waxahachie	204	201	199	224	224	224	224	224	224
Wilmer	104	107	105	104	107	105	104	107	105

The population projection was multiplied by the municipal per capita water use to establish the demand. For those entities who did not provide information through the survey, FNI assumed that the projections developed in the 2006 regional water plans was still appropriate for use in this study. Table 5 lists the range of demand projections, including the recommended projection for this study. Table 6 provides the total municipal demand for those water user groups that are split by county and/or basin. Johnson County FWSD #1 is included in Johnson County SUD projections. Table 7 compares the demand projections recommended in the *2006 Region C Water Plan* to those recommended in this study.

FNI collected the demand projections developed in the regional water planning process for manufacturing, mining, irrigation, livestock, and steam electric power. With one exception, these demands were not adjusted for this study. The mining demands in western Ellis County and Johnson County have been adjusted in years 2010 and 2020 to account for the increased mining demands that have occurred in recent years as a result of the development of the Barnett Shale. FNI applied demands developed by the Bureau of Economic Geology in the 2007 Texas Water Development Board study of the Trinity aquifer and the potential impact due to growth and the development of the Barnett Shale. While the total demand for steam electric power generation and manufacturing water needs in Johnson County did not change, the amount attributed to Cleburne was increased per the City's request.

Figures 6, 7, 8, and 9 present the demand projections for Ellis County, Johnson County, Southern Dallas County, and Southern Tarrant County, respectively. Figure 10 shows the total demand projection for the study area. Typically, the low demand projection was based on the 2006 regional water plans. The recommended demand is typically based on the information provided by entities. The high demand is usually a result of the high per capita water use multiplied by the NCTCOG population projection.

Table 5
Demand Projections in Acre-Feet per Year

Water User Group	County	Basin	Low			High			Recommended		
			2010	2020	2030	2010	2020	2030	2010	2020	2030
Ellis County											
Bardwell [1]	Ellis	Trinity	103	130	155	103	130	155	103	130	155
Brandon-Irene WSC* [1]	Ellis	Trinity	10	11	11	10	11	11	10	11	11
Buena Vista – Bethel SUD [2]	Ellis	Trinity	553	669	725	961	1,239	1,567	961	1,239	1,567
Cedar Hill [2, 3]	Ellis	Trinity	8	10	12	11	15	17	11	15	17
Community Water Company [1]	Ellis	Trinity	116	171	201	116	171	201	116	171	201
Ennis [2]	Ellis	Trinity	3,394	4,358	5,504	4,573	6,217	7,774	4,573	6,217	7,774
Ferris [2]	Ellis	Trinity	287	287	287	472	570	986	401	474	561
Files Valley WSC* [2]	Ellis	Trinity	161	169	177	186	218	247	186	199	211
Glenn Heights [1]	Ellis	Trinity	328	440	546	328	440	546	328	440	546
Grand Prairie [2]	Ellis	Trinity	76	331	777	94	410	1,008	88	410	1,008
Italy [1]	Ellis	Trinity	282	330	362	282	330	362	282	330	362
Johnson County SUD* [2]	Ellis	Trinity	27	47	60	36	52	82	27	52	82
Mansfield [2]	Ellis	Trinity	94	110	117	122	150	177	113	116	117
Maypearl [1]	Ellis	Trinity	145	142	140	145	142	140	145	142	140
Midlothian [2]	Ellis	Trinity	2,834	4,448	6,544	5,297	9,558	13,356	5,297	9,558	13,356
Milford [1, 2]	Ellis	Trinity	86	84	81	86	84	81	86	84	81
Mountain Peak SUD [2]	Ellis	Trinity	1,006	1,133	1,199	1,378	1,721	2,082	1,275	1,593	1,924
Oak Leaf [1, 2]	Ellis	Trinity	338	393	448	338	413	448	338	393	448
Ovilla [1]	Ellis	Trinity	1,016	1,347	1,666	1,016	1,347	1,666	1,016	1,347	1,666
Palmer [1]	Ellis	Trinity	239	250	259	239	250	259	239	250	259
Pecan Hill [1]	Ellis	Trinity	160	183	205	160	183	205	160	183	205
Red Oak [2]	Ellis	Trinity	915	1,113	1,309	2,366	4,021	4,921	1,960	3,223	3,932
Rice WSC* [1]	Ellis	Trinity	127	165	204	127	165	204	127	165	204

Table 5, Continued

Water User Group	County	Basin	Low			High			Recommended		
			2010	2020	2030	2010	2020	2030	2010	2020	2030
Rockett SUD [2]	Ellis	Trinity	3,992	4,786	5,151	4,642	6,064	7,737	4,642	6,064	7,737
Sardis-Lone Elm WSC [2]	Ellis	Trinity	1,674	1,705	1,698	3,356	5,129	6,496	3,356	5,129	6,496
Waxahachie [2]	Ellis	Trinity	6,462	8,151	10,330	8,255	12,155	16,009	8,255	12,155	16,009
Ellis County-Other [4]	Ellis	Trinity	2,015	2,003	1,979	2,015	15,030	22,919	2,015	2,003	1,979
Ellis County Manufacturing [1]	Ellis	Trinity	3,466	3,670	3,841	3,466	3,670	3,841	3,466	3,670	3,841
Ellis County Mining [4]	Ellis	Trinity	80	80	80	150	90	100	150	90	100
Ellis County Steam Electric [1]	Ellis	Trinity	14,237	20,379	23,825	14,237	20,379	23,825	14,237	20,379	23,825
Ellis County Irrigation [1]	Ellis	Trinity	583	583	583	583	583	583	583	583	583
Ellis County Livestock [1]	Ellis	Trinity	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183
Ellis County Total			**45,997**	**58,861**	**69,659**	**56,333**	**92,120**	**119,188**	**55,729**	**77,998**	**96,580**
Johnson County											
Acton MUD* [1]	Johnson	Brazos	21	27	33	21	27	33	21	27	33
Alvarado [2]	Johnson	Trinity	487	519	559	602	988	1,387	602	988	1,387
Bethesda WSC [1, 2]	Johnson	Trinity	2,751	3,415	4,115	2,751	3,415	4,115	2,751	3,415	4,115
Bethany WSC [2]	Johnson	Trinity	363	397	431	470	480	500	470	480	500
Burleson [2, 3]	Johnson	Trinity	3,295	3,793	4,344	5,029	7,582	9,395	5,029	7,582	9,395
Cleburne [2]	Johnson	Brazos	5,748	6,370	7,003	6,329	8,597	11,857	6,244	7,802	9,753
Godley [1]	Johnson	Brazos	167	206	250	167	206	250	167	206	250
Grandview' [2]	Johnson	Trinity	180	171	154	229	280	341	229	280	341
Johnson County SUD* [2]	Johnson	Brazos	1,806	3,139	3,950	2,413	3,471	5,430	1,789	3,471	5,430
Johnson County SUD* [2]	Johnson	Trinity	4,213	7,326	9,215	5,630	8,100	12,670	4,174	8,100	12,670

Table 5, Continued

Water User Group	County	Basin	Low			High			Recommended		
			2010	2020	2030	2010	2020	2030	2010	2020	2030
Joshua [2, 3, 4]	Johnson	Brazos	425	467	513	458	635	893	458	635	893
Joshua [2, 3, 4]	Johnson	Trinity	320	352	387	346	479	673	346	479	673
Keene [1]	Johnson	Brazos	89	101	114	89	101	114	89	101	114
Keene [1]	Johnson	Trinity	531	604	684	531	604	684	531	604	684
Mansfield [2]	Johnson	Trinity	2,225	5,439	9,152	2,863	7,427	13,942	2,670	5,732	9,153
Mountain Peak SUD [2]	Johnson	Trinity	261	356	455	357	541	789	330	500	730
Parker WSC* [2, 4]	Johnson	Brazos	204	229	268	273	304	351	273	275	277
Parker WSC* [2, 4]	Johnson	Trinity	23	26	30	30	34	39	30	31	31
Rio Vista [1, 2]	Johnson	Brazos	71	77	85	71	77	85	71	77	85
Venus [2]	Johnson	Trinity	282	278	271	527	723	1,033	527	723	1,033
Johnson County-Other[4]	Johnson	Brazos	213	220	227	213	901	2,035	213	220	227
Johnson County-Other[4]	Johnson	Trinity	2,563	2,651	2,742	2,563	10,359	23,399	2,563	2,651	2,742
Johnson County Manufacturing [1]	Johnson	Brazos	359	358	357	359	358	357	359	358	357
Johnson County Manufacturing (Cleburne) [2]	Johnson	Brazos	1,747	2,141	2,525	2,758	4,883	6,148	2,758	4,883	6,148
Johnson County Manufacturing [1]	Johnson	Trinity	15	18	21	15	18	21	15	18	21
Johnson County Mining [4]	Johnson	Brazos	165	174	180	3,779	707	1,009	3,779	707	1,009
Johnson County Mining (Cleburne) [2]	Johnson	Brazos	165	174	179	1,009	673	673	1,009	673	673
Johnson County Mining [4]	Johnson	Trinity	40	42	44	592	171	208	592	171	208
Johnson County Steam Electric (Cleburne) [2]	Johnson	Brazos	1,200	1,200	1,200	2,959	2,959	2,959	2,959	2,959	2,959

Table 5, Continued

Water User Group	County	Basin	Low			High			Recommended		
			2010	2020	2030	2010	2020	2030	2010	2020	2030
Johnson County Steam Electric [1]	Johnson	Trinity	0	0	0	0	0	0	0	0	0
Johnson County Irrigation [1]	Johnson	Brazos	240	240	240	240	240	240	240	240	240
Johnson County Irrigation [1]	Johnson	Trinity	0	0	0	0	0	0	0	0	0
Johnson County Livestock [1]	Johnson	Brazos	1,037	1,037	1,037	1,037	1,037	1,037	1,037	1,037	1,037
Johnson County Livestock [1]	Johnson	Trinity	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
Johnson County Total			**32,286**	**42,627**	**51,845**	**45,790**	**67,457**	**103,747**	**43,405**	**56,505**	**74,248**
Southern Dallas County											
Cedar Hill [2, 3]	Dallas	Trinity	7,971	9,990	11,737	10,897	14,700	17,116	10,897	14,700	17,116
Duncanville [2, 4]	Dallas	Trinity	7,033	6,988	6,971	8,215	8,388	8,254	7,399	7,345	7,206
Glenn Heights [1]	Dallas	Trinity	903	1,079	1,234	903	1,079	1,234	903	1,079	1,234
Grand Prairie [2]	Dallas	Trinity	23,023	26,000	28,746	28,449	32,281	37,209	27,070	32,281	37,209
Ovilla [1]	Dallas	Trinity	75	109	158	75	109	158	75	109	158
Rockett SUD [2]	Dallas	Trinity	326	399	439	380	505	659	380	505	659
Sardis-Lone Elm WSC [2]	Dallas	Trinity	7	7	7	15	22	28	15	22	28
Wilmer [1]	Dallas	Trinity	641	899	1,035	641	899	1,035	641	899	1,035
Dallas County (Study Area) Total			**39,979**	**45,471**	**50,327**	**49,575**	**57,983**	**65,693**	**47,380**	**56,940**	**64,645**
Southern Tarrant County											
Bethesda WSC [1, 2]	Tarrant	Trinity	1,530	1,850	2,182	1,530	1,850	2,182	1,530	1,850	2,182
Burleson [2, 3]	Tarrant	Trinity	824	948	1,086	1,257	1,895	2,349	1,257	1,895	2,349
Grand Prairie [2]	Tarrant	Trinity	6,078	7,080	7,482	7,510	8,789	9,685	7,144	8,789	9,685

Table 5, Continued

Water User Group	County	Basin	Low			High			Recommended		
			2010	2020	2030	2010	2020	2030	2010	2020	2030
Johnson County SUD* [2]	Tarrant	Trinity	266	462	582	355	511	800	263	511	800
Kennedale [2, 3]	Tarrant	Trinity	1,346	1,594	1,756	1,530	2,089	2,584	1,530	2,089	2,584
Mansfield [2]	Tarrant	Trinity	10,271	11,941	12,716	13,218	16,303	19,370	12,322	12,580	12,715
Tarrant County (Study Area) Total			**20,315**	**23,875**	**25,804**	**25,400**	**31,437**	**36,970**	**24,046**	**27,714**	**30,315**
Total Study Area			**138,577**	**170,834**	**197,635**	**177,098**	**248,997**	**325,598**	**170,560**	**219,157**	**265,788**

Notes: * Indicates the entity is partially located in a county outside of the study area. The amount shown in this table is only the amount allocated to the specified county, not the total for the entity.

1 Indicates that the recommended projection is the same as the approved projection in the 2006 regional water plans.

2 Indicates that the recommended projection is based on input provided by the water user group and/or its wholesale water provider.

3 Indicates that the recommended projection is based on the demand based on the NCTCOG population projection.

4 Indicates that the consultants adjusted the demand projection.

Table 6
Demand Projections for Entities Split by County/Basin in Acre-Feet per Year [1]

Water User Group	Low			High			Recommended		
	2010	2020	2030	2010	2020	2030	2010	2020	2030
Acton MUD [2]	2,446	2,939	3,396	2,446	2,939	3,396	2,446	2,939	3,396
Bethesda WSC	4,281	5,265	6,297	4,281	5,265	6,297	4,281	5,265	6,297
Brandon-Irene WSC	288	292	296	288	292	296	288	292	296
Burleson	4,119	4,741	5,430	6,286	9,477	11,744	6,286	9,477	11,744
Cedar Hill	7,979	10,000	11,749	10,908	14,715	17,133	10,908	14,715	17,133
Files Valley WSC	556	570	584	730	808	886	730	741	759
Glenn Heights	1,231	1,519	1,780	1,231	1,519	1,780	1,231	1,519	1,780
Grand Prairie	29,177	33,411	37,005	36,053	41,480	47,902	34,302	41,480	47,902
Johnson County SUD	6,332	11,009	13,851	8,461	12,173	19,043	6,273	12,173	19,043
Joshua	745	819	900	804	1,114	1,566	804	1,114	1,566
Keene	620	705	798	620	705	798	620	705	798
Mansfield	12,590	17,490	21,985	16,203	23,880	33,489	15,105	18,428	21,985
Mountain Peak SUD	1,267	1,489	1,654	1,735	2,262	2,871	1,605	2,093	2,654
Ovilla	1,091	1,456	1,824	1,091	1,456	1,824	1,091	1,456	1,824
Parker WSC	267	300	350	356	397	458	356	359	363
Rice WSC	945	1,167	1,409	945	1,167	1,409	945	1,167	1,409
Rockett SUD	4,318	5,185	5,590	5,022	6,569	8,396	5,022	6,569	8,396
Sardis-Lone Elm WSC	1,681	1,712	1,705	3,371	5,151	6,524	3,371	5,151	6,524

[1] The total shown is for the entire entity, including that portion of the entity located outside of the study area.
[2] Acton MUD is primarily located in Hood County and was not included in the survey of entities.

Table 7
Comparison of Demand Projections Recommended in the 2006 Regional Water Plans and Those Recommended in This Study

Water User Group	County	Basin	2006 Regional Water Plans			Recommended		
			2010	2020	2030	2010	2020	2030
Ellis County								
Bardwell	Ellis	Trinity	103	130	155	103	130	155
Brandon-Irene WSC	Ellis	Trinity	10	11	11	10	11	11
Buena Vista - Bethel SUD	Ellis	Trinity	553	669	725	961	1,239	1,567
Cedar Hill	Ellis	Trinity	8	8	8	11	15	17
Community Water Company	Ellis	Trinity	116	171	201	116	171	201
Ennis	Ellis	Trinity	3,497	4,358	5,504	4,573	6,217	7,774
Ferris	Ellis	Trinity	331	324	317	401	474	561
Files Valley WSC	Ellis	Trinity	143	153	163	186	199	211
Glenn Heights	Ellis	Trinity	328	440	546	328	440	546
Grand Prairie	Ellis	Trinity	75	342	844	88	410	1,008
Italy	Ellis	Trinity	282	330	362	282	330	362
Johnson County SUD	Ellis	Trinity	42	55	69	27	52	82
Mansfield	Ellis	Trinity	122	271	469	113	116	117
Maypearl	Ellis	Trinity	145	142	140	145	142	140
Midlothian	Ellis	Trinity	2,834	4,448	6,544	5,297	9,558	13,356
Milford	Ellis	Trinity	86	84	81	86	84	81
Mountain Peak SUD	Ellis	Trinity	1,207	1,337	1,409	1,275	1,593	1,924
Oak Leaf	Ellis	Trinity	338	393	448	338	393	448
Ovilla	Ellis	Trinity	1,016	1,347	1,666	1,016	1,347	1,666
Palmer	Ellis	Trinity	239	250	259	239	250	259
Pecan Hill	Ellis	Trinity	160	183	205	160	183	205
Red Oak	Ellis	Trinity	1,104	1,389	1,638	1,960	3,223	3,932
Rice WSC	Ellis	Trinity	127	165	204	127	165	204
Rockett SUD	Ellis	Trinity	3,992	4,786	5,151	4,642	6,064	7,737
Sardis-Lone Elm WSC	Ellis	Trinity	1,673	1,705	1,698	3,356	5,129	6,496
Waxahachie	Ellis	Trinity	6,462	8,151	10,330	8,255	12,155	16,009
Ellis County-Other	Ellis	Trinity	2,015	2,003	1,979	2,015	2,003	1,979
Ellis County Manufacturing	Ellis	Trinity	3,466	3,670	3,841	3,466	3,670	3,841
Ellis County Mining	Ellis	Trinity	90	90	90	150	90	100
Ellis County Steam Electric	Ellis	Trinity	14,237	20,379	23,825	14,237	20,379	23,825

Table 7, Continued

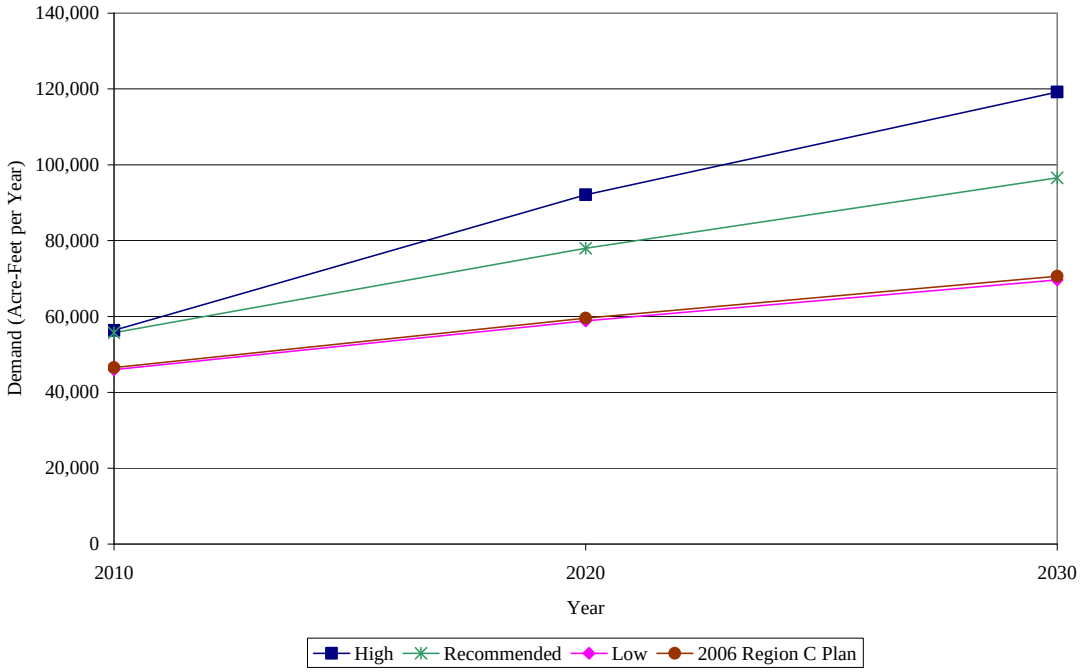
Water User Group	County	Basin	2006 Regional Water Plans			Recommended		
			2010	2020	2030	2010	2020	2030
Ellis County Irrigation	Ellis	Trinity	583	583	583	583	583	583
Ellis County Livestock	Ellis	Trinity	1,183	1,183	1,183	1,183	1,183	1,183
Ellis County Total			**46,567**	**59,550**	**70,648**	**55,729**	**77,998**	**96,580**
Johnson County								
Acton MUD	Johnson	Brazos	21	27	33	21	27	33
Alvarado	Johnson	Trinity	487	519	559	602	988	1,387
Bethesda WSC	Johnson	Trinity	2,751	3,415	4,115	2,751	3,415	4,115
Bethany WSC	Johnson	Trinity	363	397	431	470	480	500
Burleson	Johnson	Trinity	3,320	3,752	4,240	5,029	7,582	9,395
Cleburne	Johnson	Brazos	5,748	6,370	7,003	6,244	7,802	9,753
Godley	Johnson	Brazos	167	206	250	167	206	250
Grandview	Johnson	Trinity	208	219	229	229	280	341
Johnson County SUD	Johnson	Brazos	2,200	2,885	3,647	1,789	3,471	5,430
Johnson County SUD	Johnson	Trinity	4,992	6,548	8,276	4,174	8,100	12,670
Johnson County FWSD #1[1]	Johnson	Brazos	844	990	1,135	0	0	0
Joshua	Johnson	Brazos	418	460	505	458	635	893
Joshua	Johnson	Trinity	326	359	394	346	479	673
Keene	Johnson	Brazos	89	101	114	89	101	114
Keene	Johnson	Trinity	531	604	684	531	604	684
Mansfield	Johnson	Trinity	165	172	172	2,670	5,732	9,153
Mountain Peak SUD	Johnson	Trinity	313	420	534	330	500	730
Parker WSC	Johnson	Brazos	259	311	363	273	275	277
Parker WSC	Johnson	Trinity	28	33	39	30	31	31
Rio Vista	Johnson	Brazos	71	77	85	71	77	85
Venus	Johnson	Trinity	282	278	271	527	723	1,033
Johnson County-Other	Johnson	Brazos	213	220	227	213	220	227
Johnson County-Other	Johnson	Trinity	2,563	2,651	2,742	2,563	2,651	2,742
Johnson County Manufacturing	Johnson	Brazos	357	356	355	359	358	357
Johnson County Manufacturing (Cleburne)	Johnson	Brazos	1,749	2,143	2,527	2,758	4,883	6,148
Johnson County Manufacturing	Johnson	Trinity	15	18	21	15	18	21

Table 7, Continued

Water User Group	County	Basin	2006 Regional Water Plans			Recommended		
			2010	2020	2030	2010	2020	2030
Johnson County Mining	Johnson	Brazos	330	348	359	3,779	707	1,009
Johnson County Mining (Cleburne)	Johnson	Brazos	0	0	0	1,009	673	673
Johnson County Mining	Johnson	Trinity	40	42	44	592	171	208
Johnson County Steam Electric (Cleburne)	Johnson	Brazos	1,200	1,200	1,200	2,959	2,959	2,959
Johnson County Steam Electric	Johnson	Trinity	0	0	0	0	0	0
Johnson County Irrigation	Johnson	Brazos	240	240	240	240	240	240
Johnson County Irrigation	Johnson	Trinity	0	0	0	0	0	0
Johnson County Livestock	Johnson	Brazos	1,037	1,037	1,037	1,037	1,037	1,037
Johnson County Livestock	Johnson	Trinity	1,080	1,080	1,080	1,080	1,080	1,080
Johnson County Total			**32,407**	**37,478**	**42,911**	**43,405**	**56,505**	**74,248**
Southern Dallas County								
Cedar Hill	Dallas	Trinity	7,971	9,992	11,741	10,897	14,700	17,116
Duncanville	Dallas	Trinity	7,937	8,230	8,254	7,399	7,345	7,206
Glenn Heights	Dallas	Trinity	903	1,079	1,234	903	1,079	1,234
Grand Prairie	Dallas	Trinity	23,024	26,915	31,149	27,070	32,281	37,209
Ovilla	Dallas	Trinity	75	109	158	75	109	158
Rockett SUD	Dallas	Trinity	326	399	439	380	505	659
Sardis-Lone Elm WSC	Dallas	Trinity	8	7	7	15	22	28
Wilmer	Dallas	Trinity	641	899	1,035	641	899	1,035
Dallas County (Study Area) Total			**40,885**	**47,630**	**54,017**	**47,380**	**56,940**	**64,645**
Southern Tarrant County								
Bethesda WSC	Tarrant	Trinity	1,530	1,850	2,182	1,530	1,850	2,182
Burleson	Tarrant	Trinity	799	989	1,190	1,257	1,895	2,349
Grand Prairie	Tarrant	Trinity	6,077	7,328	8,108	7,144	8,789	9,685
Johnson County SUD	Tarrant	Trinity	419	532	656	263	511	800
Kennedale	Tarrant	Trinity	1,346	1,594	1,756	1,530	2,089	2,584
Mansfield	Tarrant	Trinity	13,218	19,132	24,397	12,322	12,580	12,715
Tarrant County (Study Area) Total			**23,389**	**31,425**	**38,289**	**24,046**	**27,714**	**30,315**
Total Study Area			**143,248**	**176,083**	**205,865**	**170,560**	**219,157**	**265,788**

[1] The recommended demand projection associated with Johnson County FWSD #1 has been added to Johnson County SUD.

Figure 6
Total Demand Projection for Ellis County



*Low projection is the same as 2006 Region C Plan

Figure 7
Total Demand Projection for Johnson County

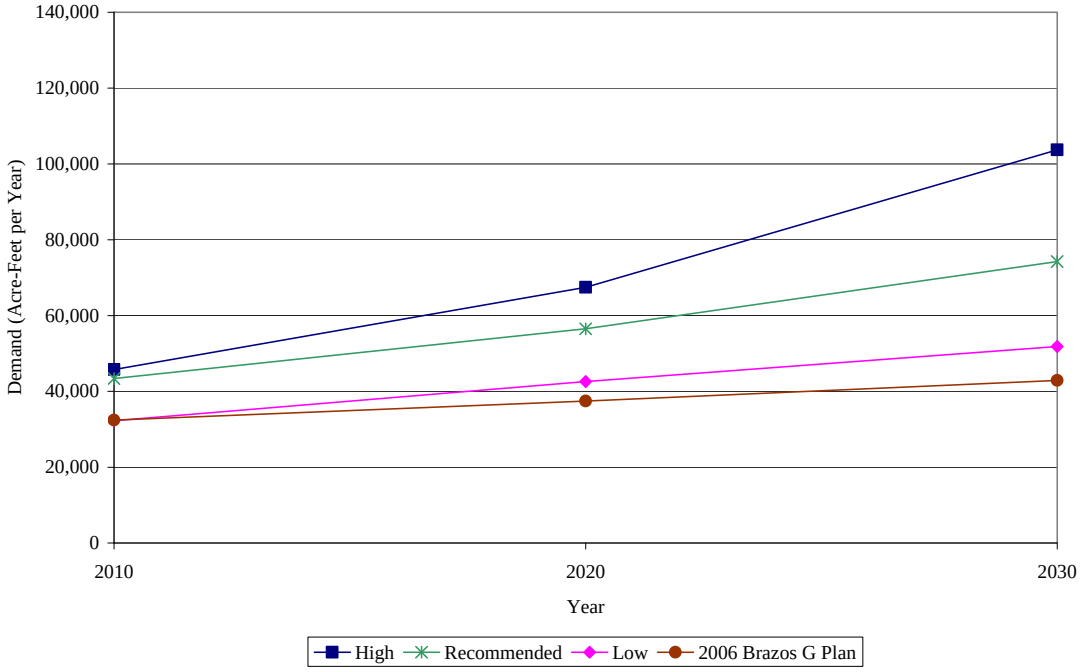


Figure 8
Total Demand Projection for Southern Dallas County

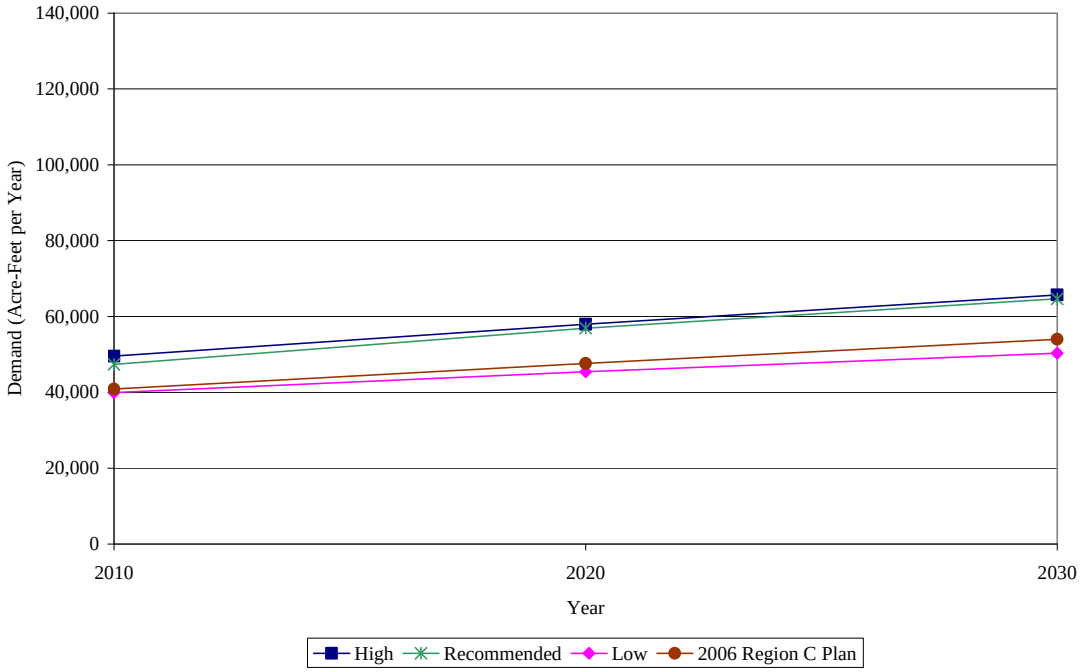


Figure 9
Total Demand Projection for Southern Tarrant County

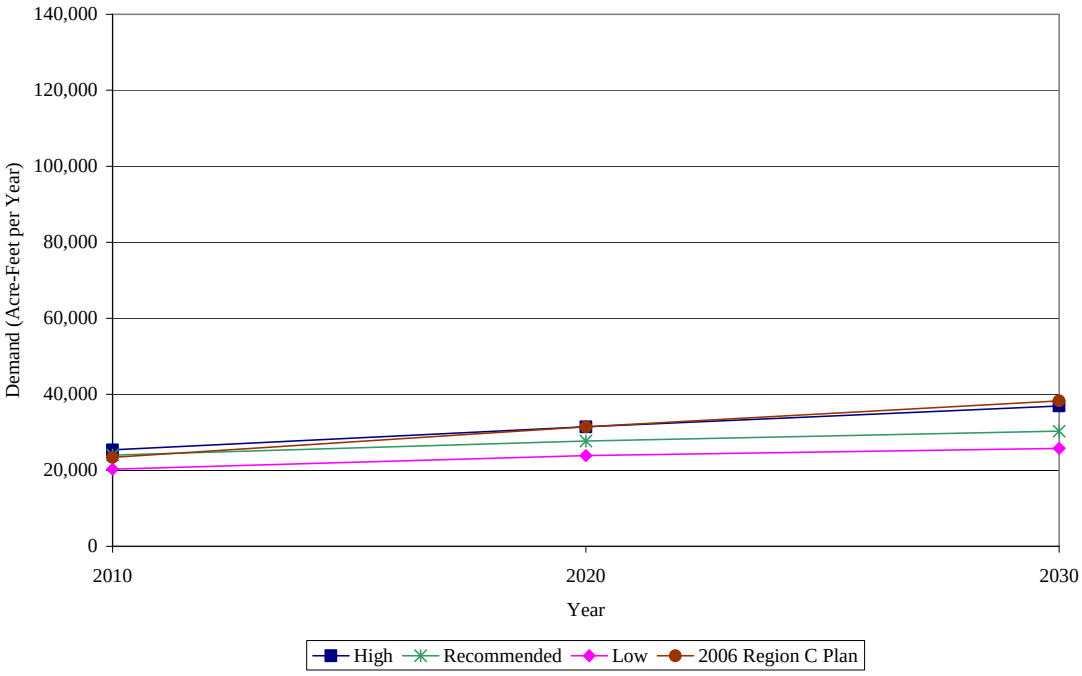
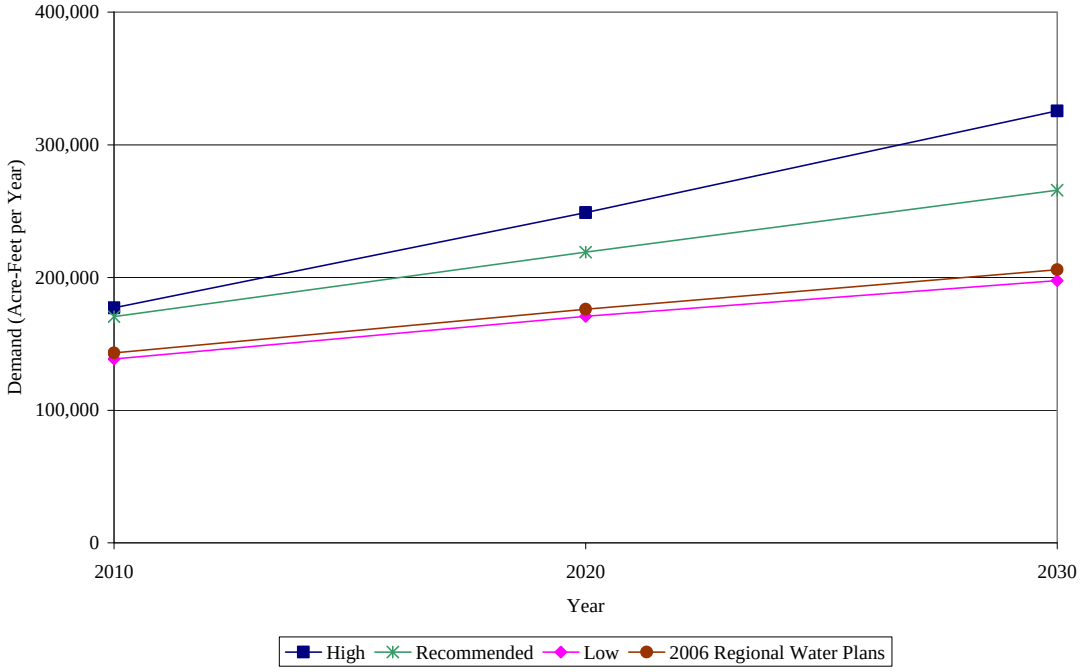


Figure 10
Total Demand Projection for Study Area



Wholesale Water Providers

The Tarrant Regional Water District (TRWD), the Trinity River Authority (TRA), Dallas, and the Brazos River Authority (BRA) have contracts in place to provide water service to a number of entities in the study area. In addition to these four regional wholesale water providers, the study area has a number of local wholesale water providers. The local wholesale water providers include:

- City of Ennis
- City of Grand Prairie is a new wholesale water provider
- Johnson County Special Utility District (SUD), includes Johnson County FWSD #1
- City of Mansfield
- City of Midlothian
- Rockett SUD
- City of Waxahachie

Tables 8 through 14 show the recommended population and demand projections attributed to each of the local wholesale water providers based on their current customers. (The City of Cedar Hill was a local wholesale water provider in the *2006 Region C Water Plan* but is no longer a wholesale water provider.) Arlington is evaluating becoming a wholesale water provider.

Table 15 lists the Ellis County entities that currently have contracts managed by TRA for TRWD supplies. Table 16 shows the remaining TRA contractual obligations from its water supply sources

in Ellis County. Tables 17 and 18 show the recommended population and demand projections that are attributed to TRWD and TRA, respectively. Table 19 shows the population and demand attributed to the City of Dallas for this study. Table 20 lists the population and demand projections attributed to BRA in the study area.

Table 8
Recommended Population and Demand Projections Attributed to Ennis

City of Ennis and Current Customers	Year		
	2010	2020	2030
Population Projections			
City of Ennis	21,600	30,000	37,922
Community Water Company (Ellis County)	1,134	1,414	1,690
East Garrett WSC (Ellis County-Other)	2,054	2,629	3,366
Rice WSC	406	417	421
Total Population	**25,194**	**34,460**	**43,399**
Demand Projections (Ac-Ft/Yr)			
In-City Demand	4,573	6,217	7,774
Community Water Company (Ellis County)	133	133	133
East Garrett WSC (Ellis County-Other)	56	56	56
Rice WSC	50	50	50
Ellis County Manufacturing	347	367	384
Ellis County Steam Electric Power	2,098	2,615	3,302
Total Demand	**7,257**	**9,438**	**11,699**

Table 9
Recommended Population and Demand Projections Attributed to Grand Prairie

Grand Prairie and Current Customers	Year		
	2010	2020	2030
Population Projections			
In City, Ellis County Portion	450	2,166	5,422
In City, Dallas County Portion	138,883	170,517	200,098
In City, Tarrant County Portion	36,654	46,424	52,085
Total Population	**175,987**	**219,107**	**257,605**
Demand Projections (Ac-Ft/Yr)			
In City, Ellis County Portion	88	410	1,008
In City, Dallas County Portion	27,070	32,281	37,209
In City, Tarrant County Portion	7,144	8,789	9,685
Total Demand	**34,302**	**41,480**	**47,902**

Table 10
Recommended Population and Demand Projections Attributed to Johnson County SUD

Johnson County SUD and Current Customers	Year		
	2010	2020	2030
Population Projections			
In-District, Ellis County Portion	146	281	428
In-District, Hill County Portion	109	209	319
In-District, Johnson County Portion	32,281	62,090	94,540
In-District, Tarrant County Portion	1,426	2,744	4,177
Alvarado	81	84	85
Joshua	5,523	7,895	11,369
Total Population	**39,566**	**73,303**	**110,918**
Demand Projections (Ac-Ft/Yr)			
In-District, Ellis County Portion	27	52	82
In-District, Hill County Portion	20	39	61
In-District, Johnson County Portion	5,963	11,571	18,100
In-District, Tarrant County Portion	263	511	800
Alvarado	11	11	11
Joshua	804	1,114	1,566
Johnson County Mining	561	561	561
Total Demand	**7,649**	**13,859**	**21,181**

Table 11
Recommended Population and Demand Projections Attributed to Mansfield

City of Mansfield and Current Customers	Year		
	2010	2020	2030
Population Projections			
In-City, Ellis County Portion	460	474	483
In-City, Johnson County Portion	10,833	23,472	37,827
In-City, Tarrant County Portion	50,000	51,515	52,551
Johnson County SUD	1,713	0	0
Total Population	**63,006**	**75,461**	**90,861**
Demand Projections (Ac-Ft/Yr)			
In-City, Ellis County Portion	113	116	117
In-City, Johnson County Portion	2,670	5,732	9,153
In-City, Tarrant County Portion	12,322	12,580	12,715
Johnson County SUD	307	0	0
Total Demand	**15,412**	**18,428**	**21,985**

Table 12
Recommended Population and Demand Projections Attributed to Midlothian

City of Midlothian and Current Customers	Year		
	2010	2020	2030
Population Projections			
In-City Demand	19,682	35,962	50,466
Mountain Peak SUD (Ellis and Johnson Counties)	4,889	7,919	11,403
Rockett SUD	11,027	12,012	12,012
City of Grand Prairie	11,502	11,843	12,057
City of Venus	1,381	2,589	4,506
Current Customer Population	**48,481**	**70,325**	**90,444**
Demand Projections (Ac-Ft/Yr)			
In-City Demand	5,297	9,558	13,356
Mountain Peak SUD (Ellis and Johnson Counties)	816	1,304	1,865
Ellis County Steam Electric Power	224	224	224
Ellis County Mining	280	280	280
Rockett SUD	1,544	1,682	1,682
City of Grand Prairie	2,242	2,242	2,242
City of Venus	263	493	858
Total Demand	**10,666**	**15,783**	**20,507**

Table 13
Recommended Population and Demand Projections Attributed to Rockett SUD

Rockett SUD Current Customers	Year		
	2010	2020	2030
Population Projections			
Service Area not within City Boundaries (Dallas County)	2,713	3,611	4,706
Service Area not within City Boundaries (Ellis County)	20,249	26,822	36,076
Ennis	80	82	84
Ferris	2,631	3,183	3,851
Palmer	1,924	2,063	2,200
Pecan Hill	813	943	1,072
Red Oak	3,832	6,579	8,267
Lancaster	600	616	629
Oak Leaf	244	249	253
Waxahachie	2,443	2,455	2,468
Ellis County-Other	372	374	379
Total Population	**35,901**	**46,977**	**59,985**

Table 13, Continued

Rockett SUD Current Customers	Year		
	2010	2020	2030
Demand Projections (Ac-Ft/Yr)			
Service Area not within City Boundaries (Dallas County)	380	505	659
Service Area not within City Boundaries (Ellis County)	2,396	3,299	4,609
Ennis	*17*	*17*	*17*
Ferris	401	474	561
Palmer	239	250	259
Pecan Hill	*160*	*183*	*205*
Red Oak	*601*	*1,010*	*1,250*
Lancaster	*90*	*90*	*91*
Oak Leaf	*55*	*55*	*56*
Waxahachie	*613*	*616*	*619*
Ellis County-Other	*70*	*70*	*70*
Total Demand	**5,022**	**6,569**	**8,396**

Table 14
Recommended Population and Demand Projections Attributed to Waxahachie

City of Waxahachie and Current Customers	Year		
	2010	2020	2030
Population Projections			
City of Waxahachie	32,900	48,440	63,800
Rockett SUD and Customers	0	0	0
Ellis County-Other	1,285	1,285	1,285
Total Population	**34,185**	**49,725**	**65,085**
Demand Projections (Ac-Ft/Yr)			
In-City Demand	8,255	12,155	16,009
Rockett SUD and Customers	0	0	0
Ellis County-Other	242	240	237
Ellis County Manufacturing (28%)	970	1,028	1,075
Total Demand	**9,467**	**13,423**	**17,321**

Table 15
Trinity River Authority Managed Contracts for
Tarrant Regional Water District Water Supply in Ellis County

Entity	Contract Amount (MGD)	Contract Amount (Ac-Ft/Yr)	Is the entity currently using the contracted water?
Ennis	3.560	3,991	Yes
Midlothian	6.330	7,096	No
Midlothian (to Venus)	1.000	1,121	No
Midlothian (to Grand Prairie)	2.000	2,242	No
Ellis County WCID #1 (Waxahachie)	4.650	5,213	No
Ellis County WCID #1 (to Buena Vista-Bethel SUD)	0.850	953	No
Ellis County WCID #1 (to Maypearl)	0.370	415	No
Ellis County WCID #1 (to Avalon WSC)	0.600	673	No
Ellis County WCID #1 (to Italy)	0.500	561	No
Rockett SUD	5.520	6,188	No
Rockett SUD (to Ferris)	0.720	807	No
Rockett SUD (to Palmer)	0.271	304	No
Rockett SUD (to Boyce)	0.320	359	No
Rockett SUD (to Bristol)	0.210	235	No
Rockett SUD (to Nash-Forreston WSC)	0.250	280	No
Red Oak	1.800	2,018	No
Total	**28.951**	**32,456**	

Table 16
Trinity River Authority Contracts for TRA Sources of Supply in Ellis County

Entity	Contract Amount (MGD)	Contract Amount (Ac-Ft/Yr)	Is the entity currently using the contracted water?
TRA Joe Pool Lake Contracts			
Cedar Hill	6.550	7,343	No
Duncanville	1.070	1,199	No
Grand Prairie	1.600	1,794	Yes
Midlothian	5.950	6,670	Yes
Total TRA Joe Pool Lake Contracts	**15.170**	**17,006**	
TRA Lake Bardwell Contracts			
Ennis	8.000	8,968	Yes
Waxahachie	8.428	9,448	Yes
Total TRA Lake Bardwell Contracts	**16.428**	**18,416**	

Table 17
Recommended Population and Demand Projections in Study Area Attributed to Tarrant Regional Water District

TRWD Current Customers in Study Area	Year		
	2010	2020	2030
Population Projections			
Bethesda WSC (Fort Worth)	17,067	17,474	17,755
Burleson (Fort Worth)	34,007	52,546	65,934
Grand Prairie (Fort Worth)	5,752	5,922	6,029
Johnson County SUD (Mansfield)	1,713	0	0
Kennedale	7,715	10,720	13,412
Mansfield	63,006	75,461	90,861
TRA	134,904	135,803	136,181
Total Population	**264,164**	**297,926**	**330,172**
Demand Projections (Ac-Ft/Yr)			
Bethesda WSC (Fort Worth)	2,466	2,466	2,466
Burleson (Fort Worth)	6,286	9,477	11,744
Grand Prairie (Fort Worth)	1,121	1,121	1,121
Johnson County SUD (Mansfield)	307	0	0
Kennedale	725	1,284	2,584
Mansfield	18,517	27,142	33,312
TRA	27,556	27,556	27,556
Total Demand	**56,978**	**69,046**	**78,783**
Contracts in Study Area (Ac-Ft/Yr)			
Bethesda WSC (Fort Worth)	2,466	2,466	2,466
Burleson (Fort Worth)	6,286	9,477	11,744
Grand Prairie (Fort Worth)	1,121	1,121	1,121
Grand Prairie (Mansfield)	6,726	6,726	6,726
Grand Prairie (Arlington)	2,242	2,242	2,242
Grand Prairie (Midlothian)	2,522	2,522	2,522
Johnson County SUD (Mansfield)	307	0	0
Additional Johnson County SUD (Mansfield)	3,056	3,363	6,726
Kennedale	725	1,284	2,584
Mansfield	18,517	27,703	33,873
TRA	32,456	32,456	32,456
Total Demand Based on Existing Contracts in Study Area (Ac-Ft/Yr)	**76,424**	**91,883**	**104,983**

Table 18
Recommended Population and Demand Projections in Study Area
Attributed to Trinity River Authority

TRA Current Customers in Study Area	Year		
	2010	2020	2030
Population Projections			
Joe Pool Lake			
Midlothian	24,811	24,469	23,287
Lake Bardwell			
Ennis	23,150	24,027	25,509
Waxahachie	15,364	14,619	13,881
TRWD Sources			
Ennis	18,852	19,259	19,470
Midlothian	38,905	39,397	39,564
Rockett SUD	56,371	56,371	56,371
Waxahachie	20,776	20,776	20,776
Total Population	**198,229**	**198,918**	**198,858**
Demand Projections (Ac-Ft/Yr)			
Joe Pool Lake			
Midlothian	6,670	6,496	6,156
Grand Prairie (Irrigation)	1,794	1,794	1,794
Lake Bardwell			
Ennis	4,901	4,979	5,229
Waxahachie	3,855	3,668	3,483
Dallas County Irrigation	100	100	100
Ellis County SEP	2,098	2,615	2,915
TRWD Sources			
Ennis	3,991	3,991	3,991
Midlothian	10,459	10,459	10,459
Rockett SUD	7,893	7,893	7,893
Waxahachie	5,213	5,213	5,213
Total Demand	**46,974**	**47,208**	**47,233**

Table 19
Recommended Population and Demand Projections in Study Area Attributed to Dallas

City of Waxahachie and Current Customers	Year		
	2010	2020	2030
Population Projections			
Cedar Hill	48,686	66,679	78,036
Duncanville	38,400	38,800	38,988
Glenn Heights and Customers	14,920	26,038	30,495
Grand Prairie	132,227	164,386	196,415
Ovilla	4,289	5,671	7,028
Red Oak	12,581	19,212	26,613
Total Population	**251,103**	**320,786**	**377,575**
Demand Projections (Ac-Ft/Yr)			
Cedar Hill	8,968	13,138	15,122
Duncanville	6,849	7,107	7,511
Glenn Heights and Customers	1,838	3,150	3,621
Grand Prairie	25,772	31,119	36,522
Ovilla	874	1,143	1,401
Red Oak	1,973	2,948	4,024
Rockett SUD	1,592	841	34
Waxahachie	0	13,452	13,452
Total Demand	**46,275**	**58,606**	**68,202**

Table 20
Recommended Population and Demand Projections in Study Area Attributed to the Brazos River Authority

BRA Current Customers in Study Area	Year		
	2010	2020	2030
Population Projections			
Acton MUD	6,981	10,244	13,314
Aquilla WSD			
Brandon-Irene WSC	1,540	1,609	1,690
Files Valley WSC and Customers	3,039	3,087	3,159
Cleburne	71,866	69,336	66,807
Johnson County SUD	37,360	16,571	34,747
Keene	4,977	5,975	7,042
Total Population	**125,763**	**106,822**	**126,759**

Table 20, Continued

BRA Current Customers in Study Area	Year		
	2010	2020	2030
Demand Projections (Ac-Ft/Yr)			
Acton MUD	1,126	1,618	2,073
Aquilla WSD			
Brandon-Irene WSC	188	191	195
Files Valley WSC and Customers	609	618	639
Cleburne	14,490	13,980	13,470
Johnson County SUD	6,612	3,007	6,461
Keene	524	609	702
Total Demand	**23,549**	**20,023**	**23,540**
Contracts in Study Area (Ac-Ft/Yr)			
Lake Aquilla			
Cleburne	5,300	5,300	5,300
Aquilla WSD *	5,953	5,953	5,953
Lake Whitney			
Cleburne	9,700	9,700	9,700
Lake Granbury			
Johnson County SUD	13,210	13,210	13,210
Acton MUD	7,000	7,000	7,000
Keene	2,040	2,040	2,040
Total Demand Based on Existing Contracts in Study Area (Ac-Ft/Yr)	**43,203**	**43,203**	**43,203**

* Not all of the water contracted with Aquilla WSD is available to the study area. Aquilla WSD has contracts to provide water to Hillsboro and others who are outside the study area.

Conclusion

The population and demand projections in the Four County Study are larger than originally projected in the 2006 regional water plans. The information presented in this memo represents FNI's recommended demands for the specified water user groups in the study area. The low and high ranges included in this memo provide a range in which the water user groups and wholesale water providers might grow in the future.

The evaluation of current supplies for each water user group in the study area will be determined in a separate document. Then, the current supplies will be compared to the projected demands presented here to determine which water user groups have sufficient water supplies to meet their projected water needs through 2030 and which entities need additional supplies. Recommended water management strategies for each water user group within the study area will be developed in a separate document.

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

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APPENDIX D

POPULATION FIGURES

Appendix D
Population Figures

This appendix includes figures that show recent population estimates and population projections for water user groups that have adjustments to their population projections. Only water user groups with changes in their recommended projections have figures shown in this appendix. The remaining water user groups have projections such that the "low", "high" and "recommended" projections are the same and result in a single line being plotted. Therefore, they were not included in this appendix.

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Figure D-1
Alvarado Population Estimates and Projections

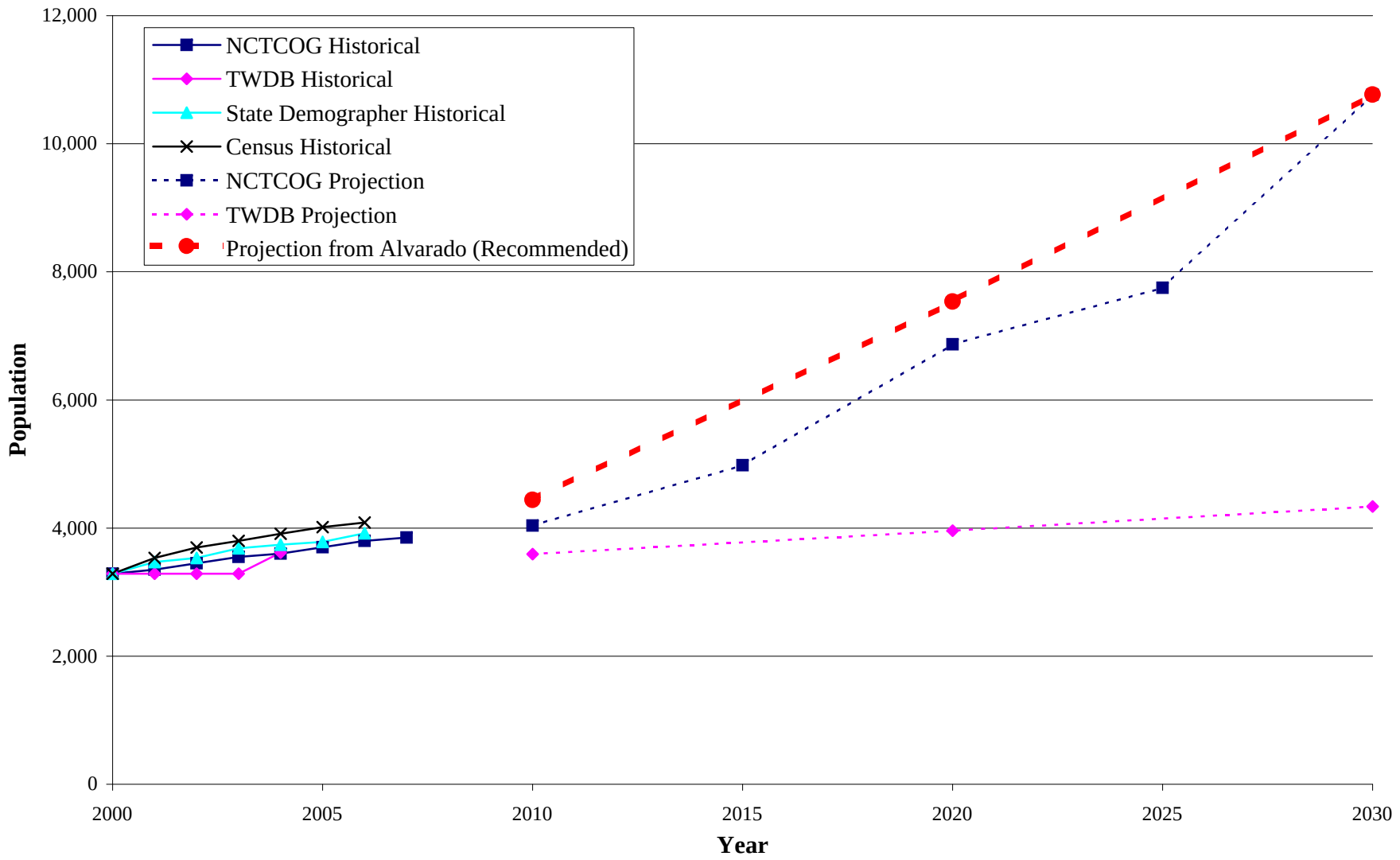
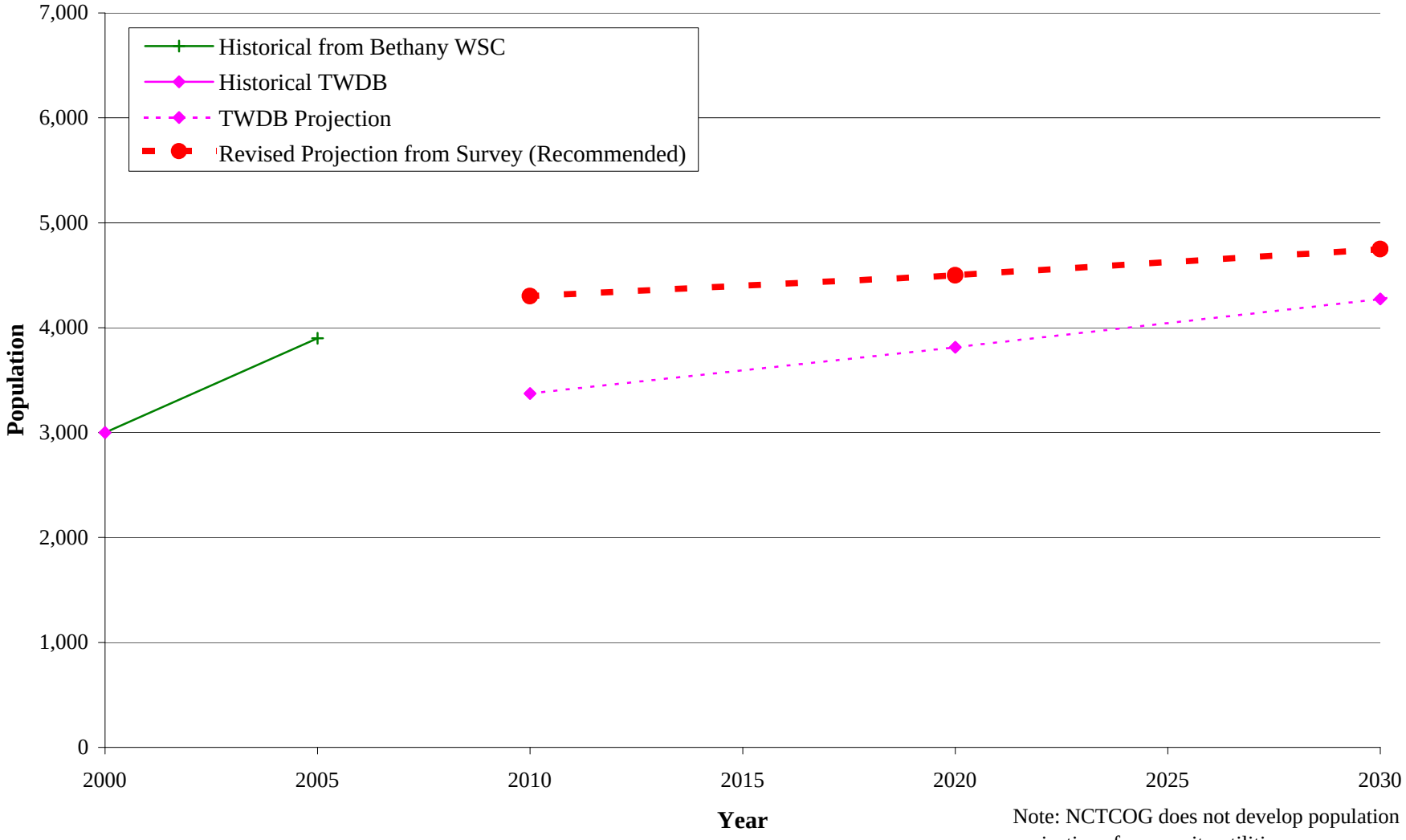
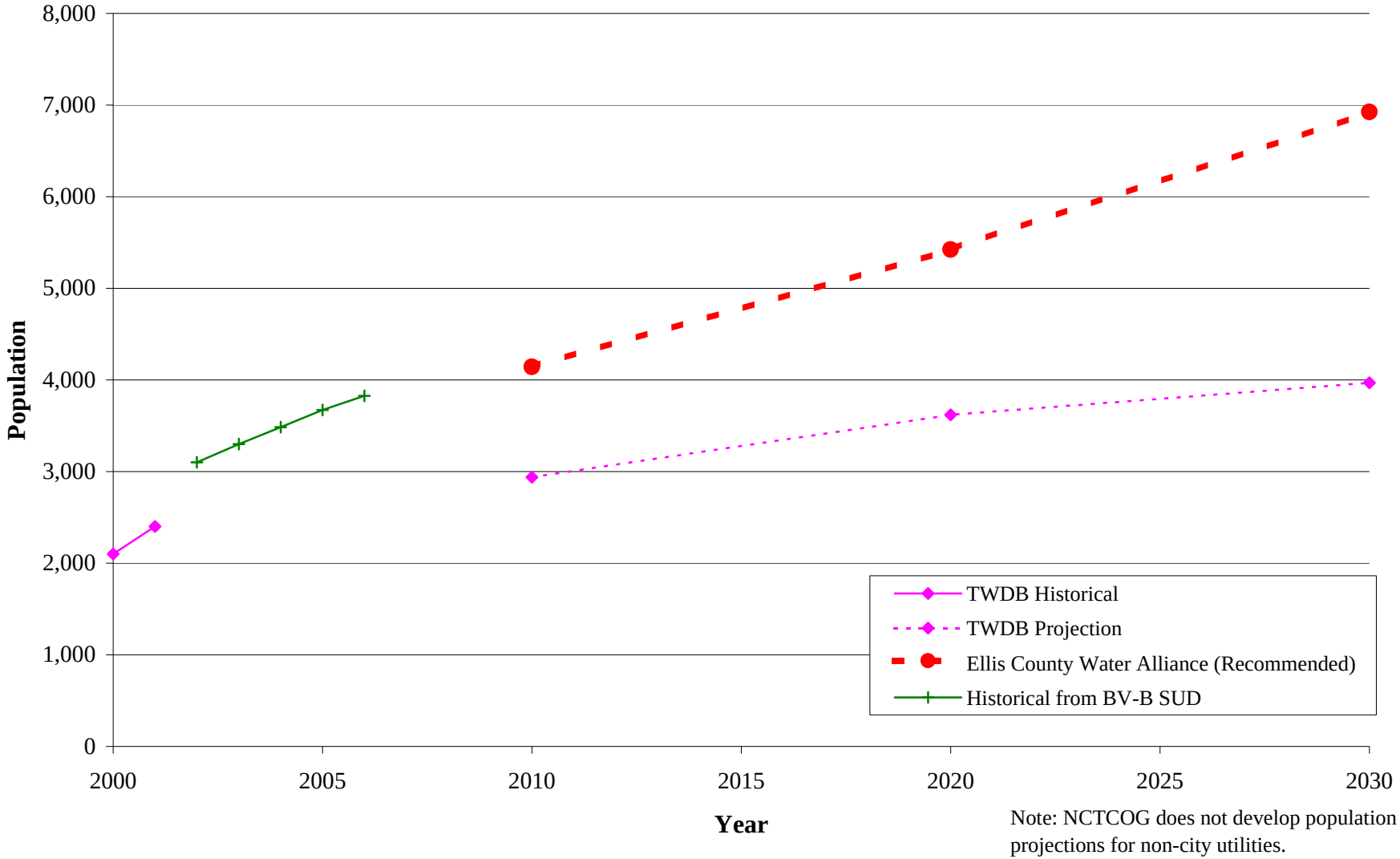


Figure D-2
Bethany WSC Population Estimates and Projections



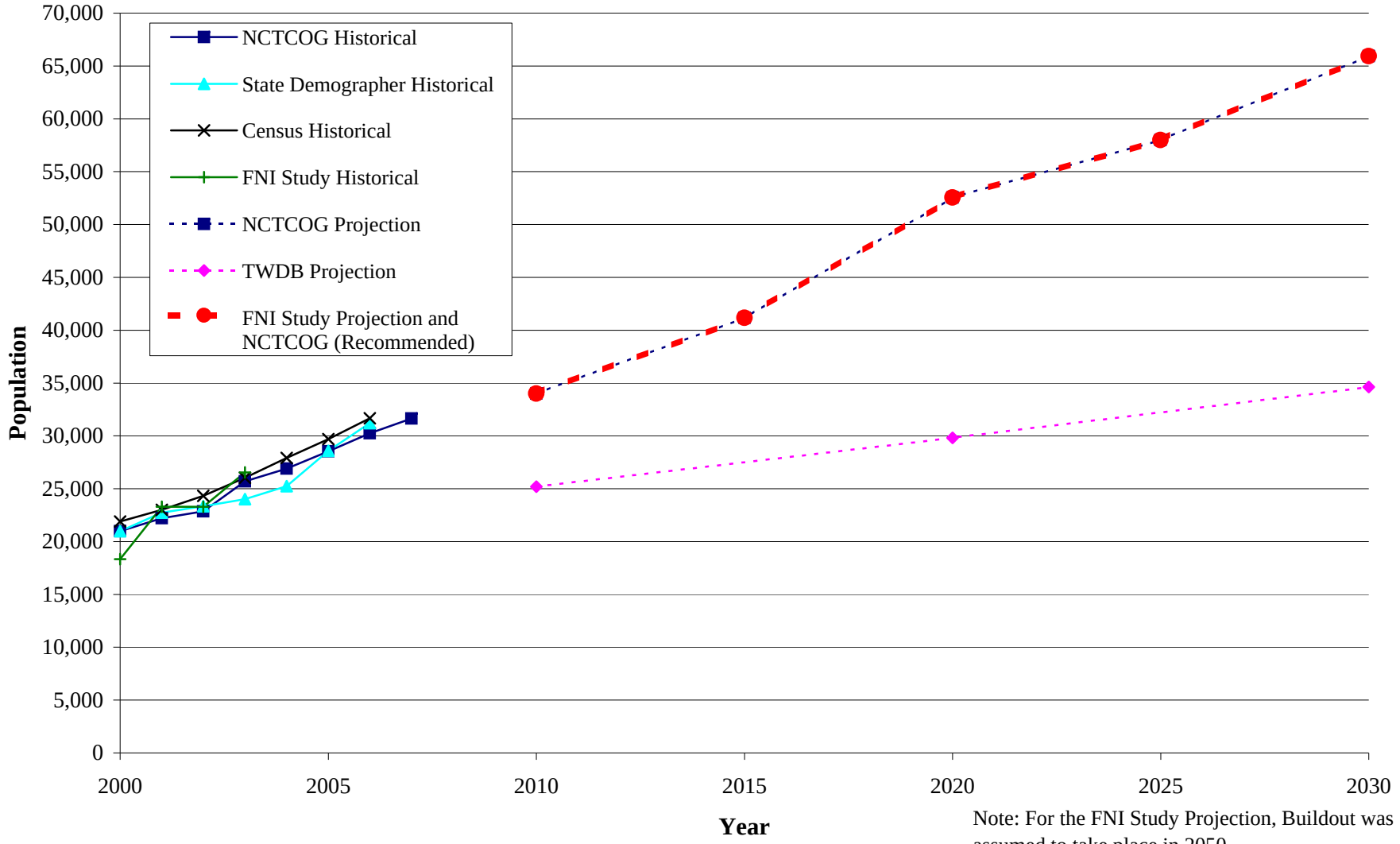
Note: NCTCOG does not develop population projections for non-city utilities.

Figure D-3
Buena Vista-Bethel SUD Population Estimates and Projections



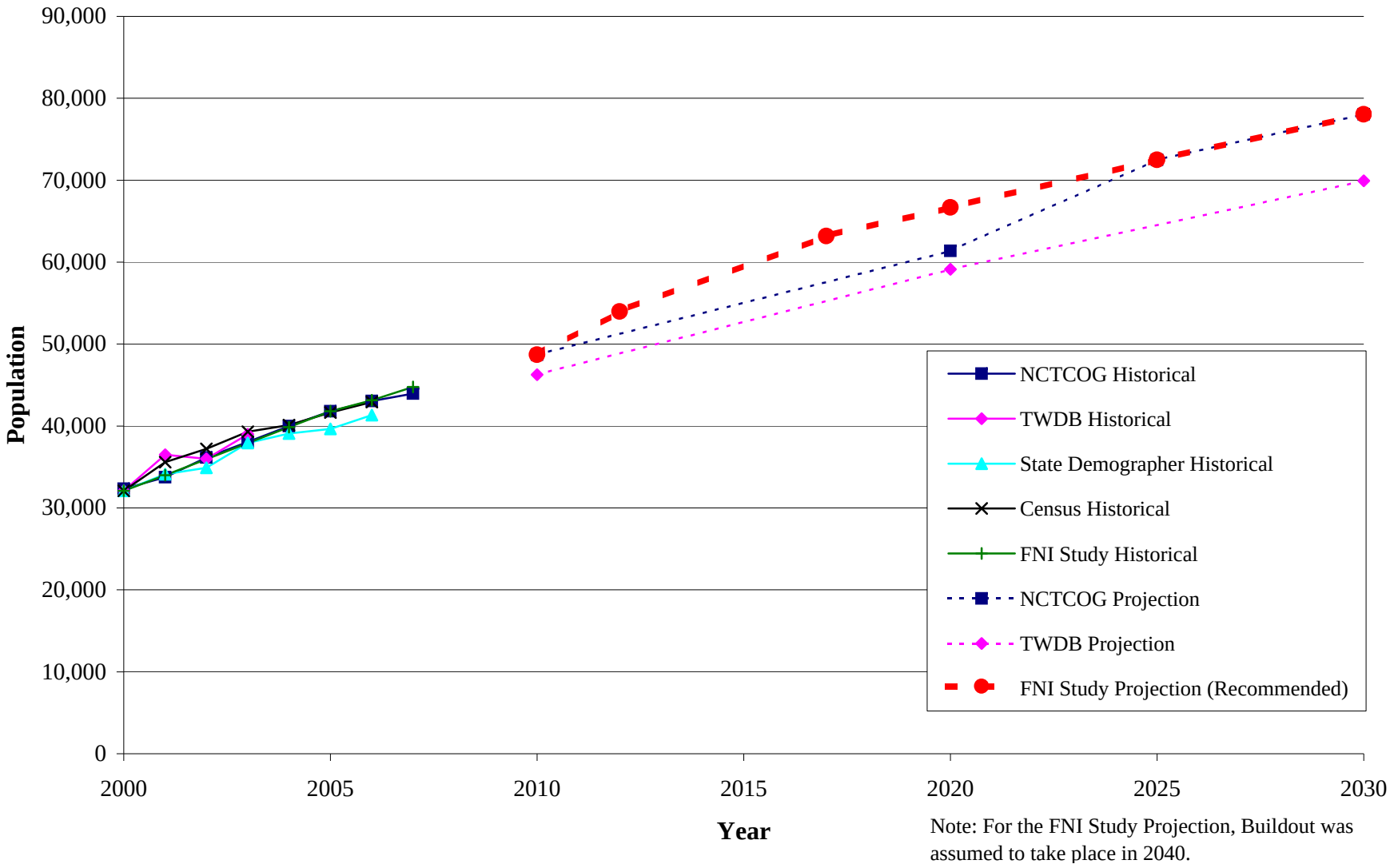
Note: NCTCOG does not develop population projections for non-city utilities.

Figure D-4
Burleson Population Estimates and Projections



Note: For the FNI Study Projection, Buildout was assumed to take place in 2050.

Figure D-5
Cedar Hill Population Estimates and Projections



Note: For the FNI Study Projection, Buildout was assumed to take place in 2040.

Figure D-6
Cleburne Population Estimates and Projections

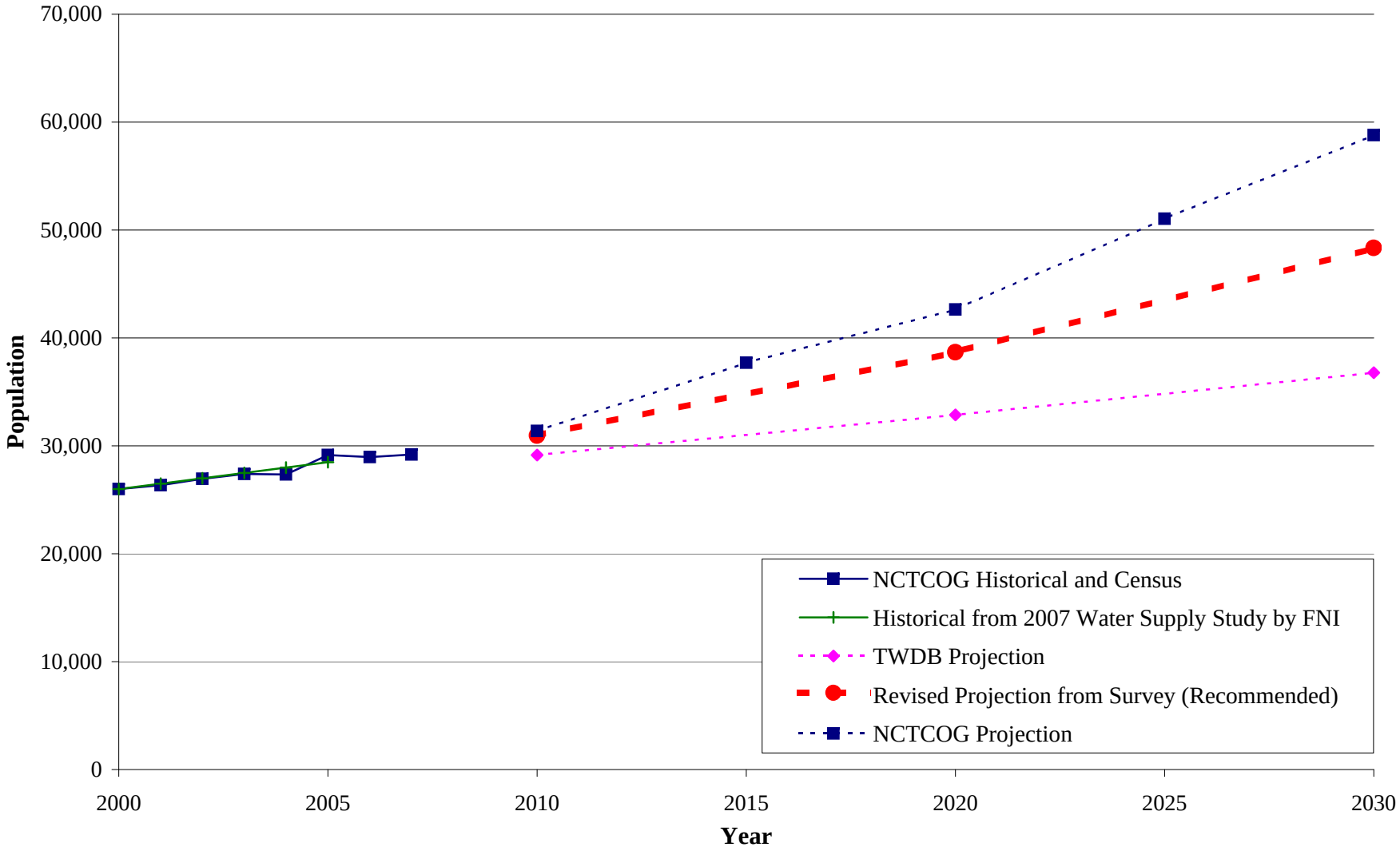
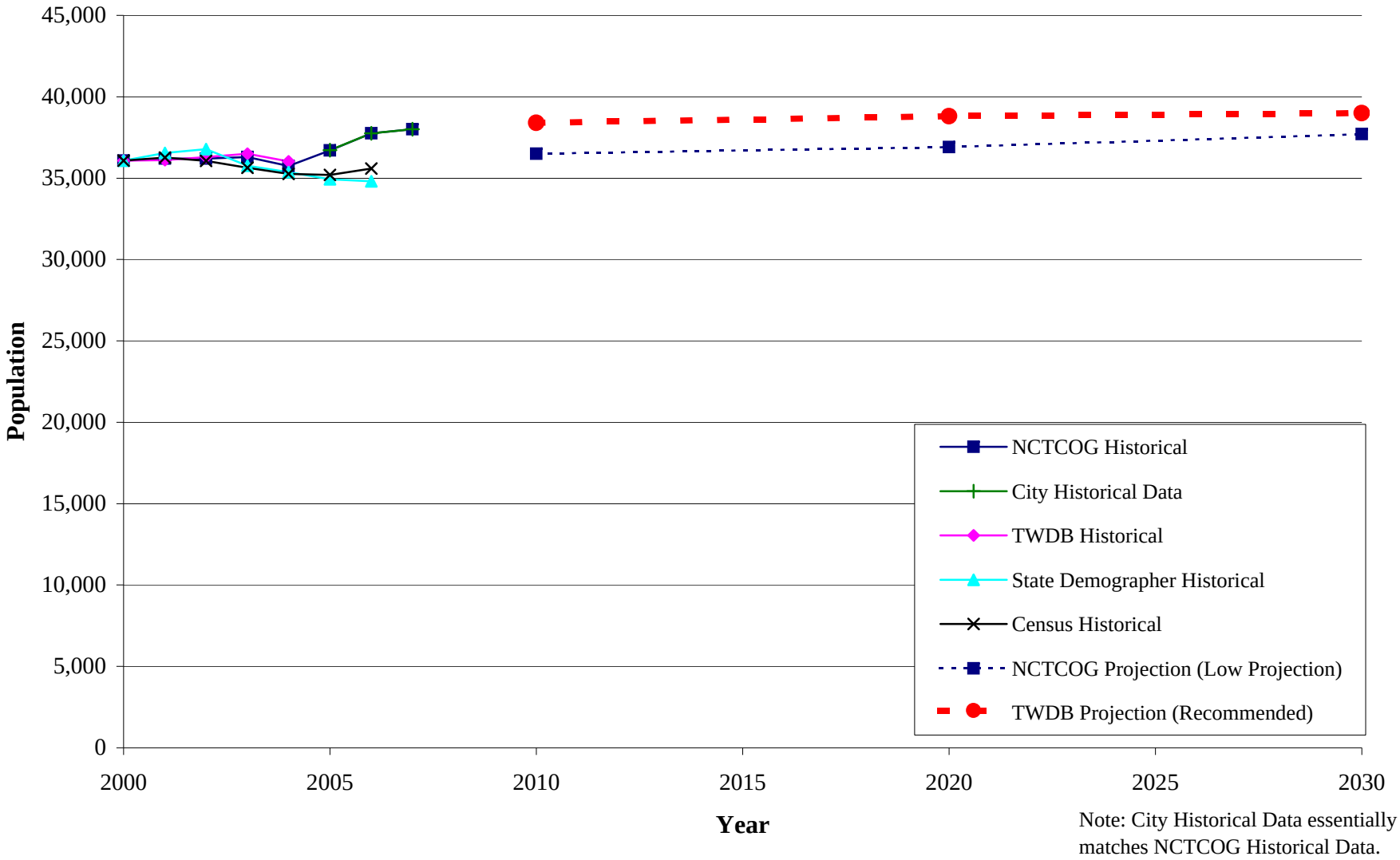


Figure D-7
Duncanville Population Estimates and Projections



Note: City Historical Data essentially matches NCTCOG Historical Data.

Figure D-8
Ennis Population Estimates and Projections

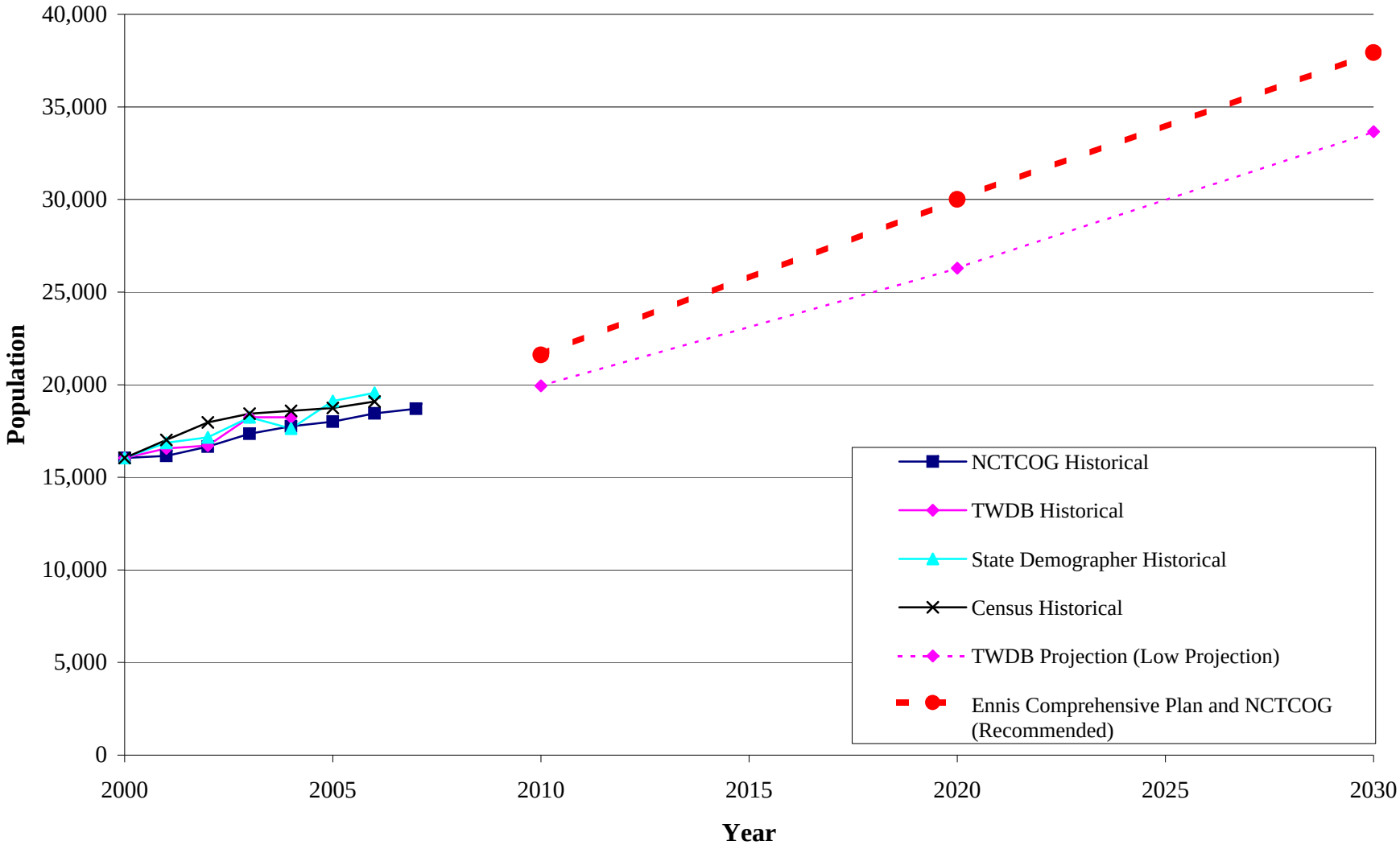


Figure D-9
Ferris Population Estimates and Projections

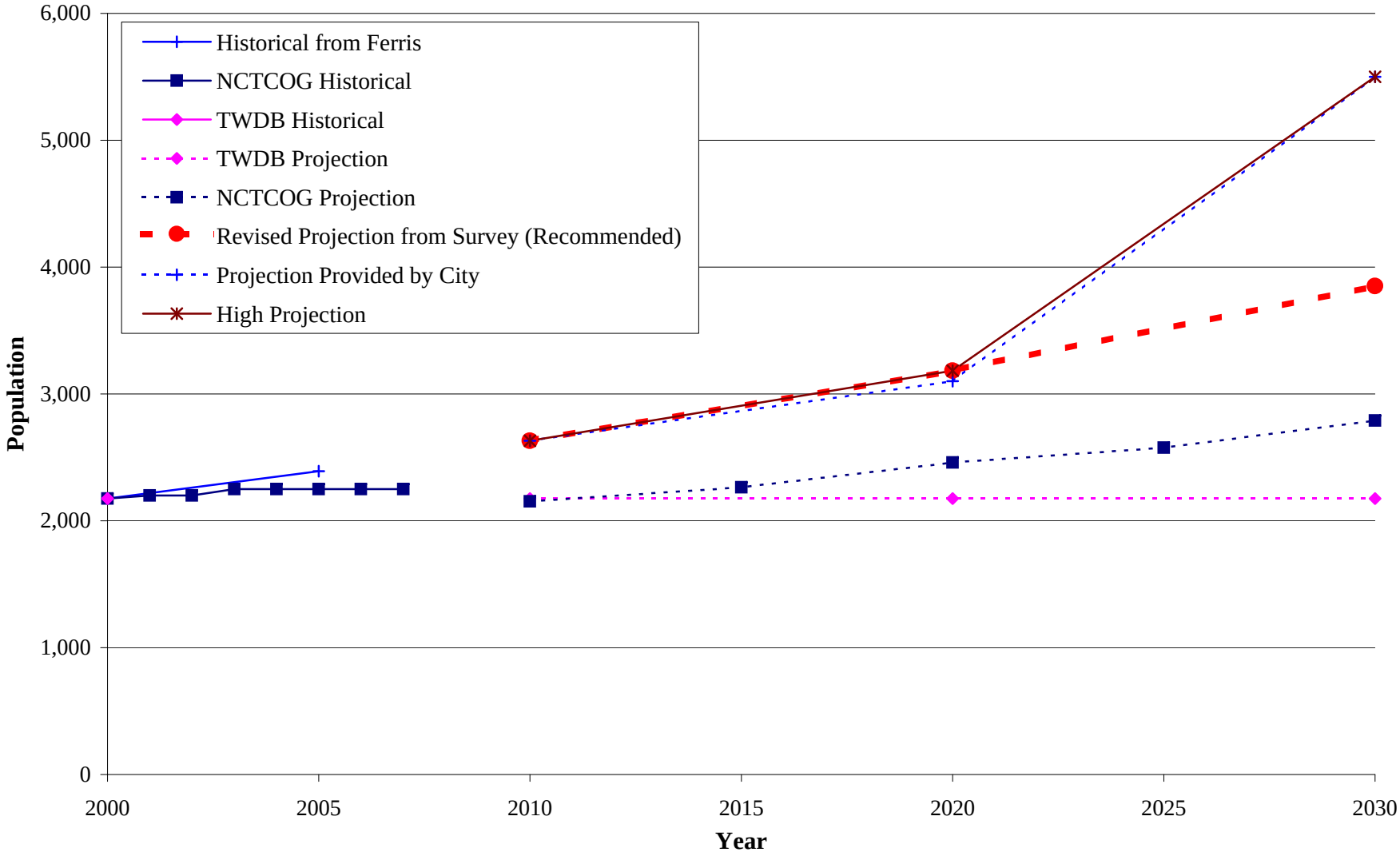
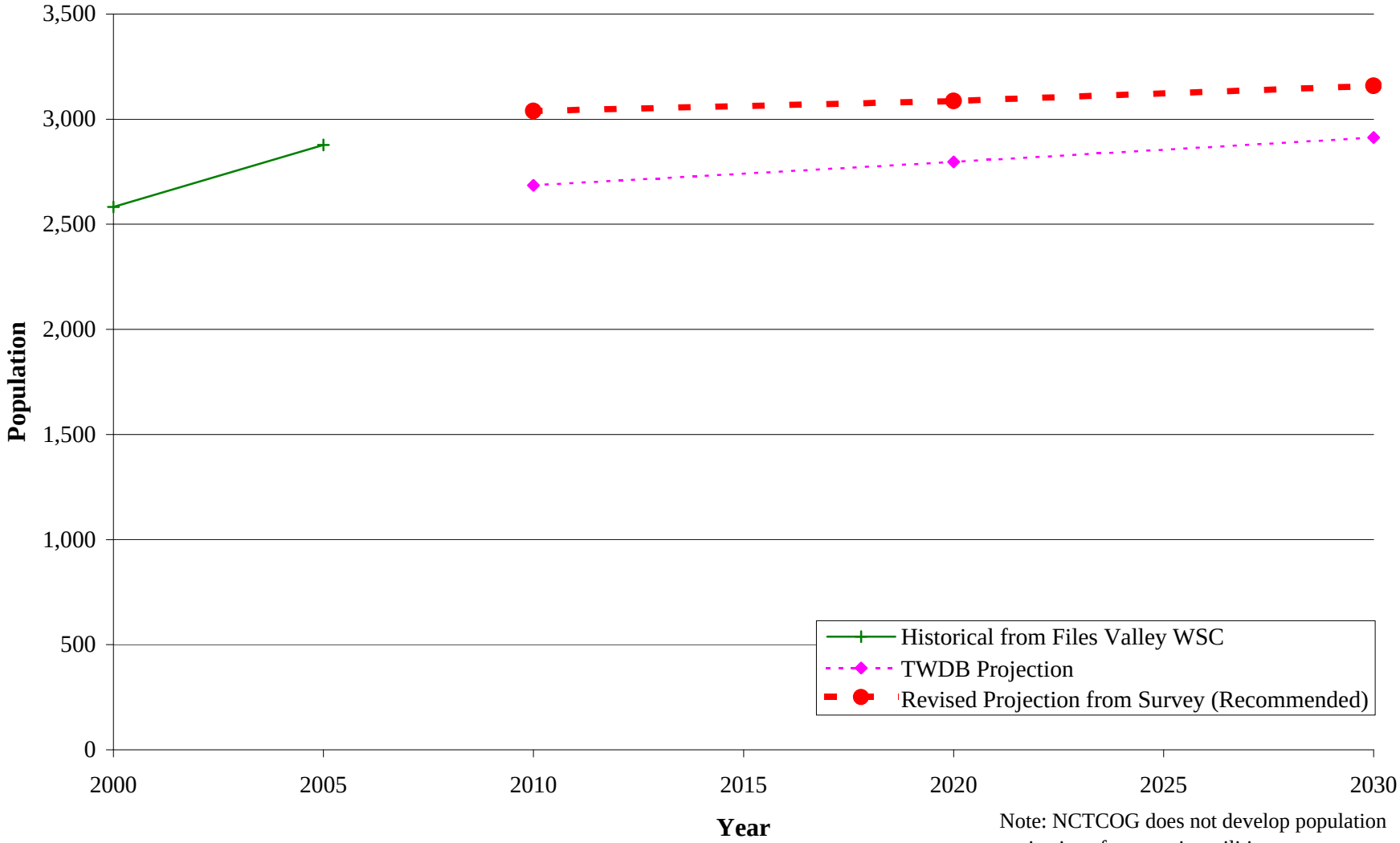


Figure D-10
Files Valley WSC Population Estimates and Projections



Note: NCTCOG does not develop population projections for non-city utilities.

Figure D-11
Grand Prairie Population Estimates and Projections

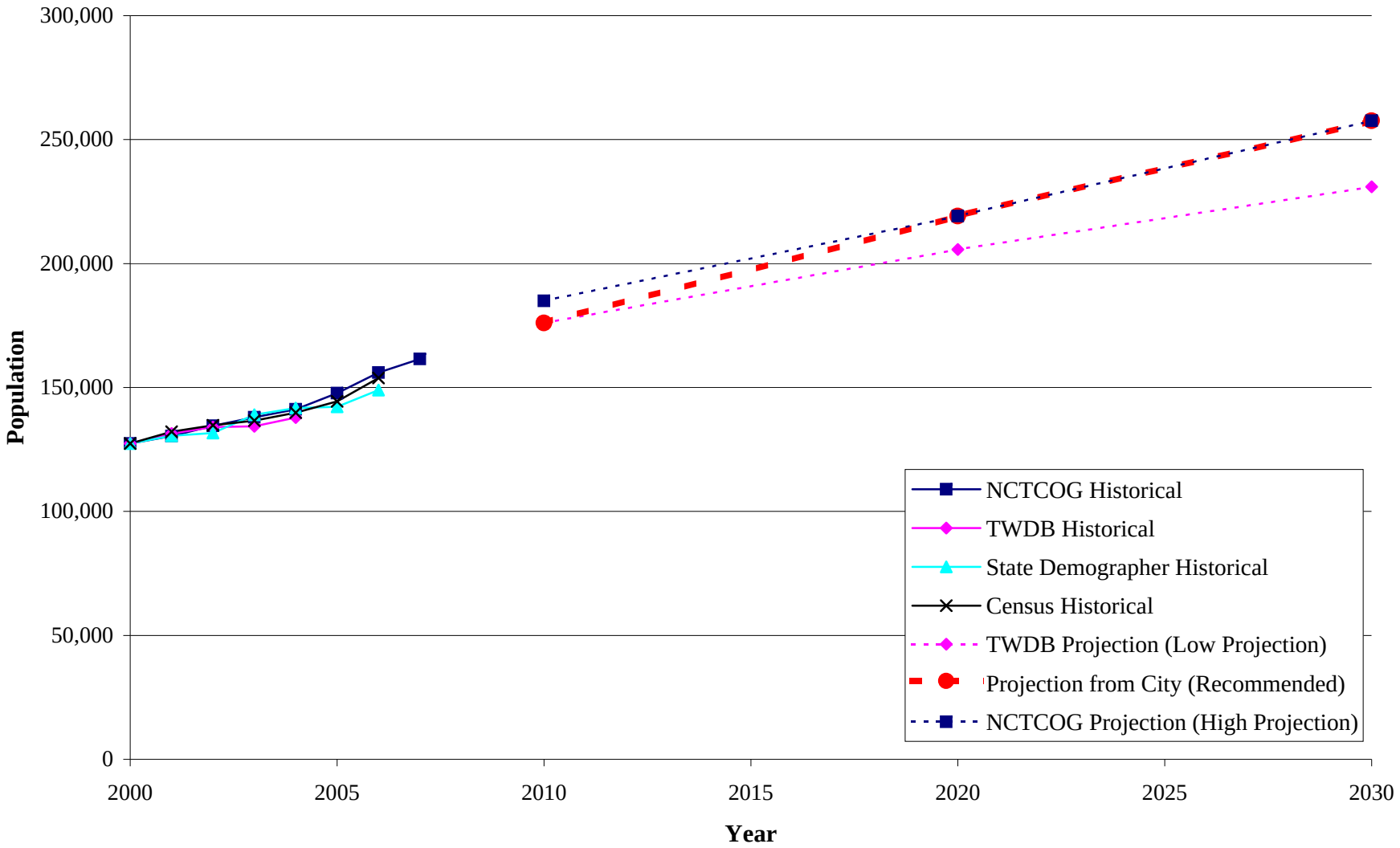


Figure D-12
Grandview Population Estimates and Projections

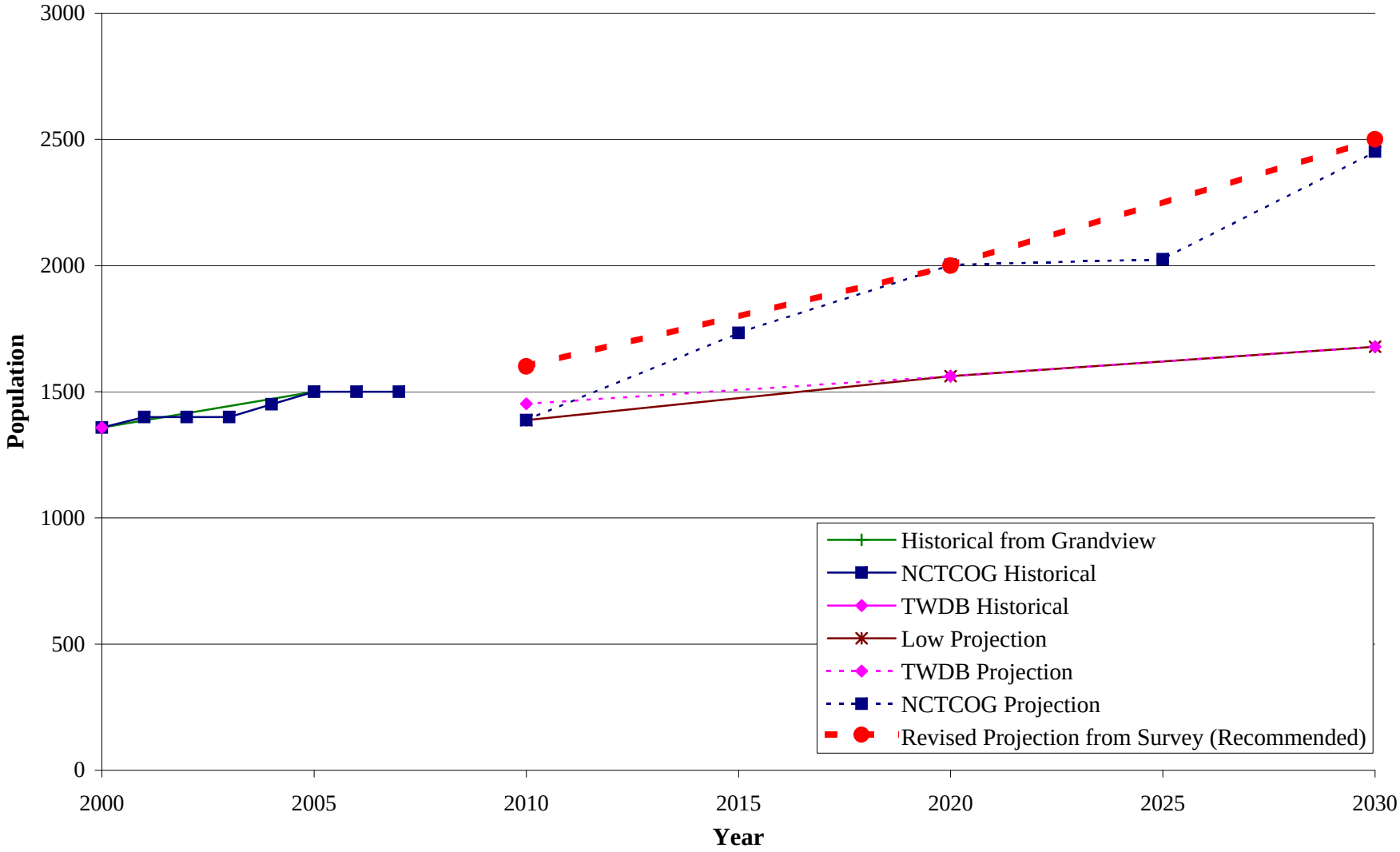
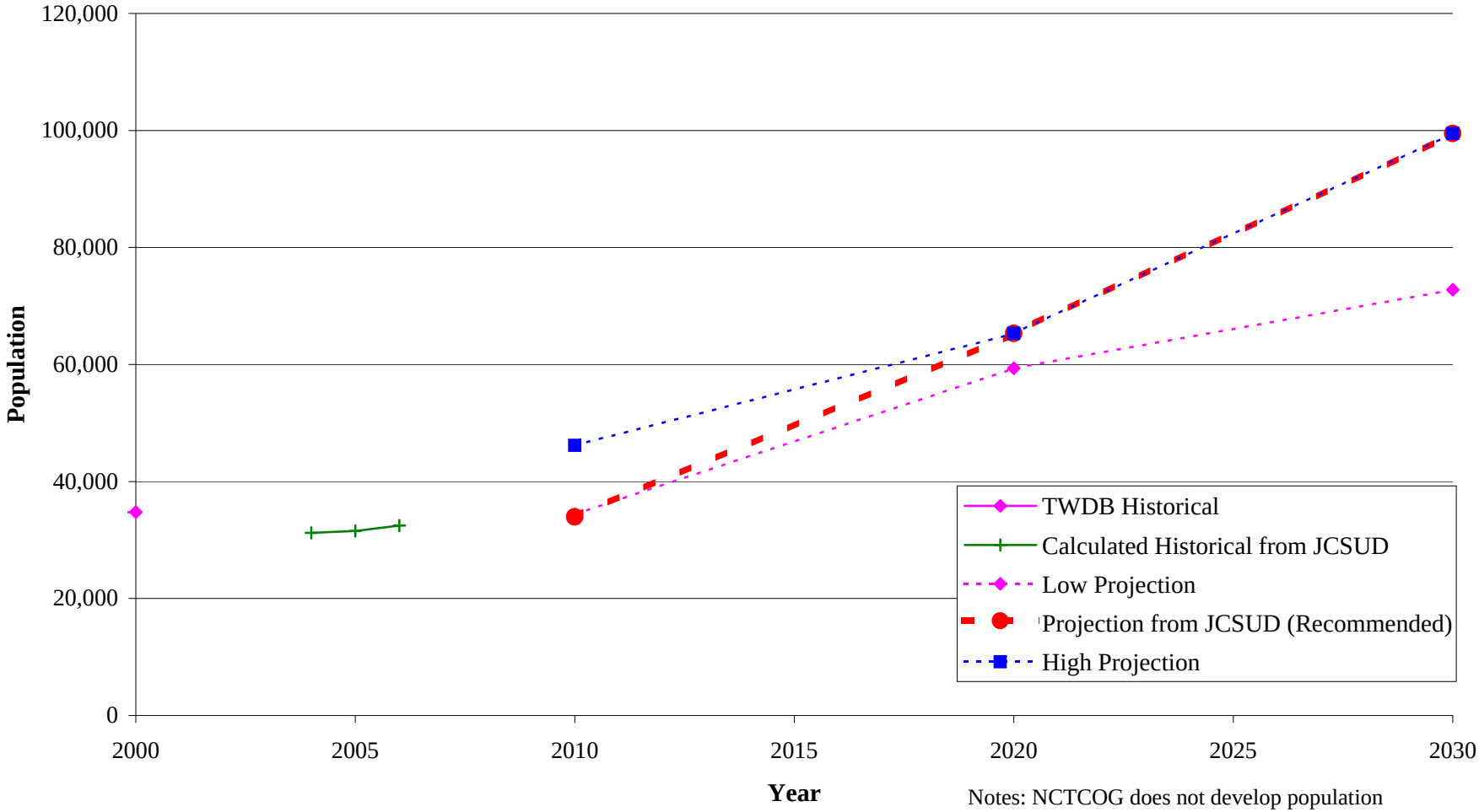


Figure D-13
Johnson County SUD
Population Estimates and Projections



Notes: NCTCOG does not develop population projections for non-city utilities.
Calculated values assume 2.75 people per connection.

Figure D-14
Joshua Population Estimates and Projections

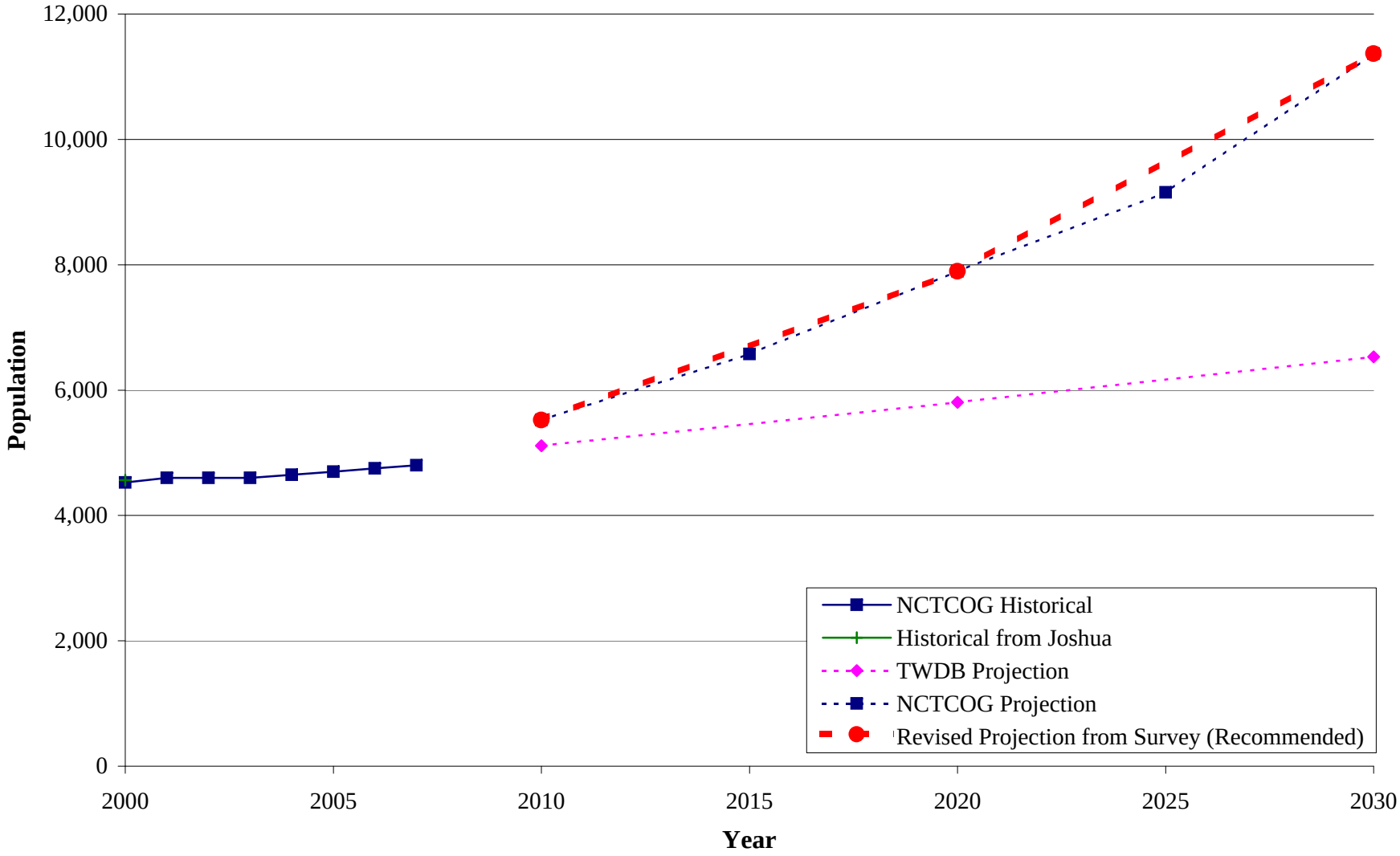


Figure D-15
Kennedale Population Estimates and Projections

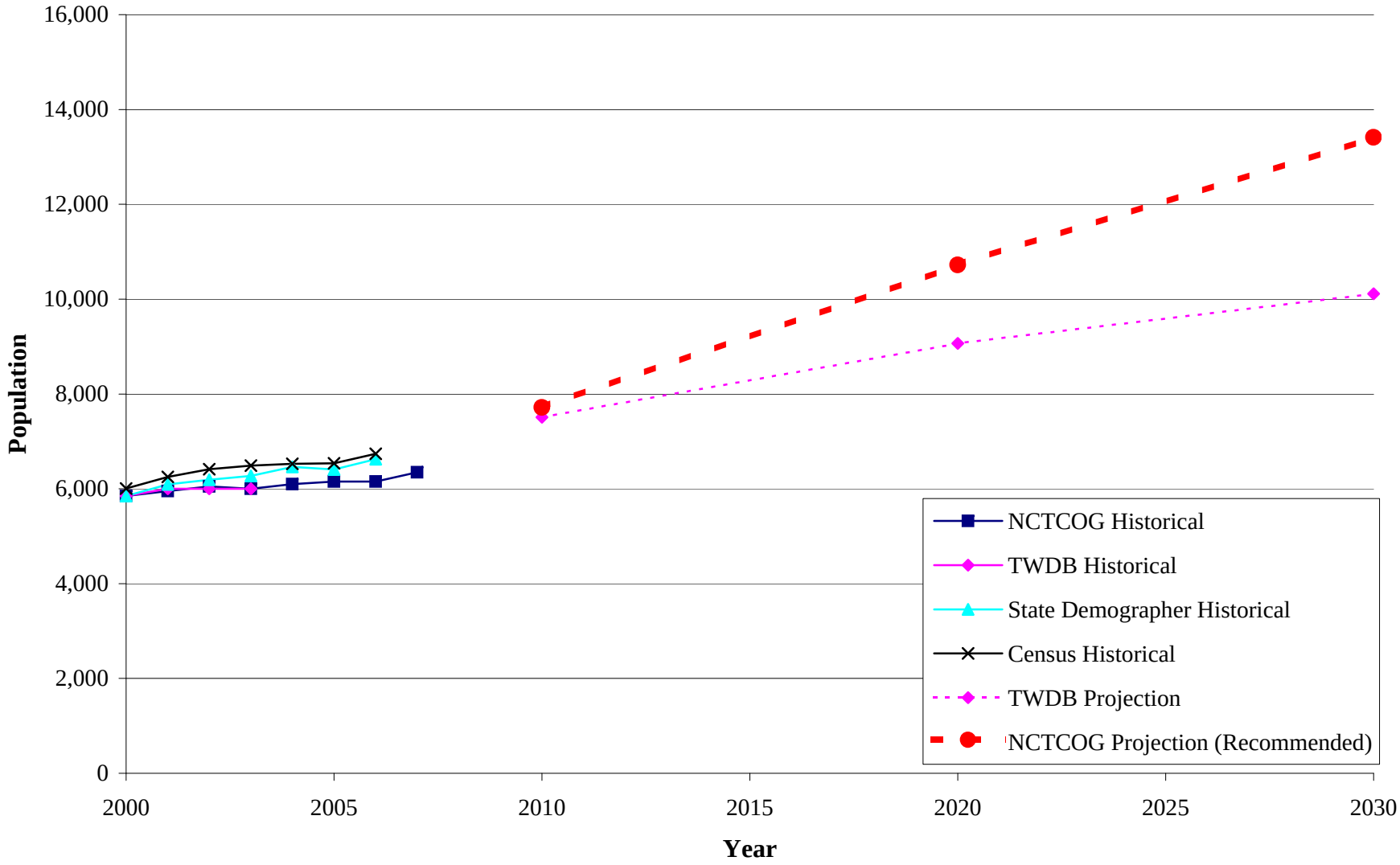


Figure D-16
Mansfield Population Estimates and Projections
(Tarrant, Ellis and Johnson Counties)

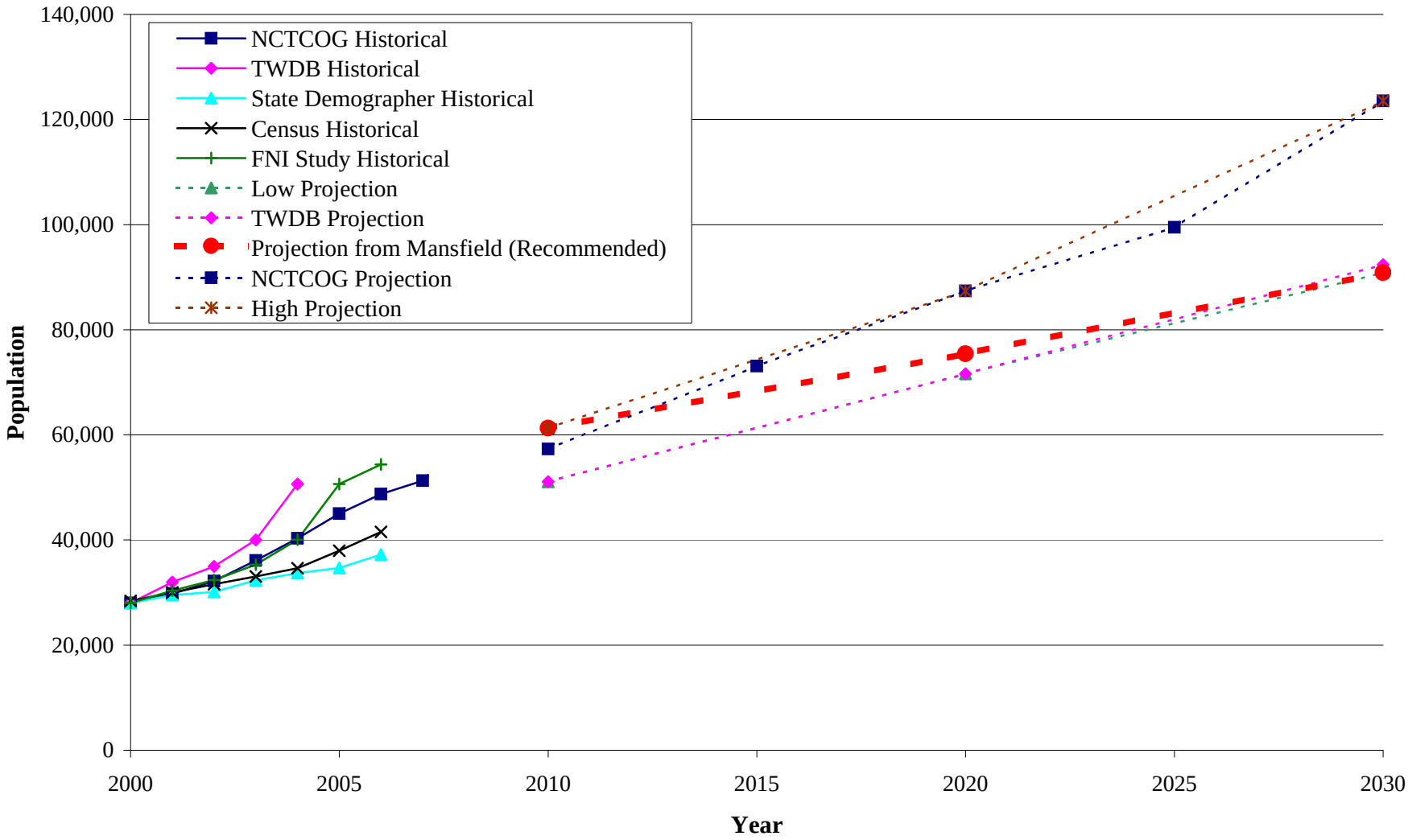


Figure D-17
Midlothian Population Estimates and Projections

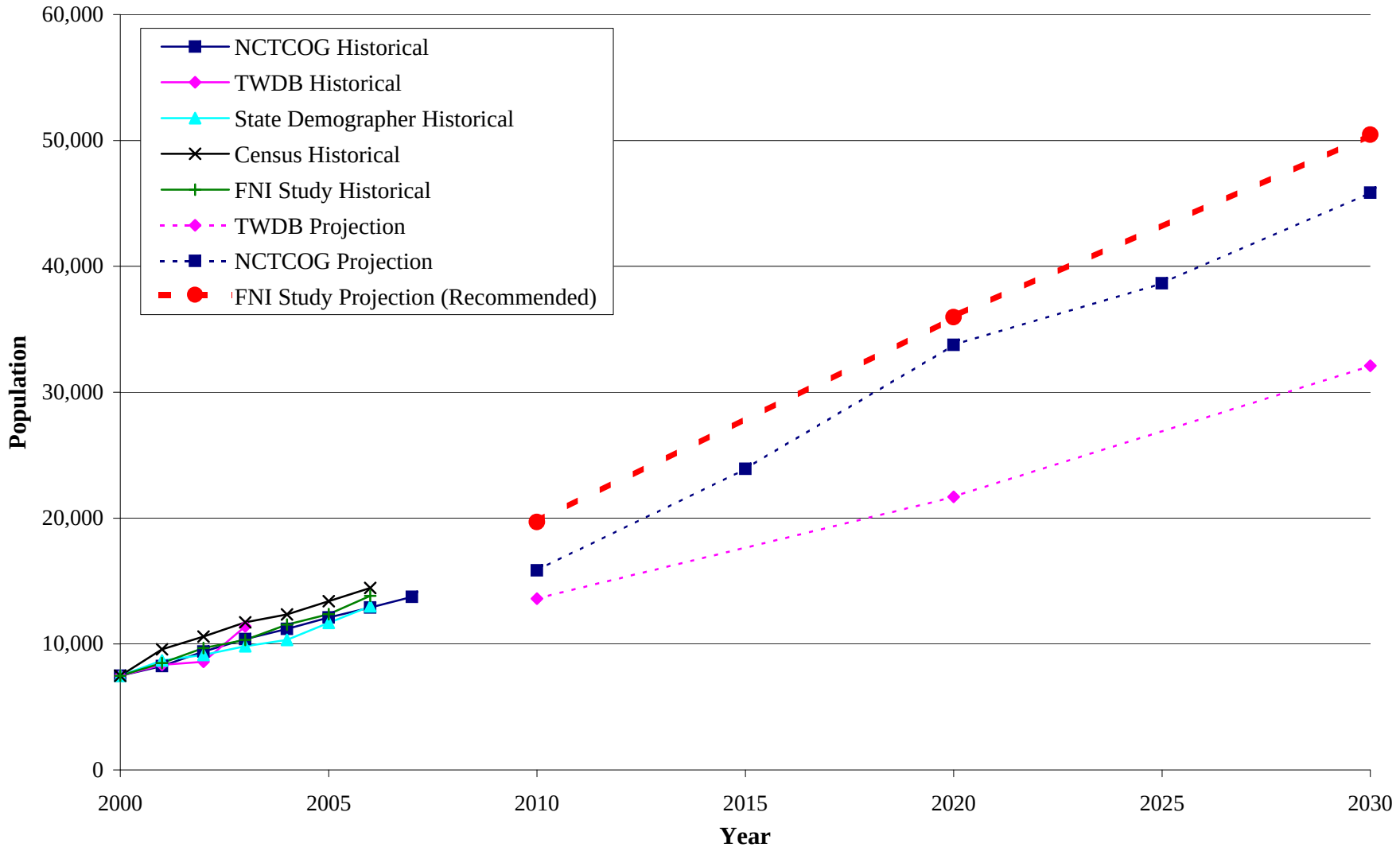
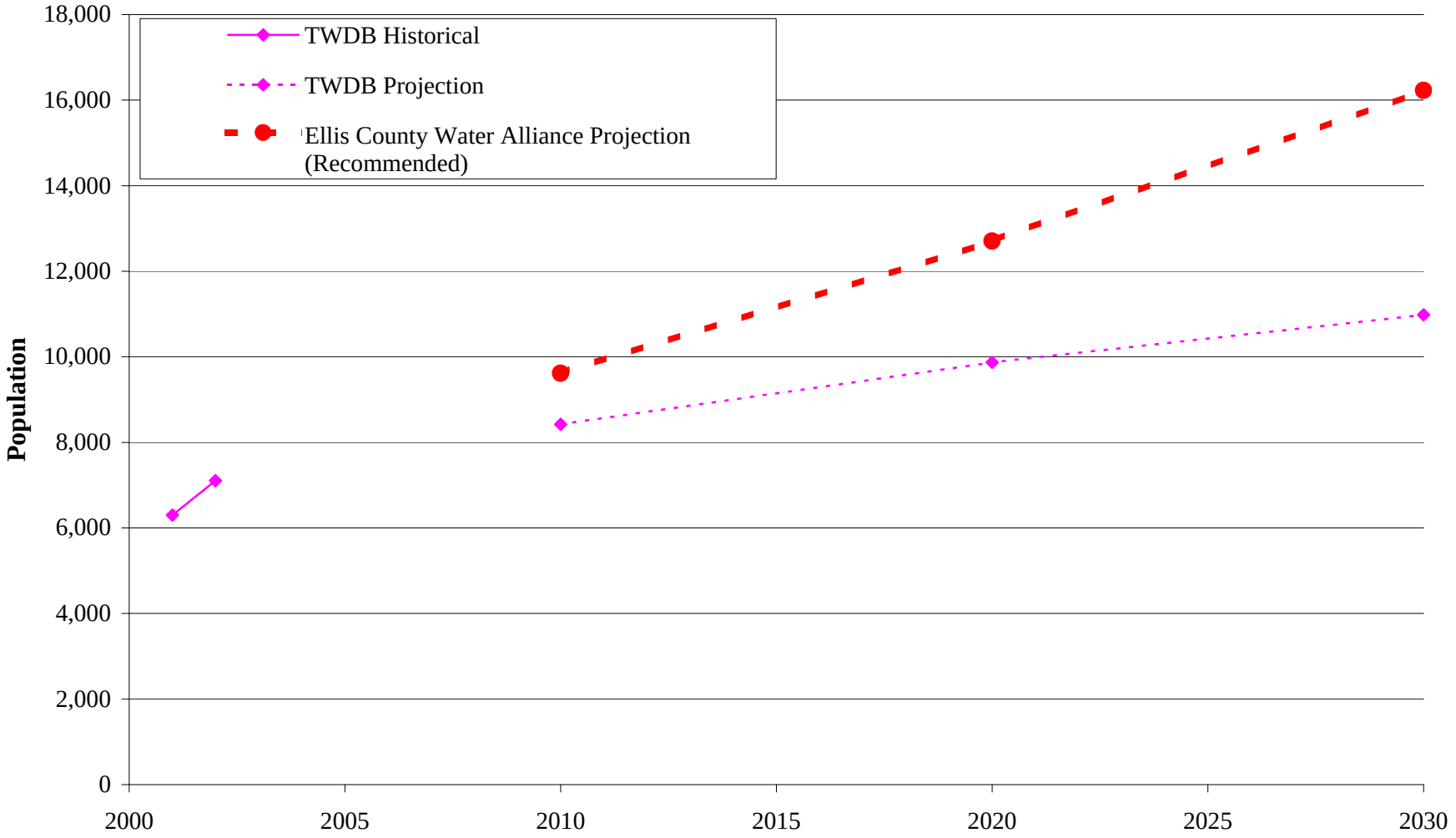
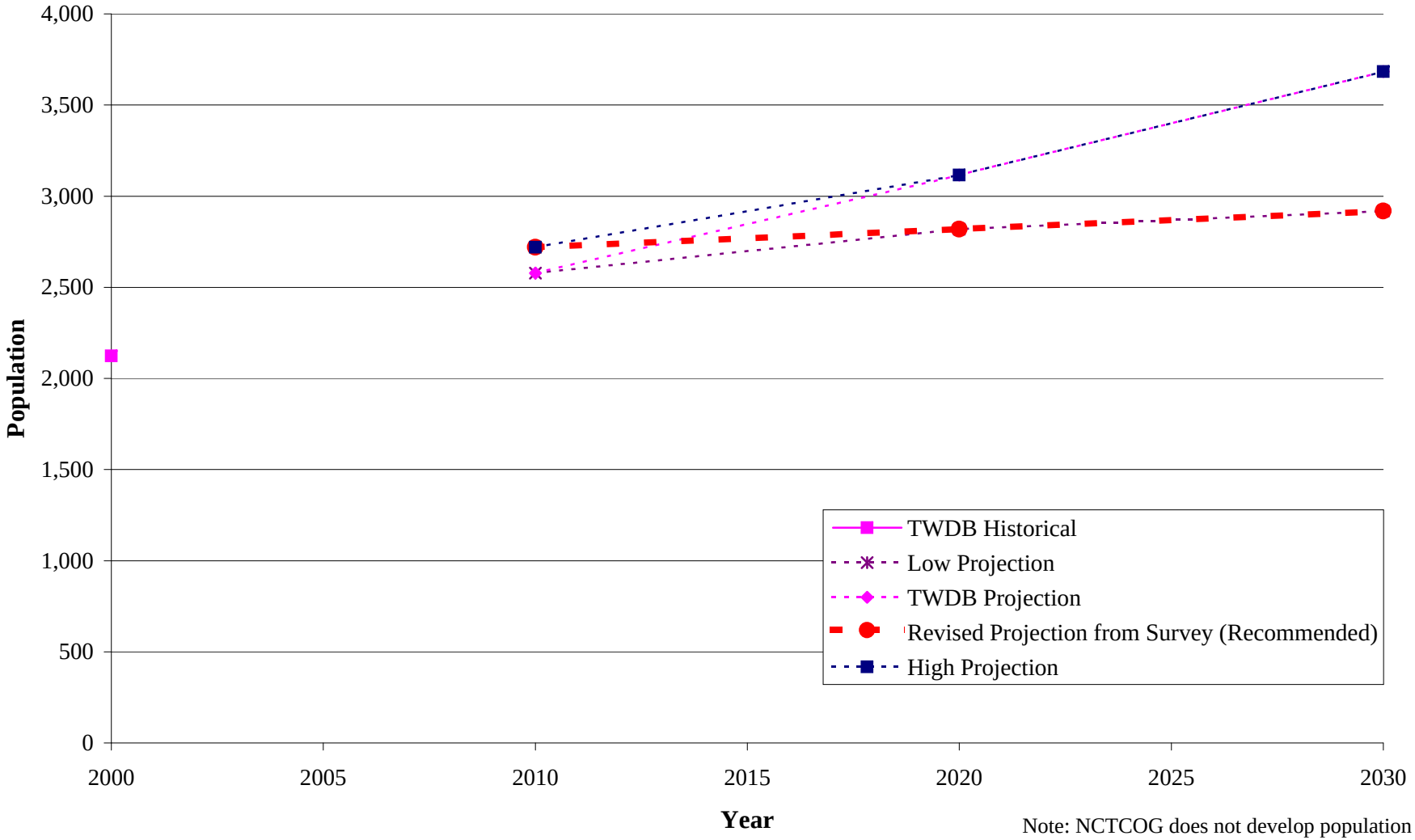


Figure D-18
Mountain Peak SUD Population Estimates and Projections



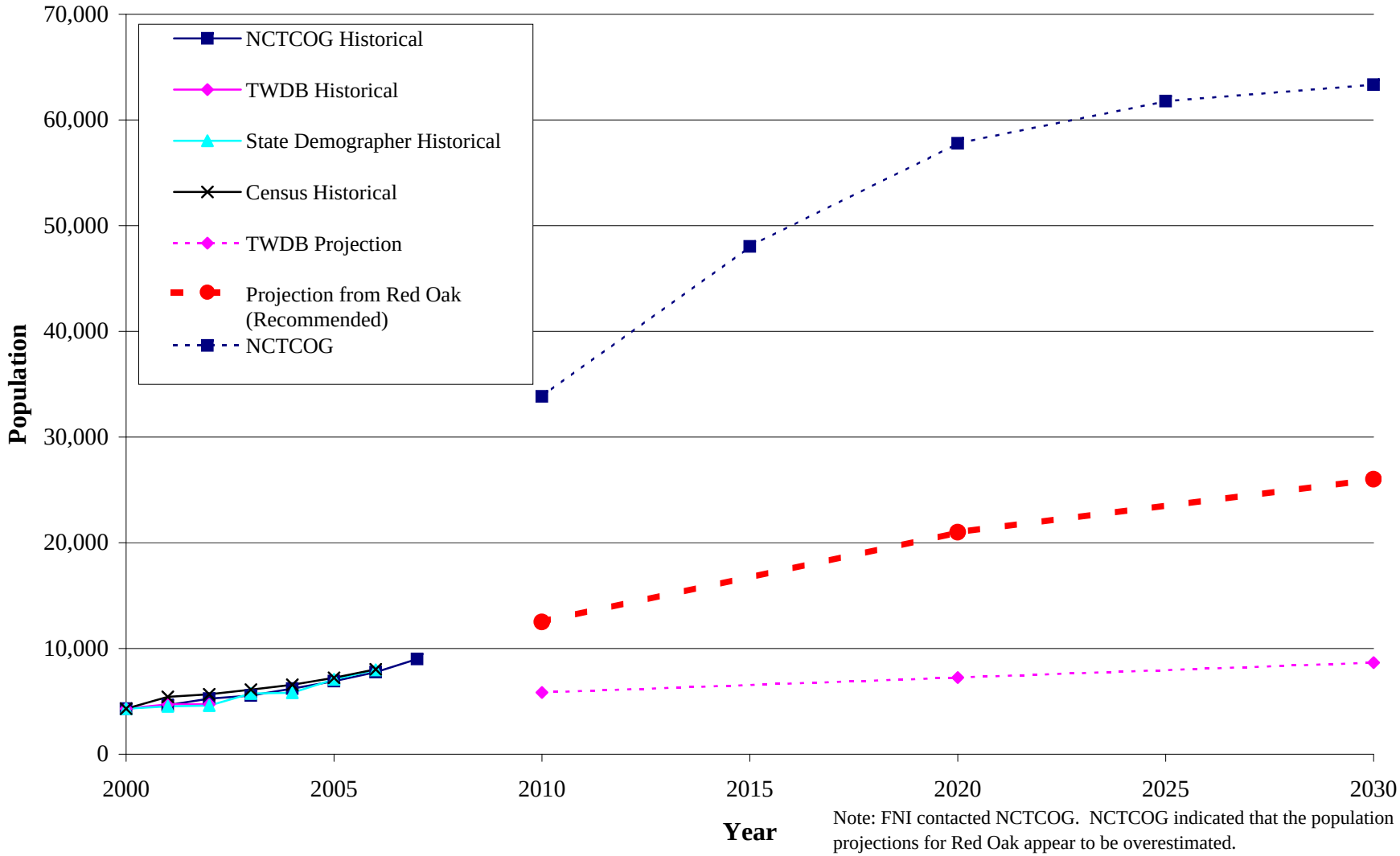
Note: NCTCOG does not develop population projections for non-city utilities.

Figure D-19
Parker WSC Population Estimates and Projections



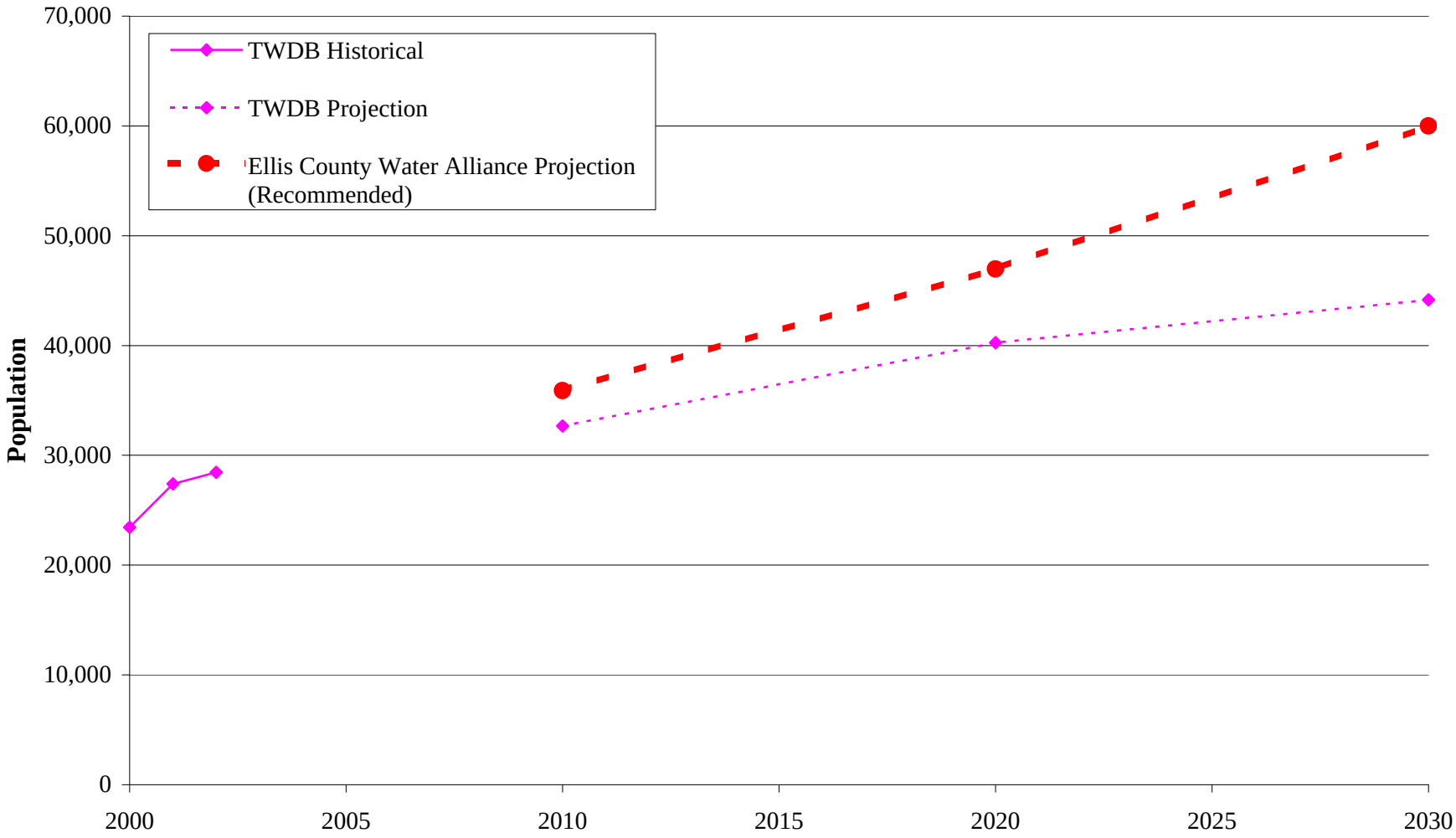
Note: NCTCOG does not develop population projections for non-city utilities.

Figure D-20
Red Oak Population Estimates and Projections



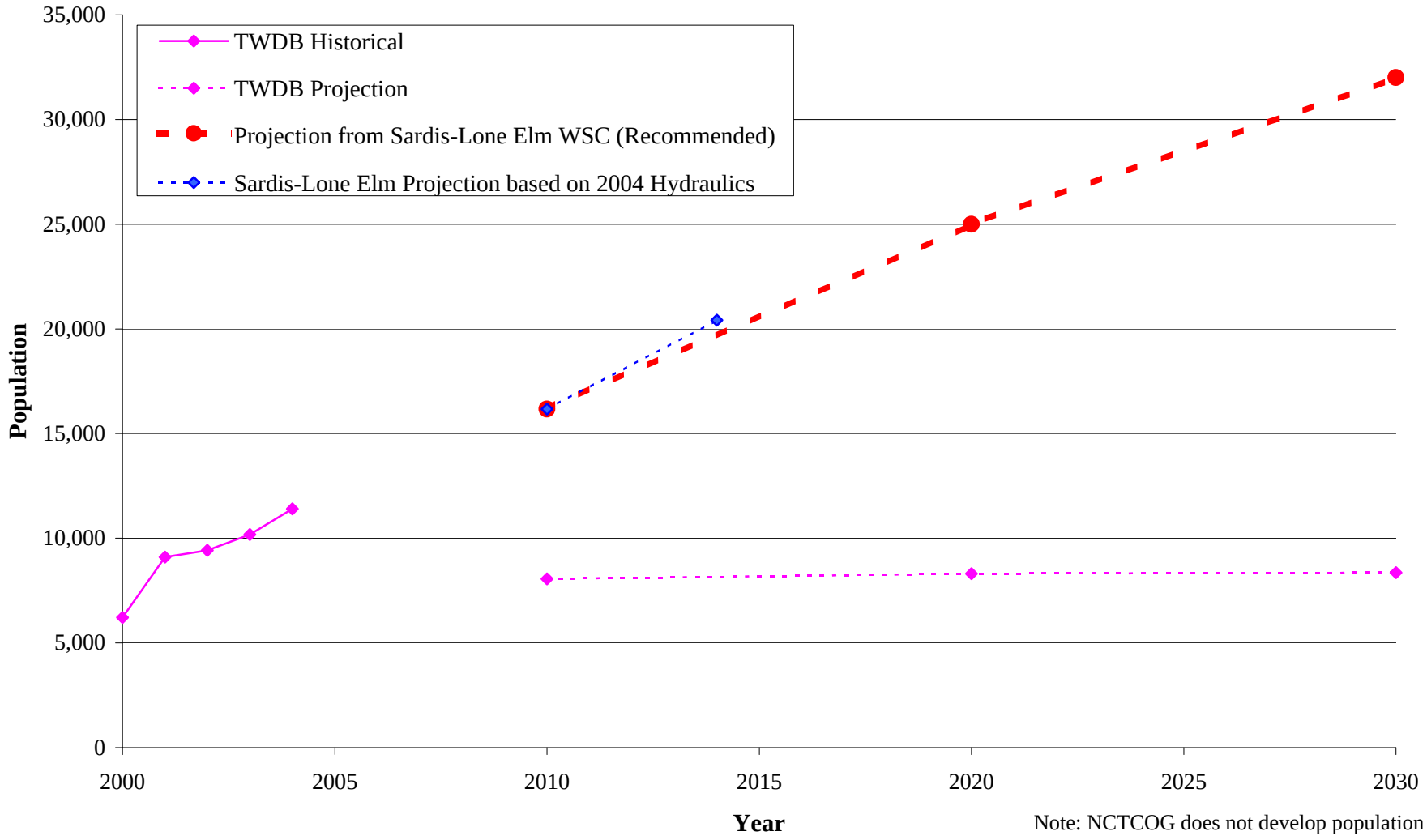
Note: FNI contacted NCTCOG. NCTCOG indicated that the population projections for Red Oak appear to be overestimated.

Figure D-21
Rockett SUD Population Estimates and Projections



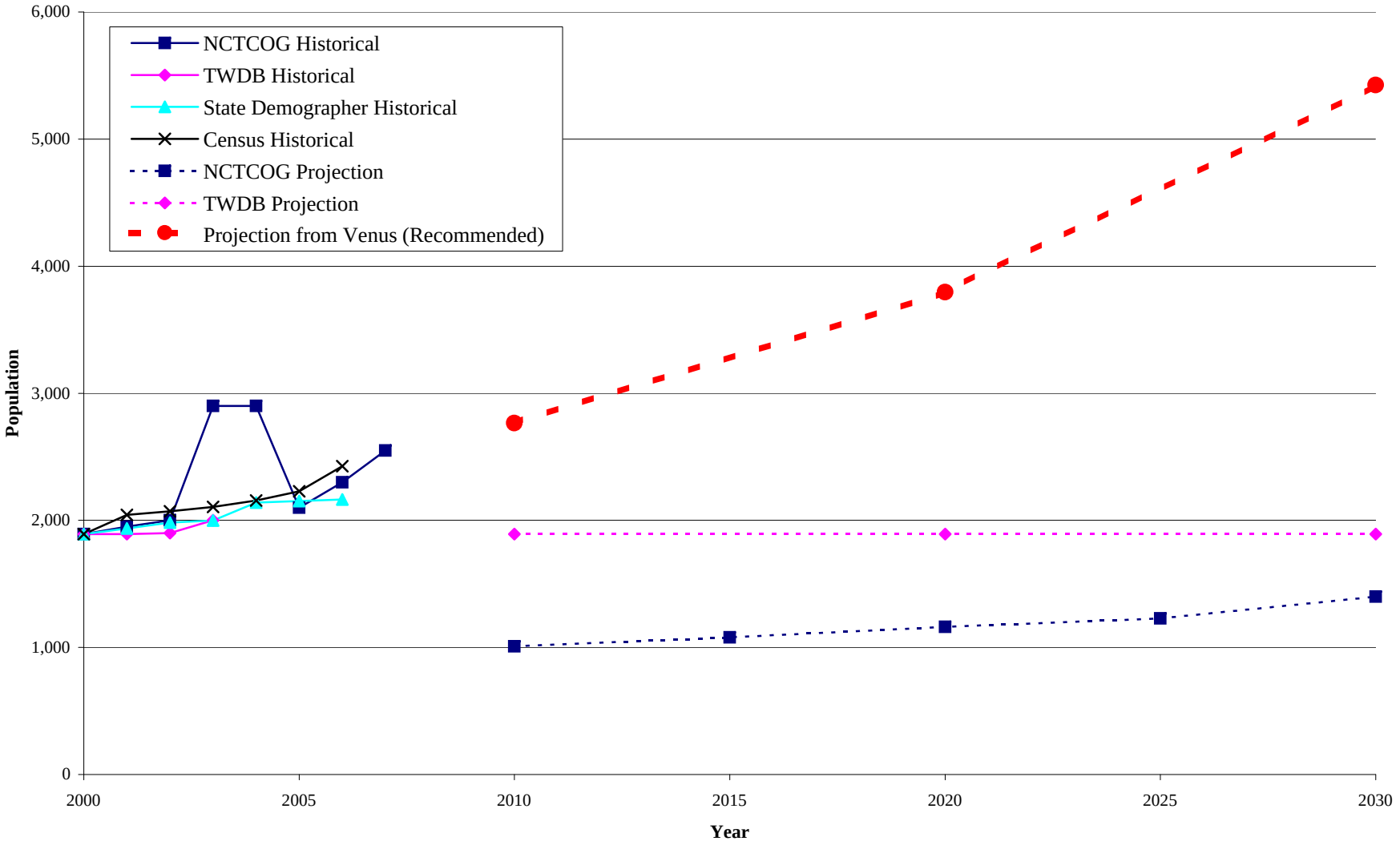
Note: NCTCOG does not develop population projections for non-city utilities.

Figure D-22
Sardis-Lone Elm WSC Population Estimates and Projections



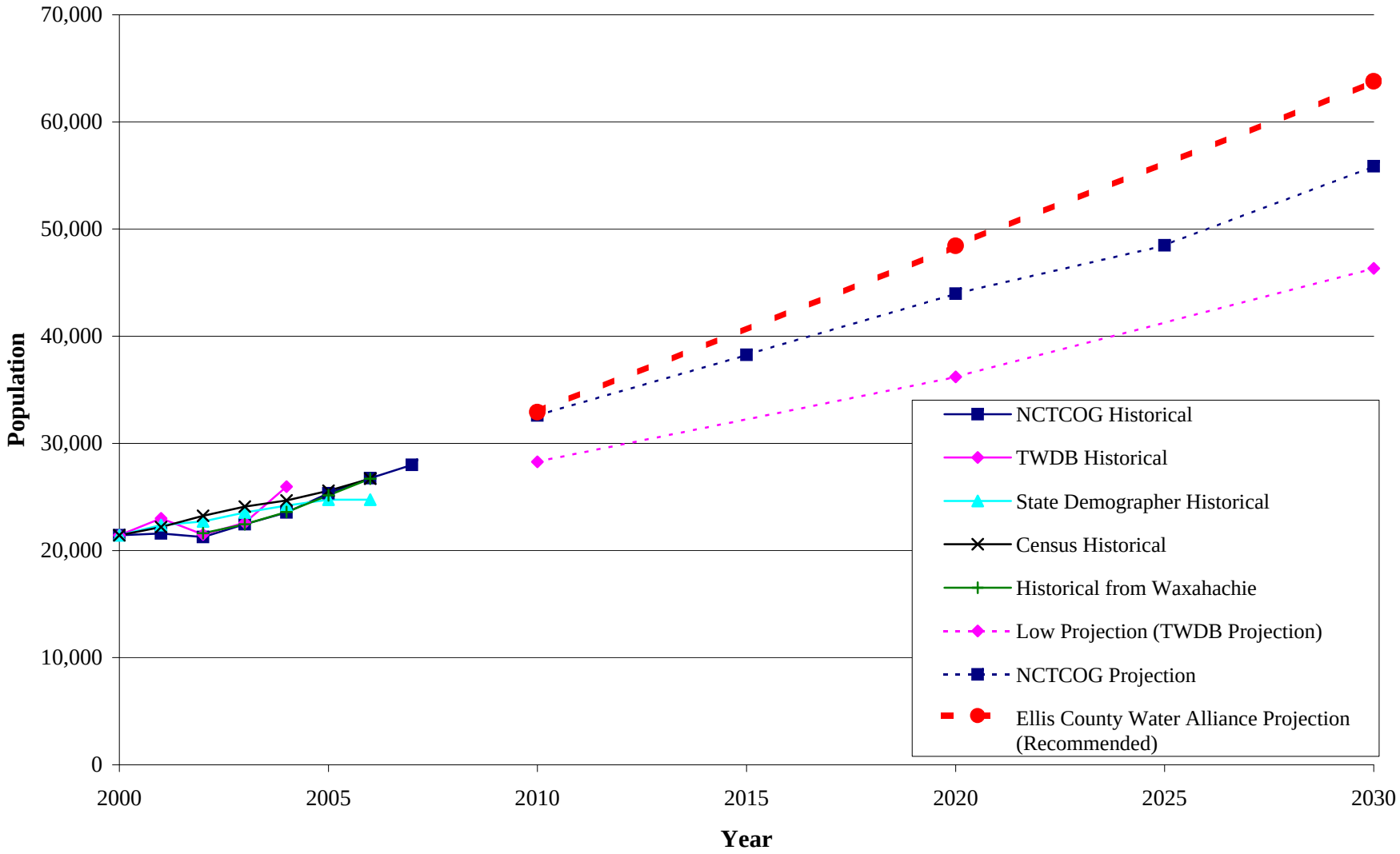
Note: NCTCOG does not develop population projections for non-city utilities.

Figure D-23
Venus Population Estimates and Projections



Note: TWDB and Recommended Projections include prison population.

Figure D-24
Waxahachie Population Estimates and Projections



APPENDIX E

WATER DEMAND FIGURES

Appendix E
Water Demand Figures

This appendix includes figures that show recent water use and water demand projections for water user groups that have adjustments to their projections. Only water user groups with changes in their recommended water needs have figures shown in this appendix. The remaining water user groups have projections such that the "low", "high" and "recommended" projections are the same and result in a single line being plotted. Therefore, they were not included in this appendix.

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Alvarado Water Use Estimates and Demand Projections

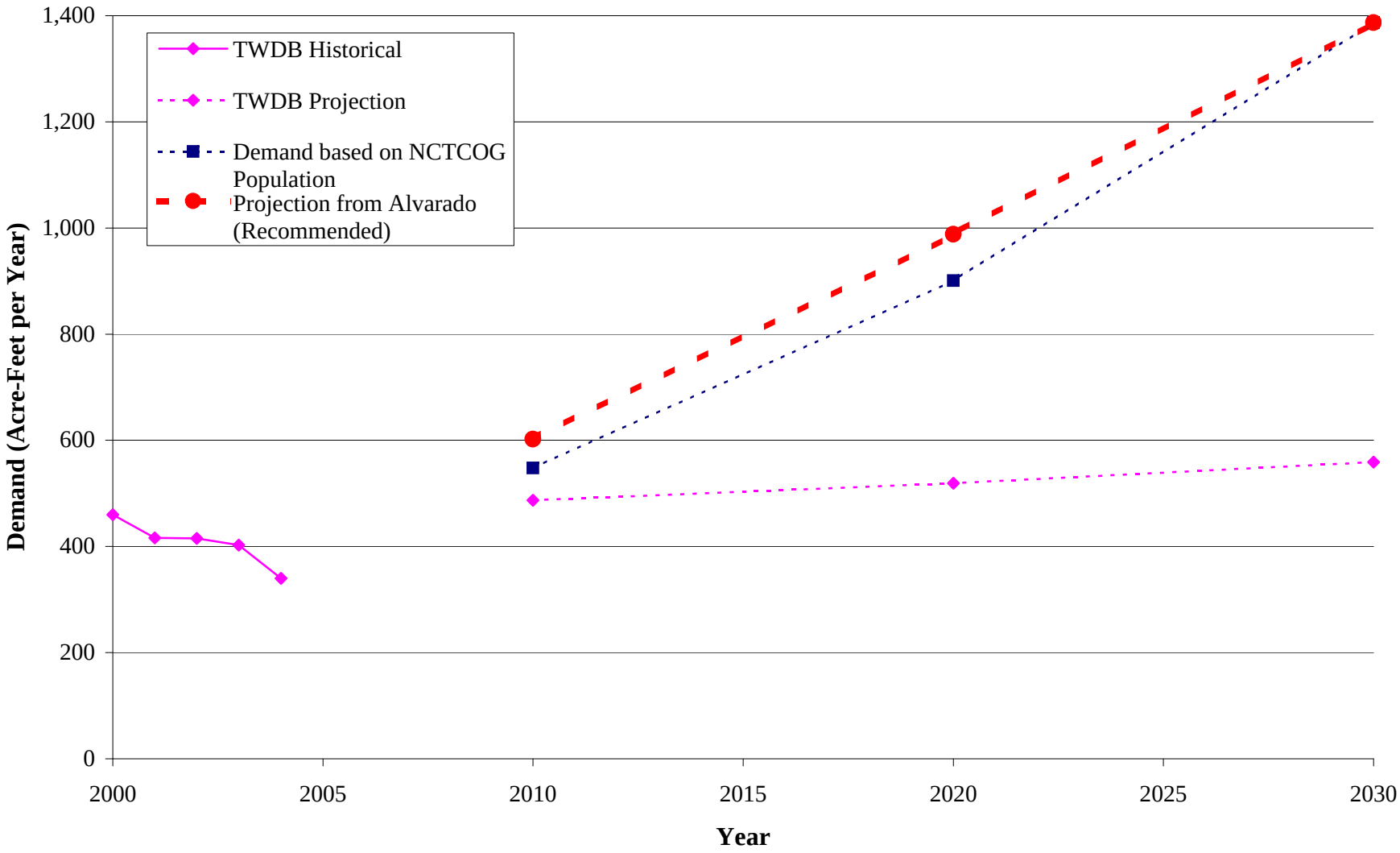


Figure E-2
Bethany WSC Water Use Estimates and Demand Projections

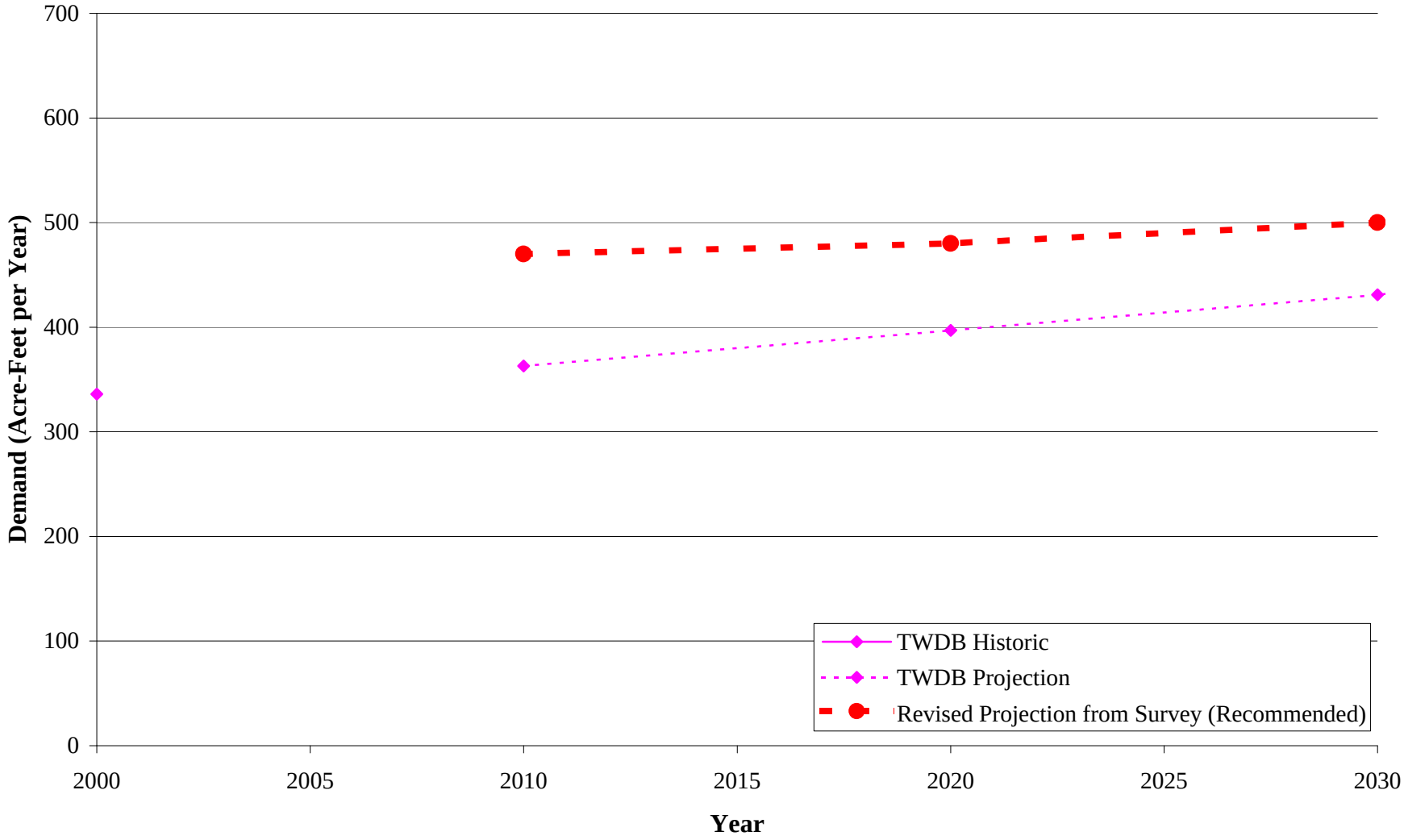


Figure E-3
Buena Vista-Bethel SUD Water Use Estimates and Demand Projections

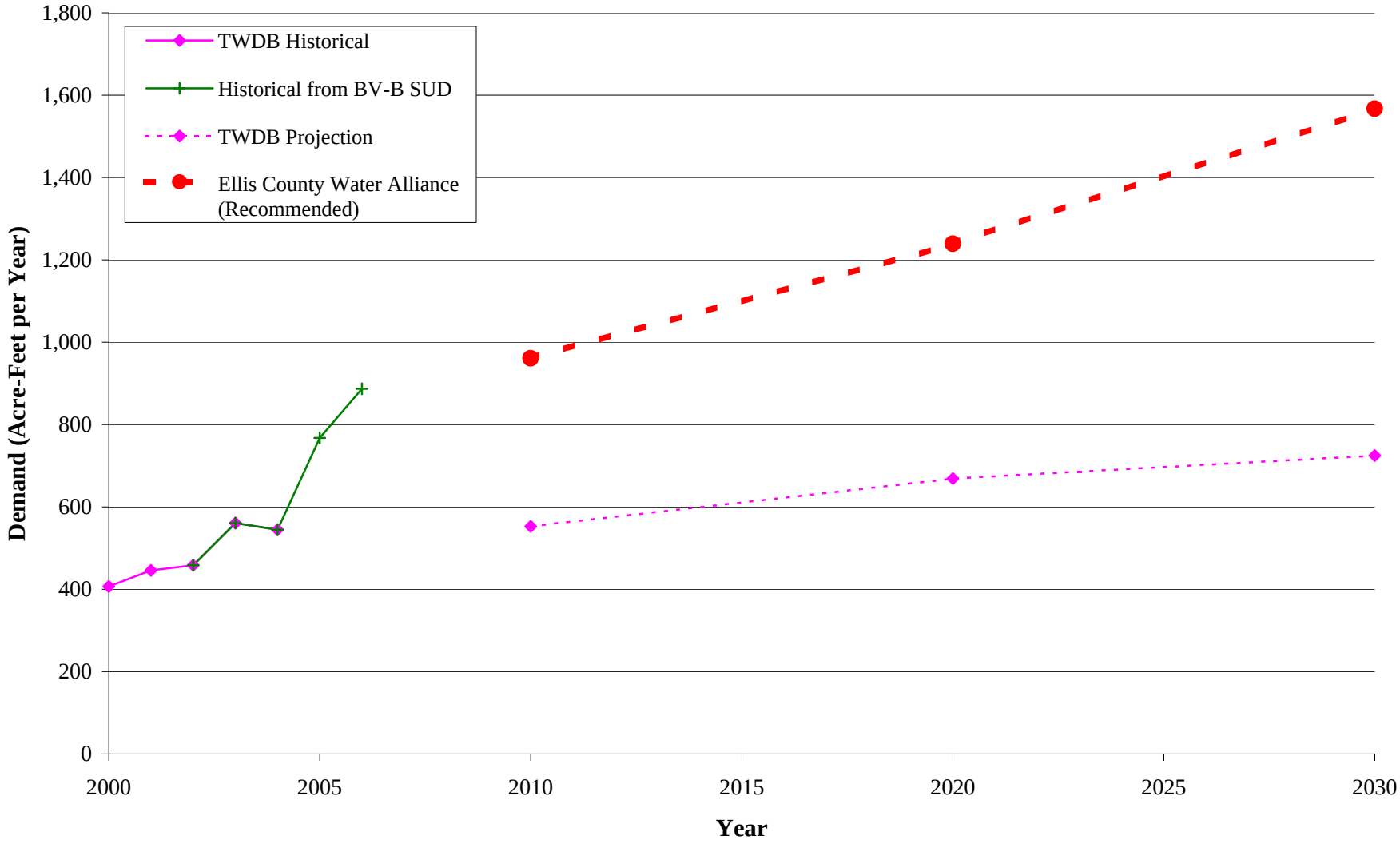
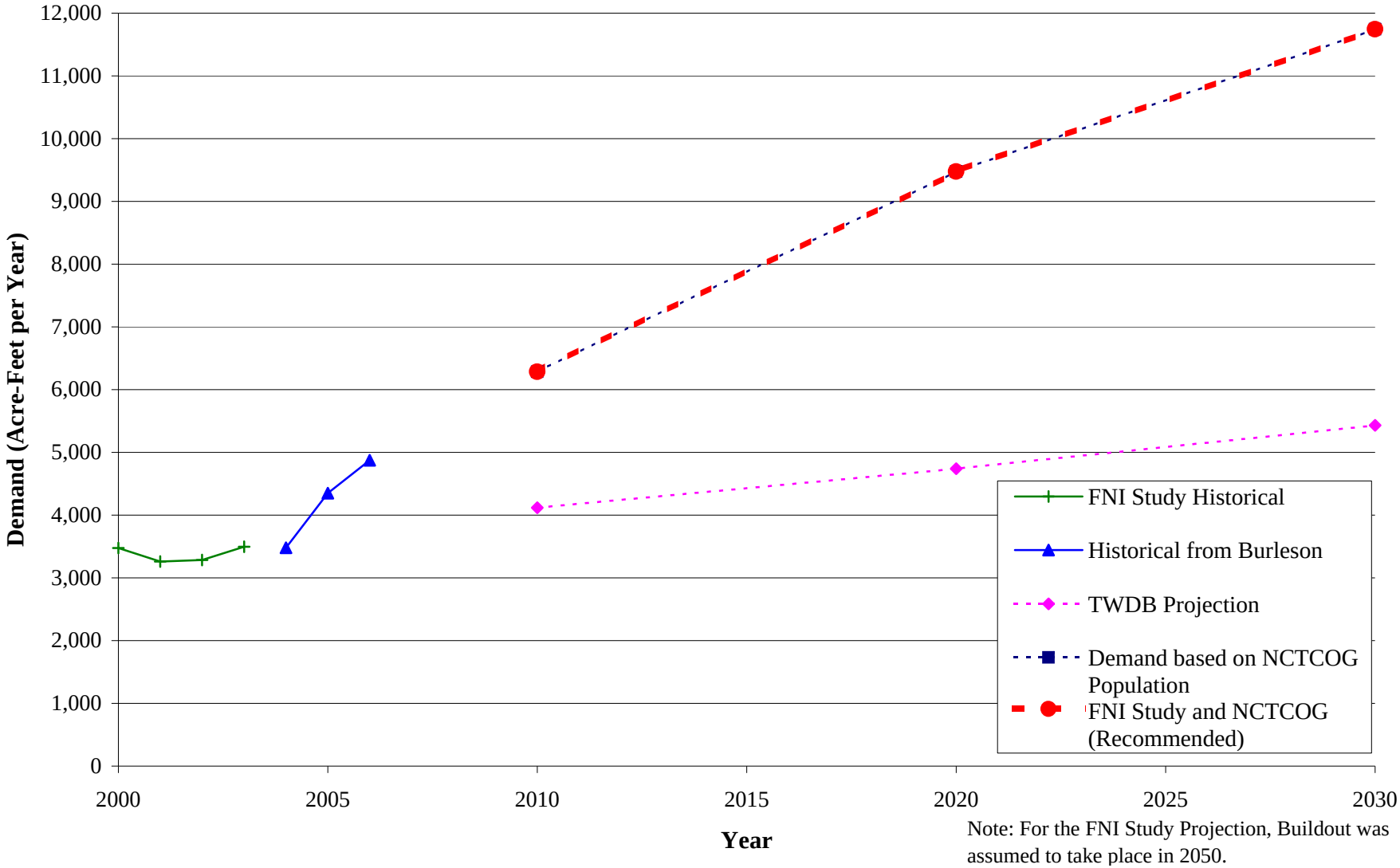
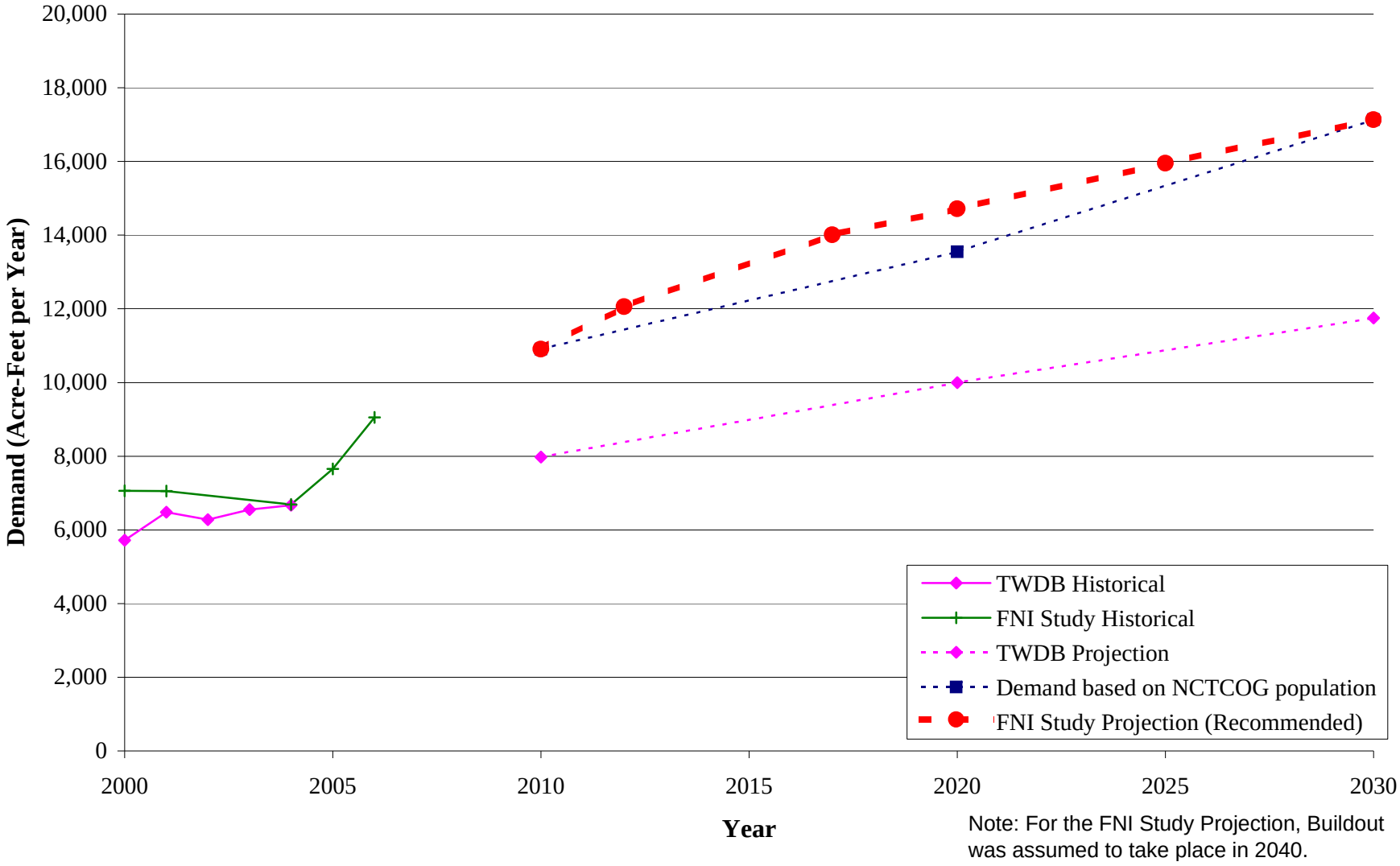


Figure E-4
Burleson Water Use Estimates and Demand Projections



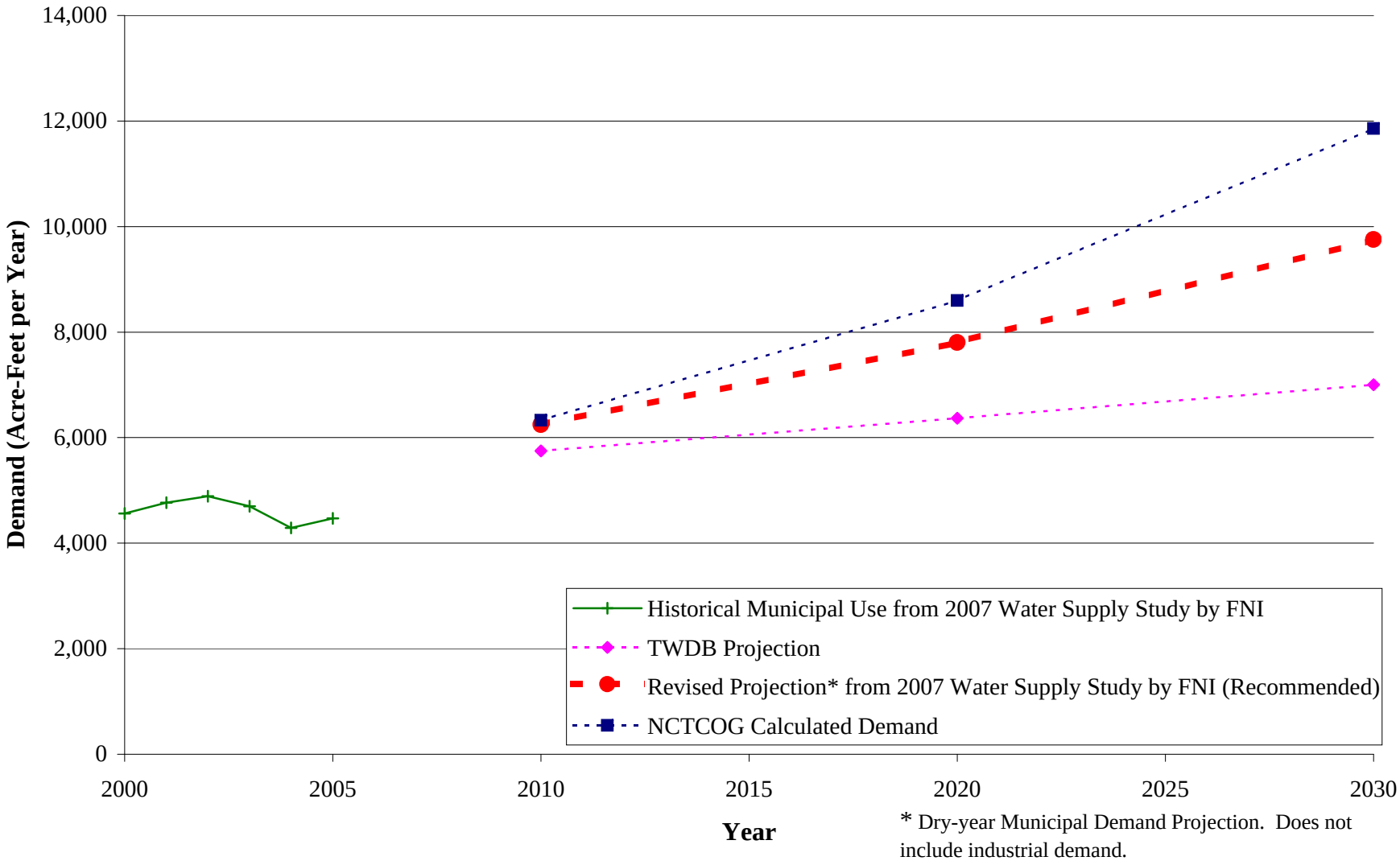
Note: For the FNI Study Projection, Buildout was assumed to take place in 2050.

Figure E-5
Cedar Hill Water Use Estimates and Demand Projections



Note: For the FNI Study Projection, Buildout was assumed to take place in 2040.

Figure E-6
Cleburne Water Use Estimates and Demand Projections



* Dry-year Municipal Demand Projection. Does not include industrial demand.

Figure E-7
Duncanville Water Use Estimates and Demand Projections

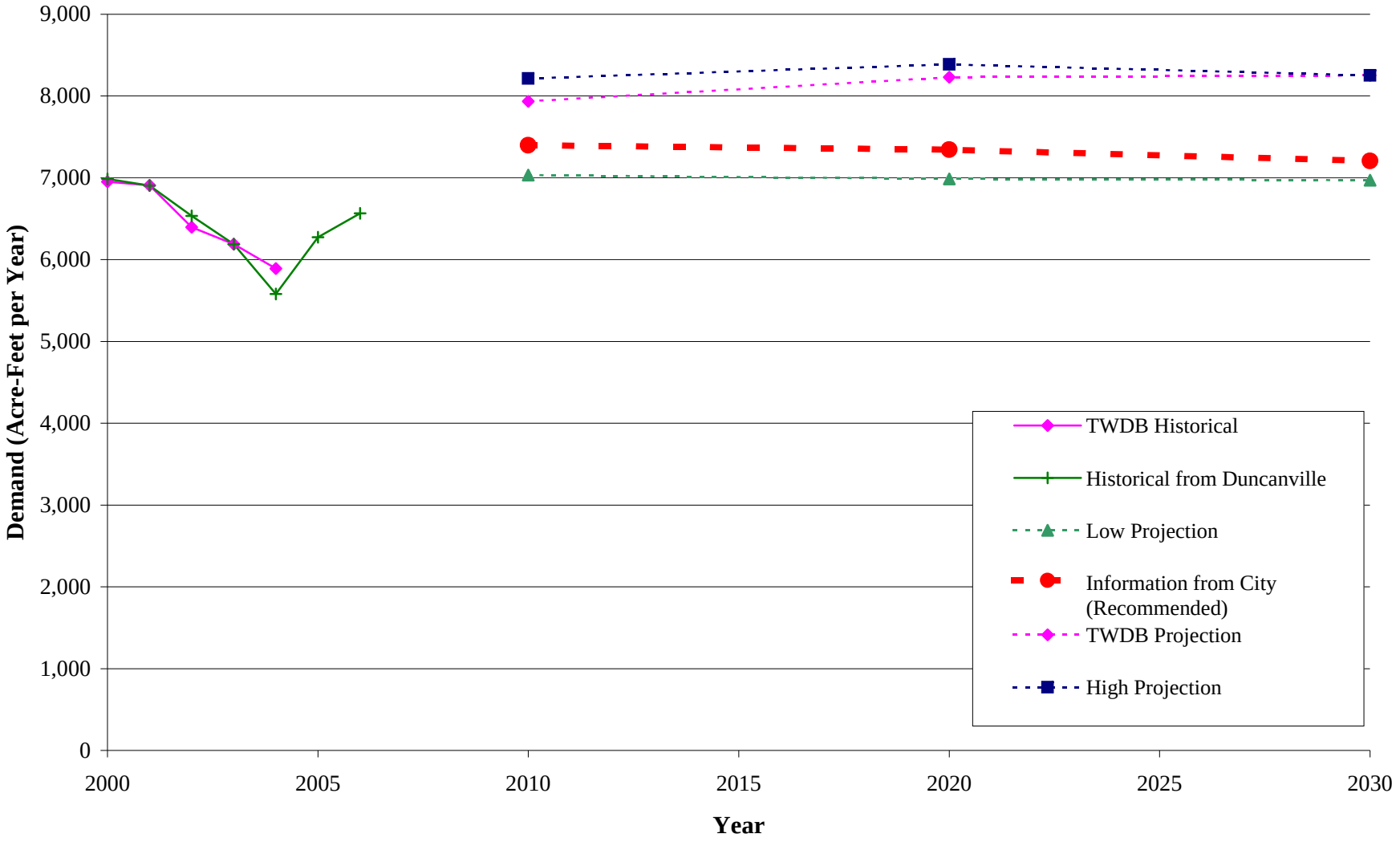


Figure E-8
Ennis Water Use Estimates and Demand Projections

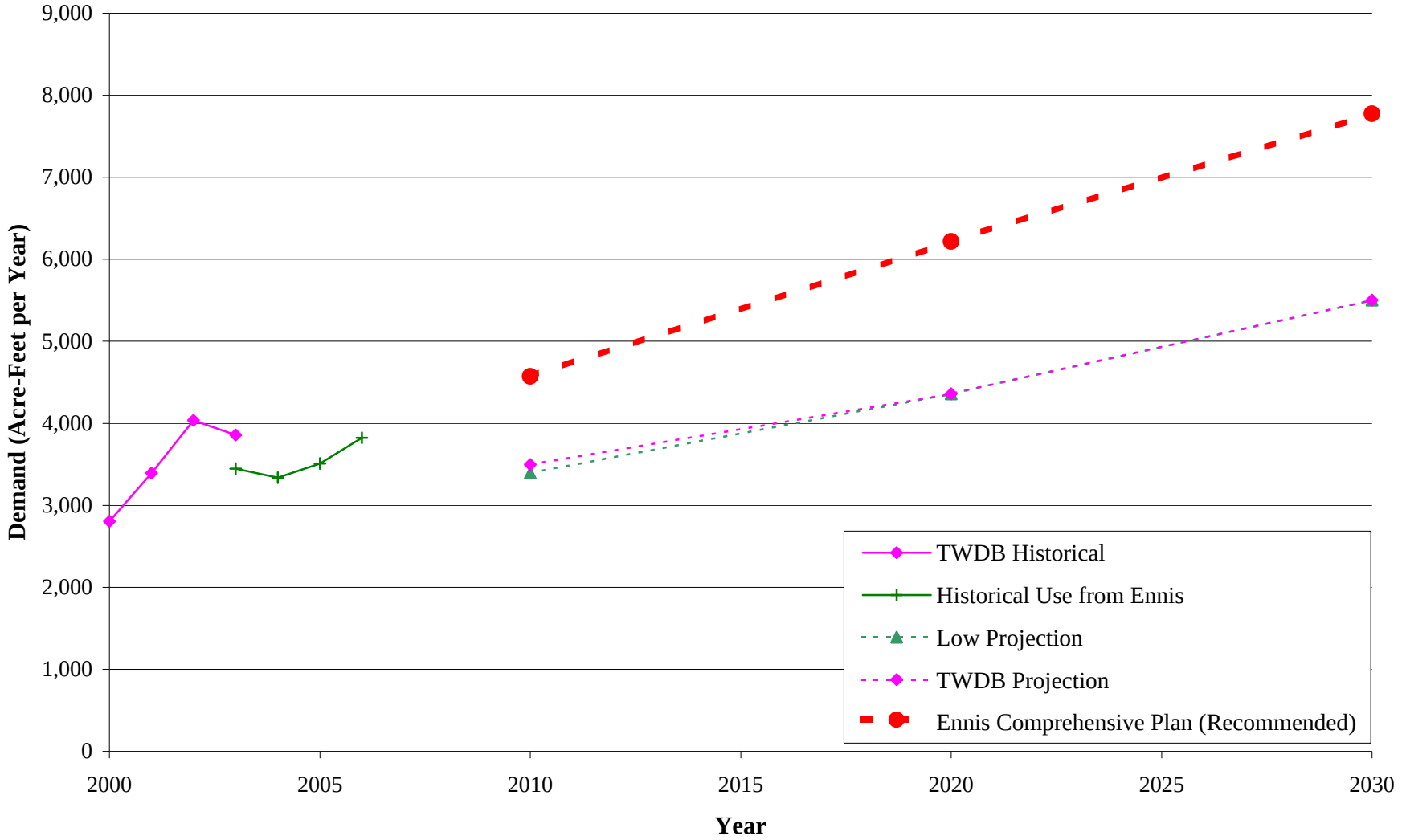


Figure E-9
Ferris Water Use Estimates and Demand Projections

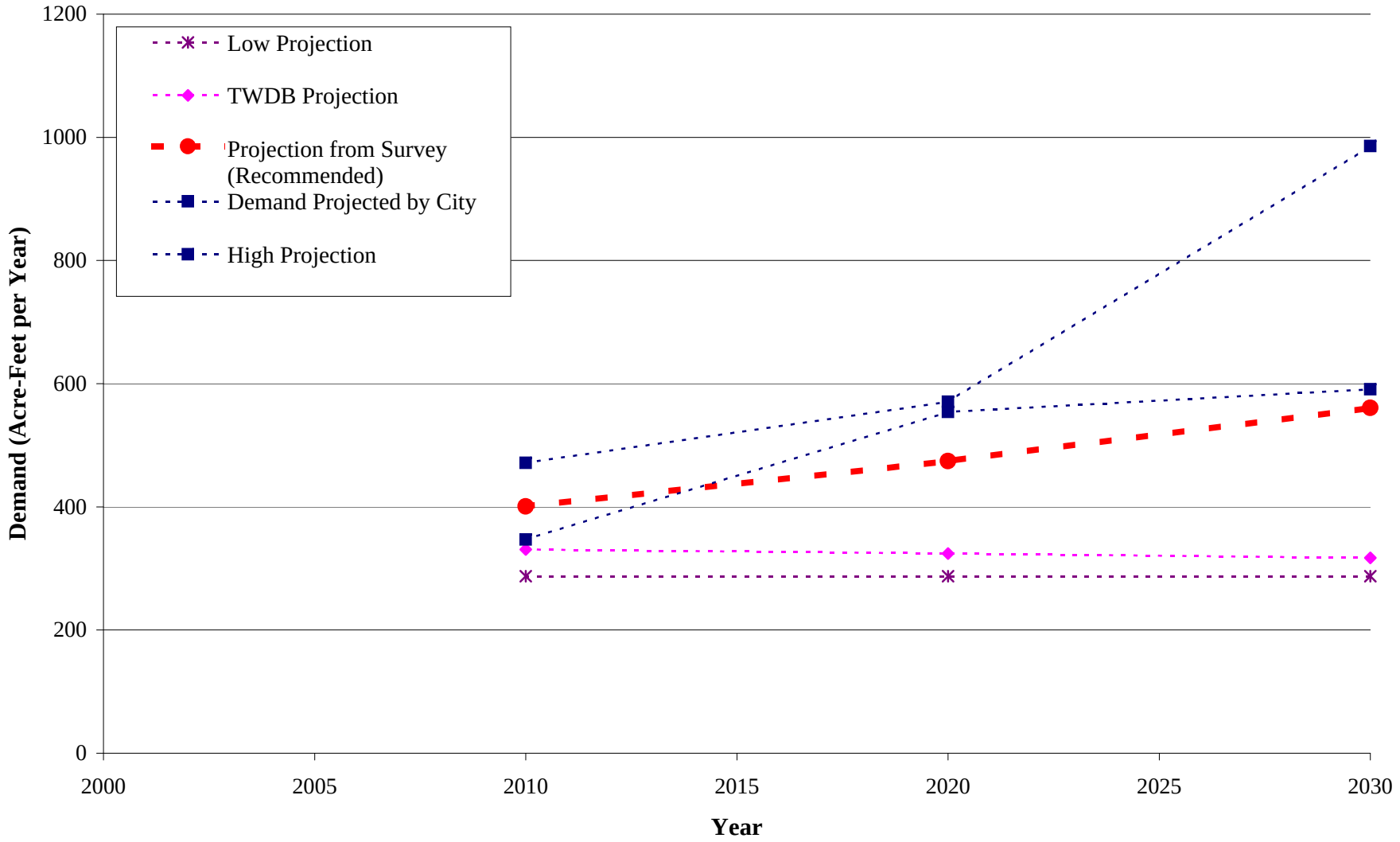


Figure E-10
Files Valley WSC Water Use Estimates and Demand Projections

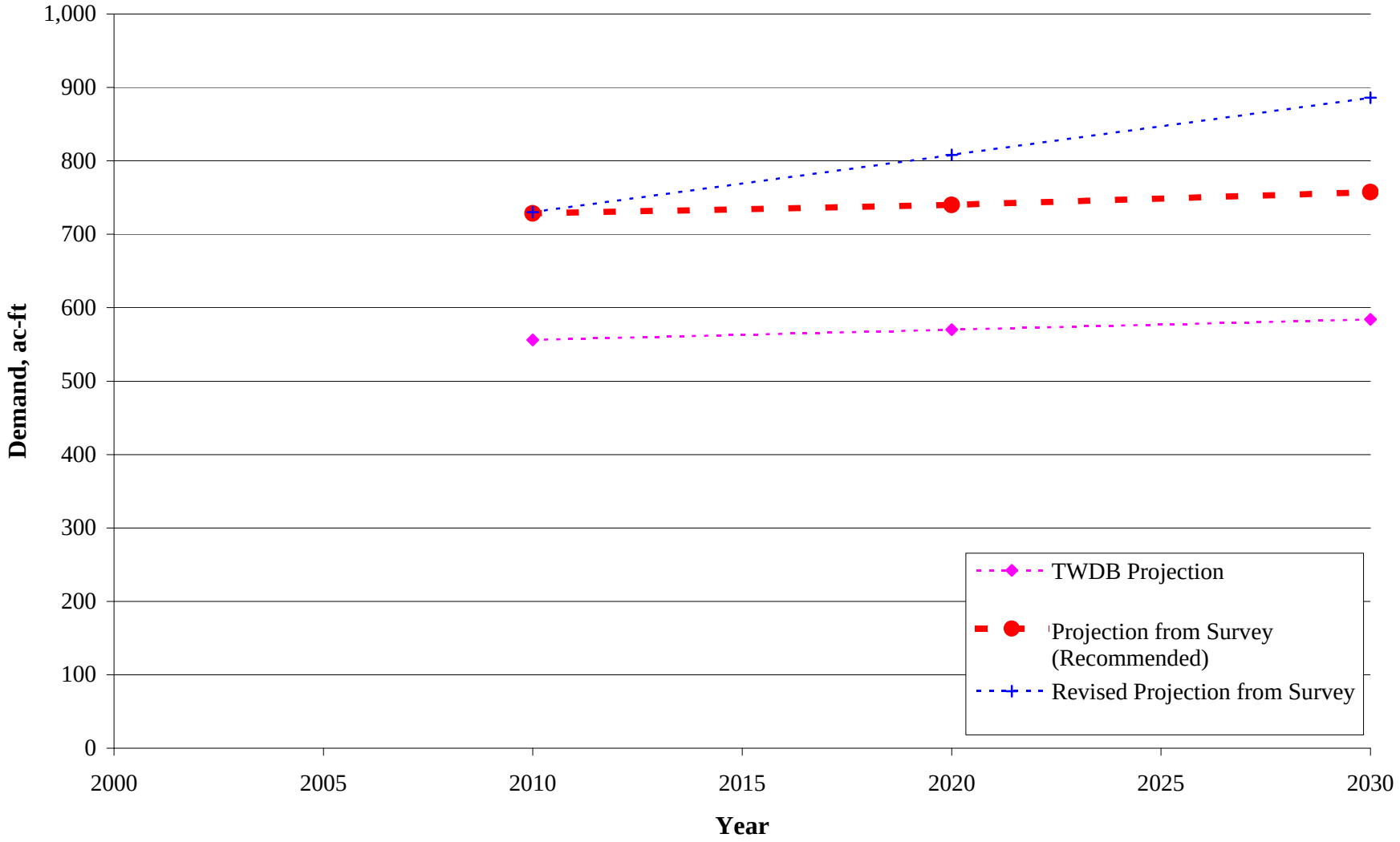


Figure E-11
Grand Prairie Water Use Estimates and Demand Projections

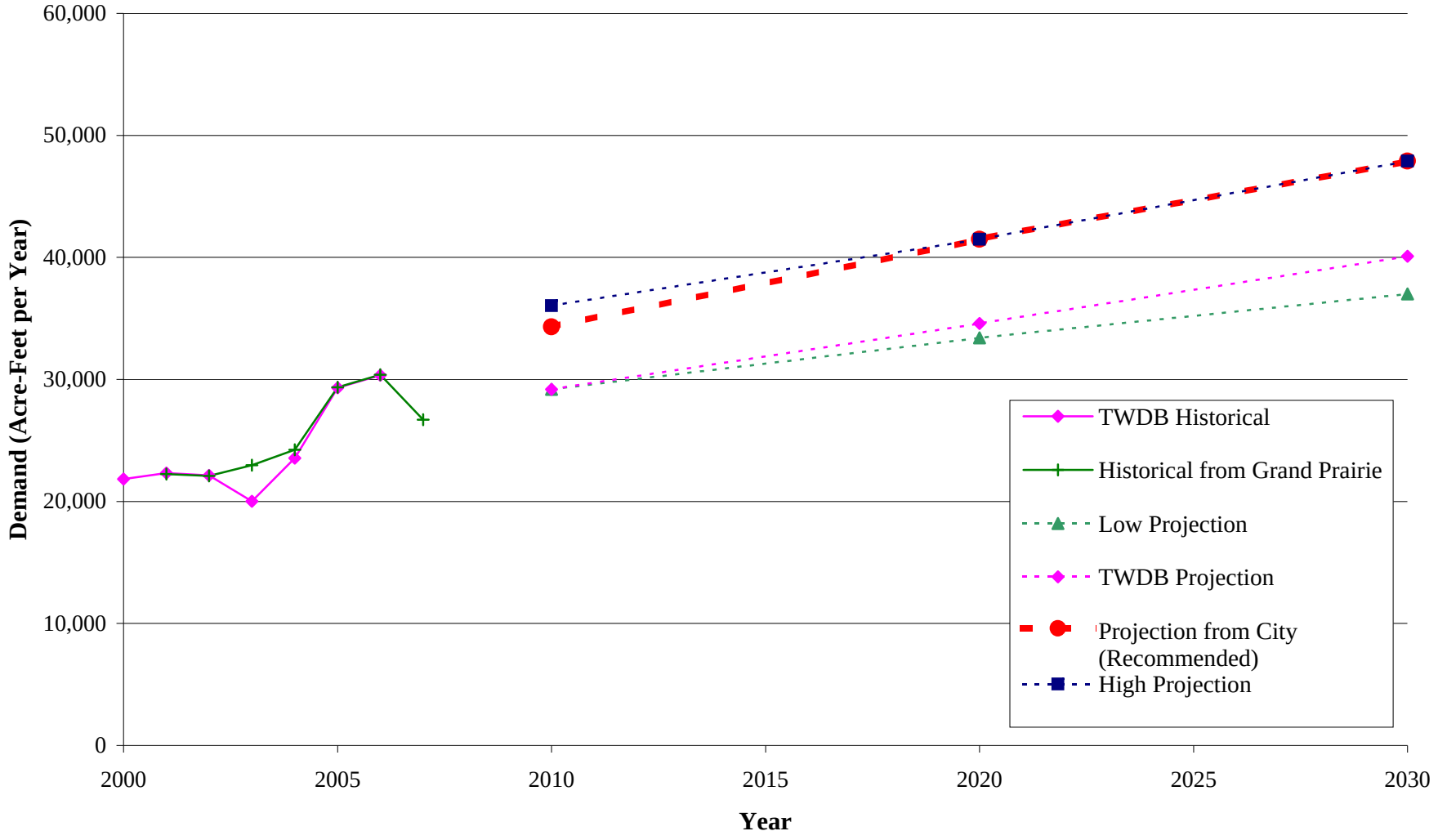


Figure E-12
Grandview Water Use Estimates and Demand Projections

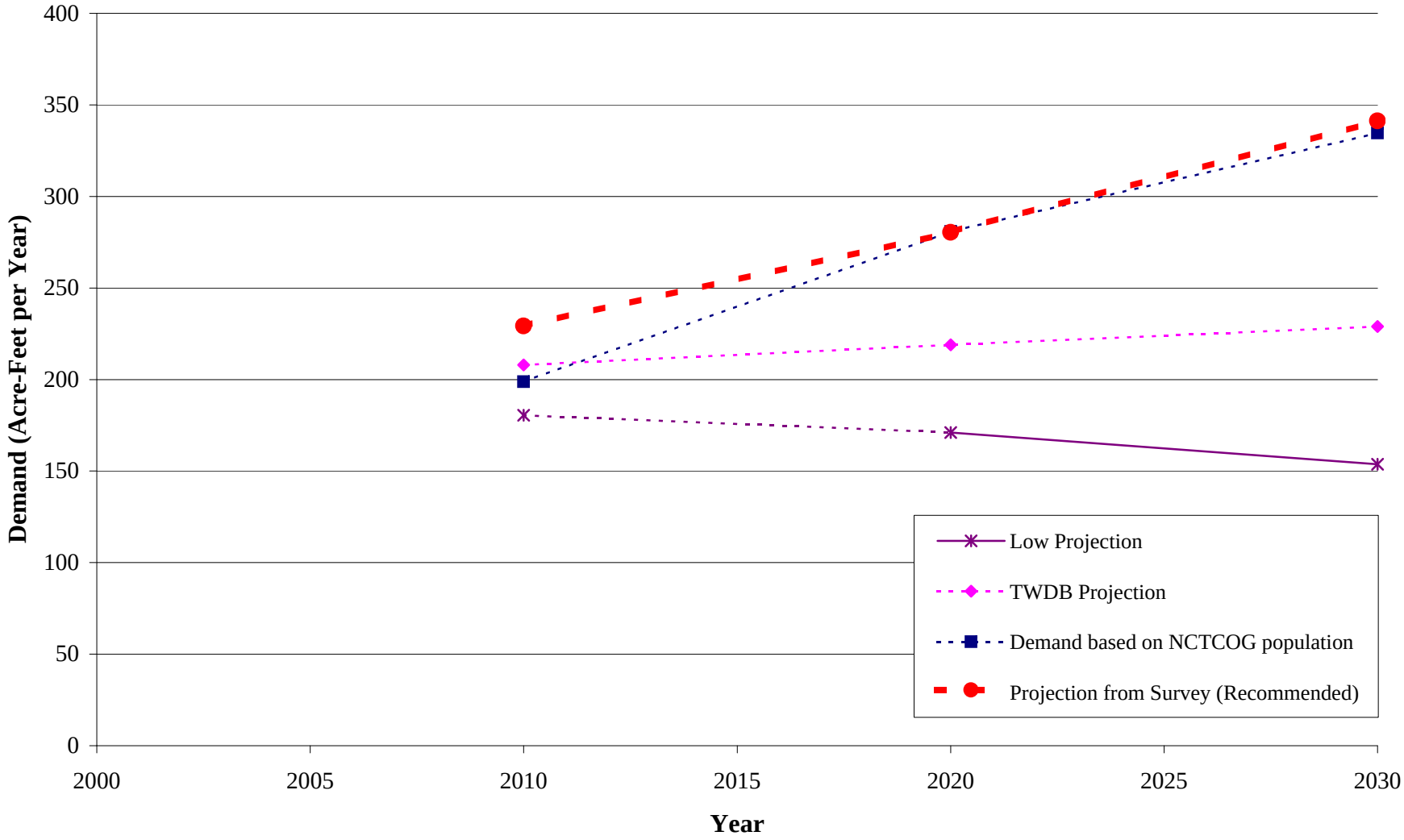


Figure E-13
Johnson County SUD
Water Use Estimates and Demand Projections

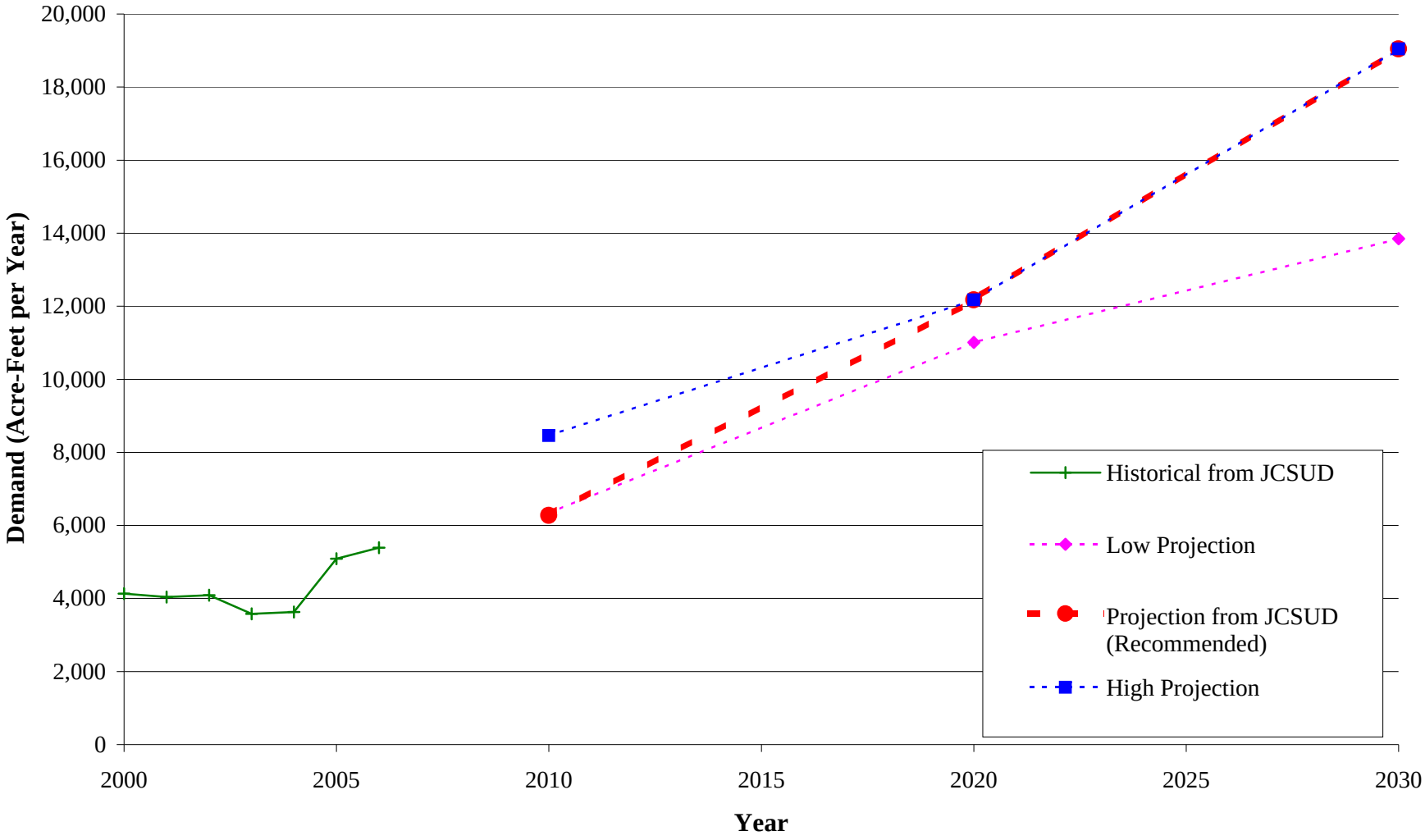


Figure E-14
Joshua Water Use Estimates and Demand Projections

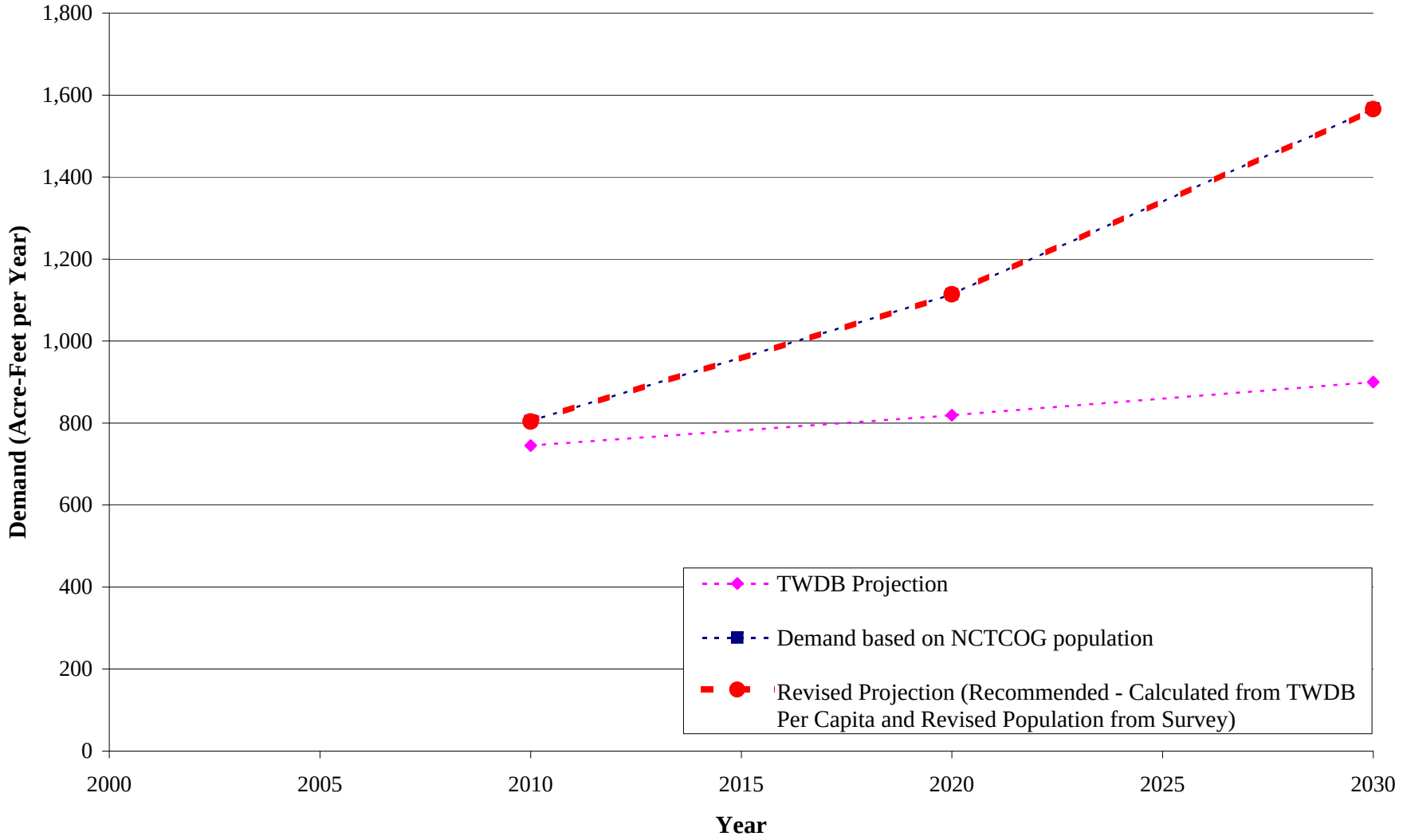
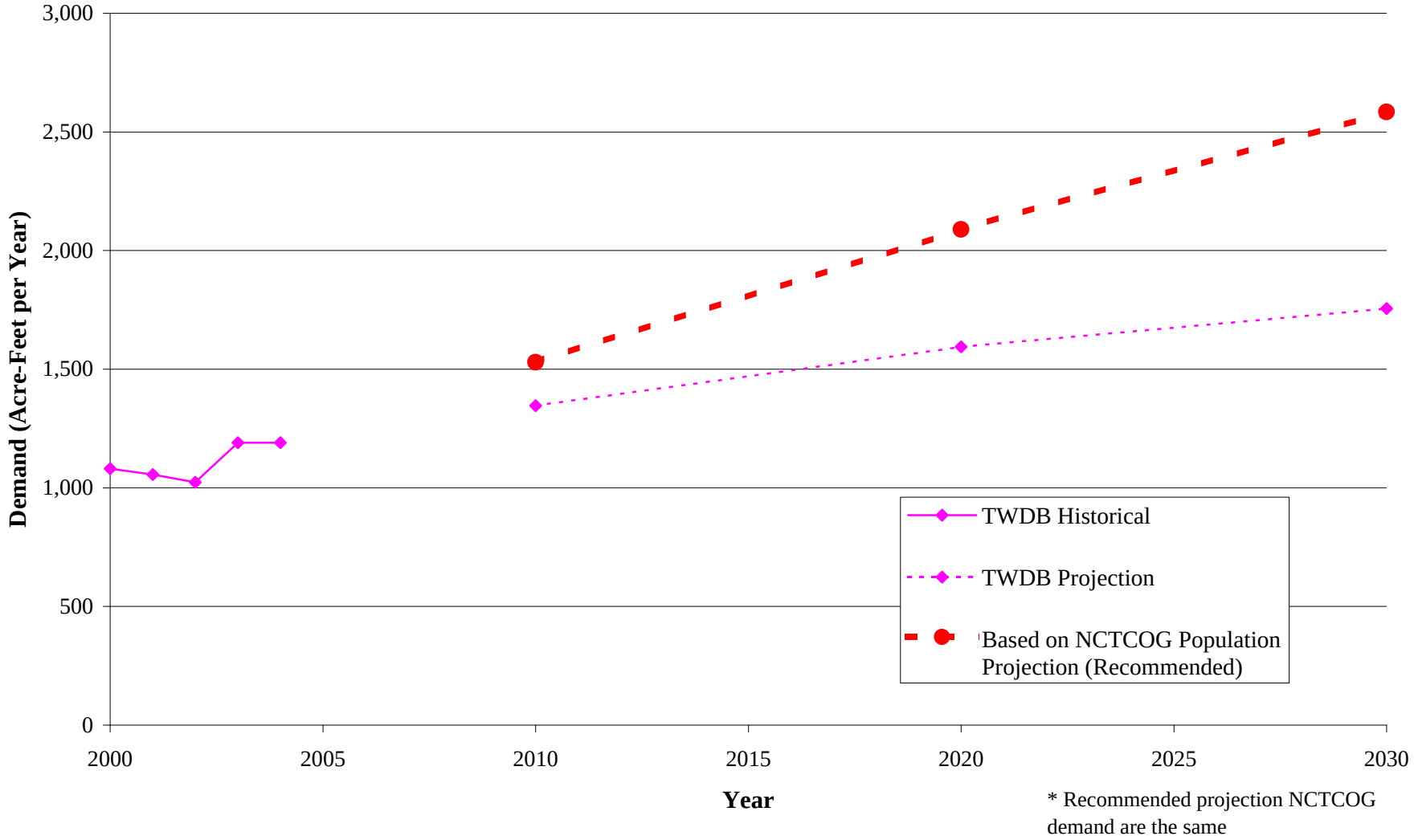


Figure E-15
Kennedale Water Use Estimates and Demand Projections



* Recommended projection NCTCOG demand are the same

Figure E-16
Mansfield Water Use Estimates and Demand Projections
(Tarrant, Ellis and Johnson Counties)

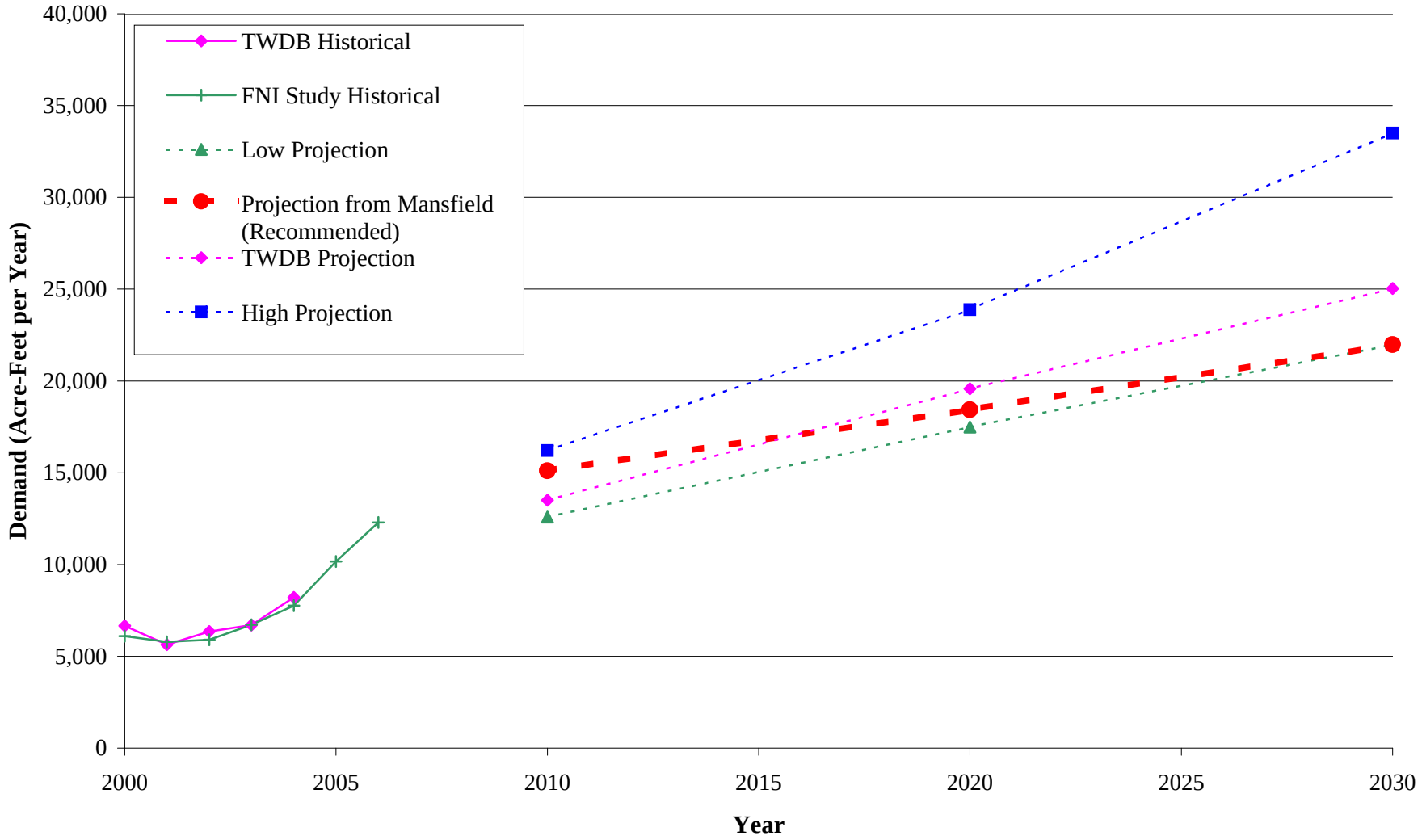


Figure E-17
Midlothian Water Use Estimates and Demand Projections

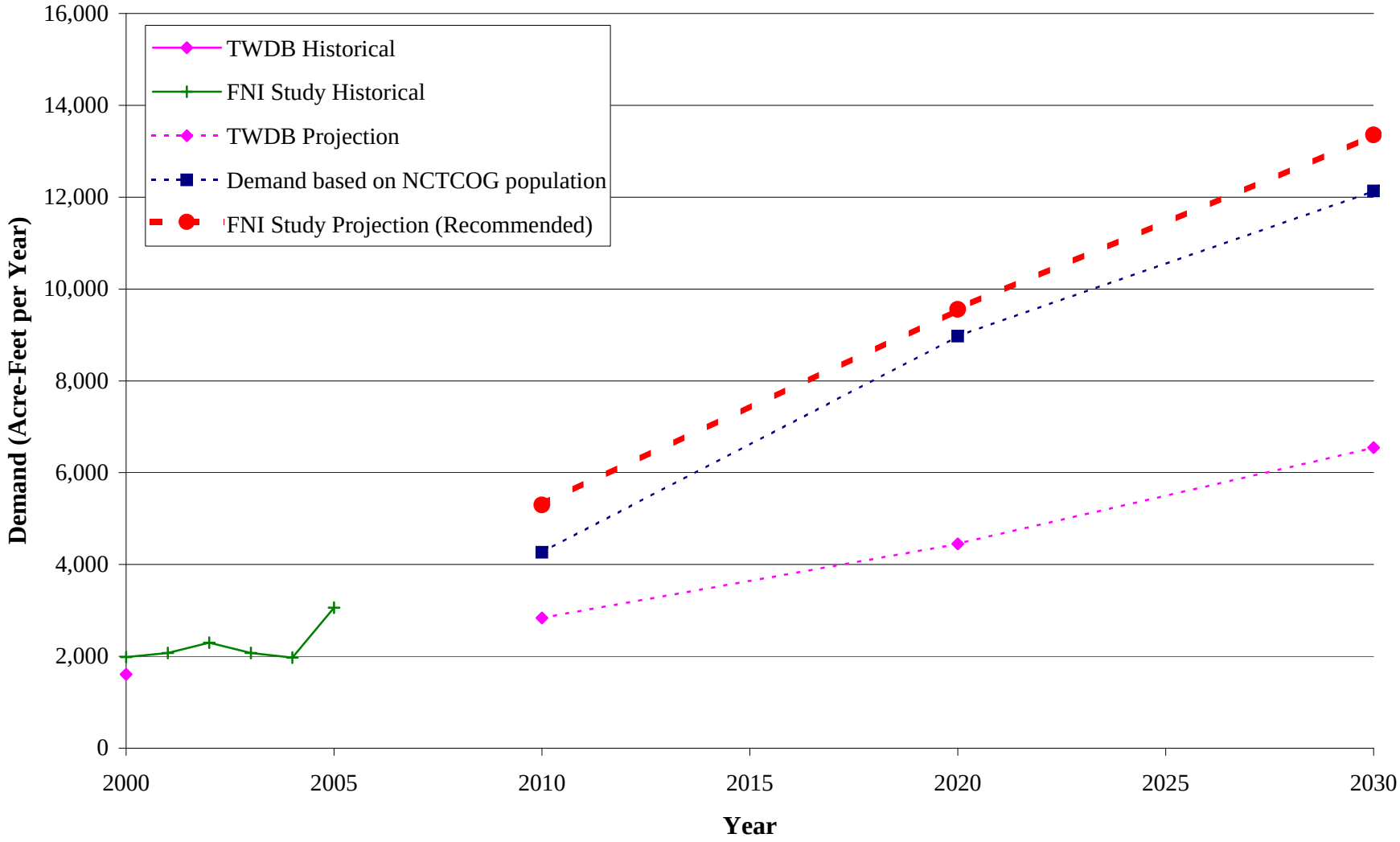


Figure E-18
Mountain Peak SUD Water Use Estimates and Demand Projections

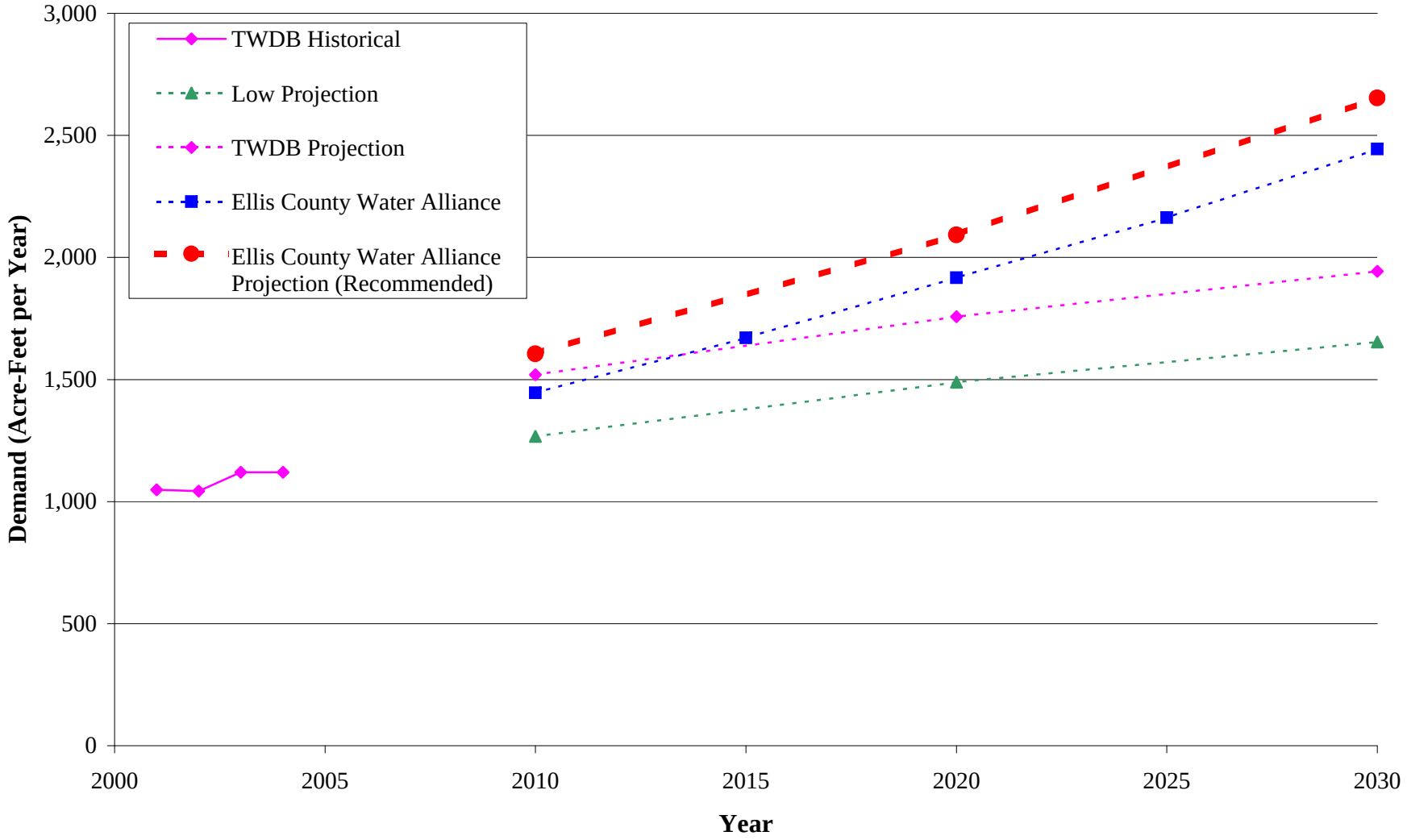


Figure E-19
Parker WSC Water Use Estimates and Demand Projections

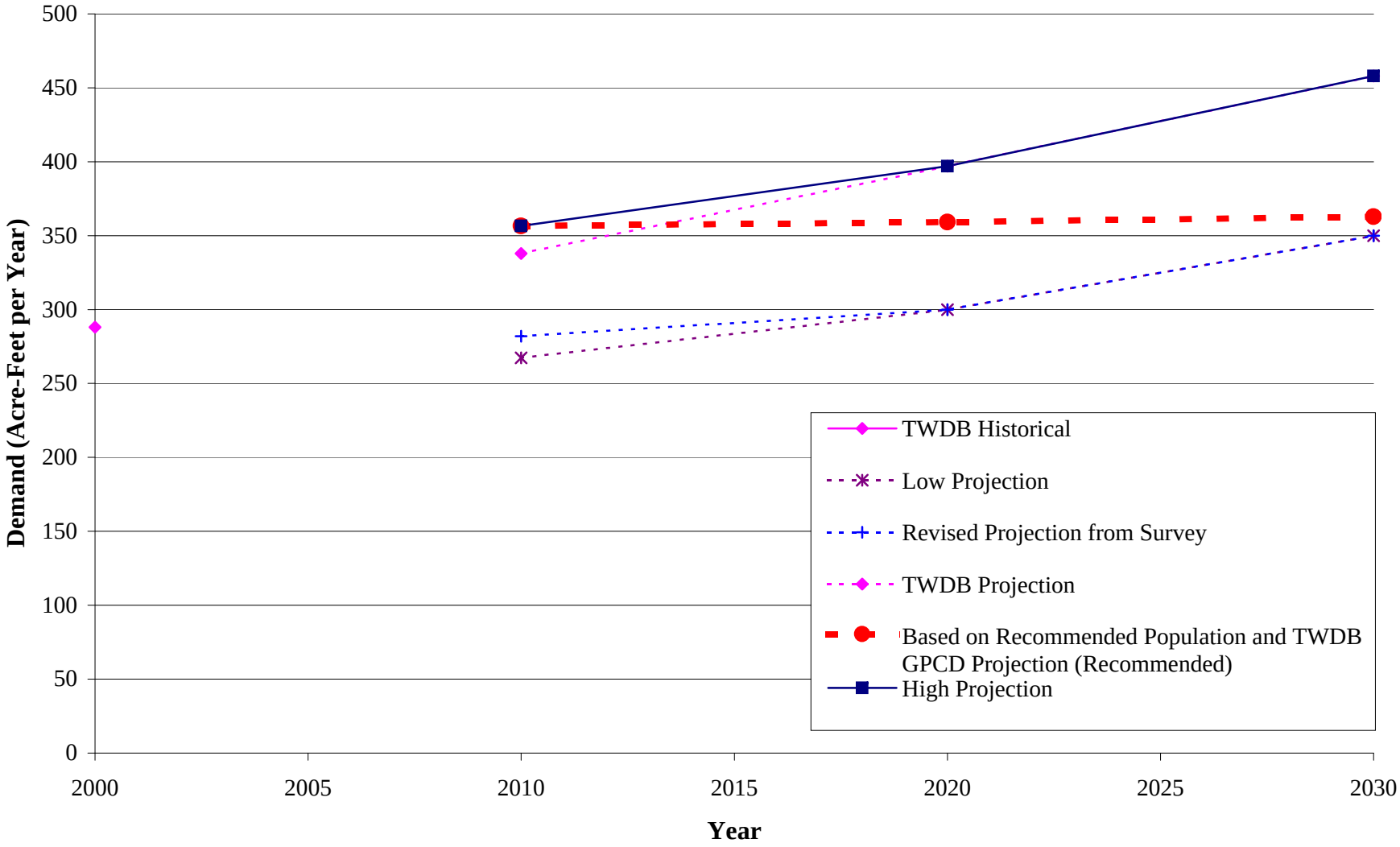


Figure E-20
Red Oak Water Use Estimates and Demand Projections

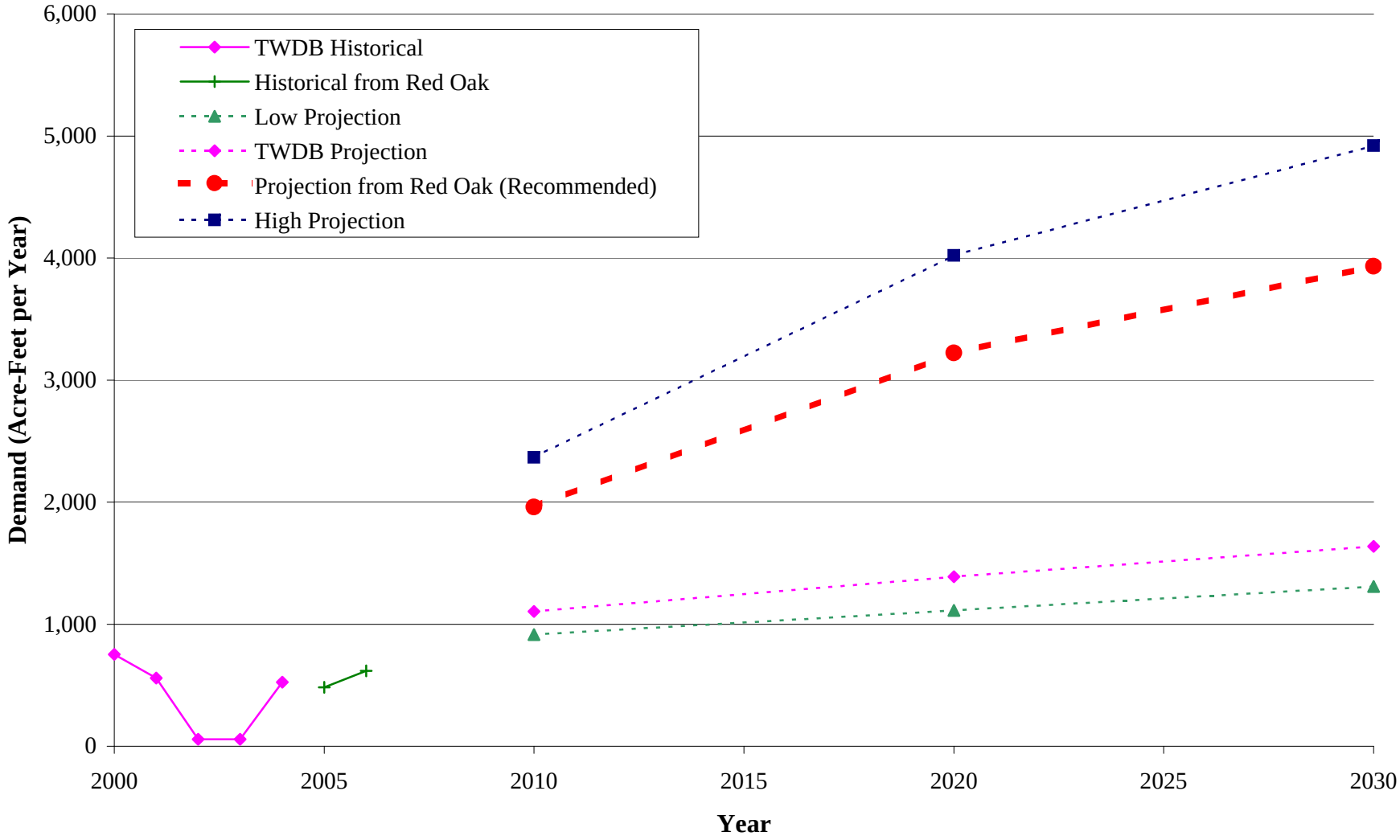


Figure E-21
Rockett SUD Water Use Estimates and Demand Projections

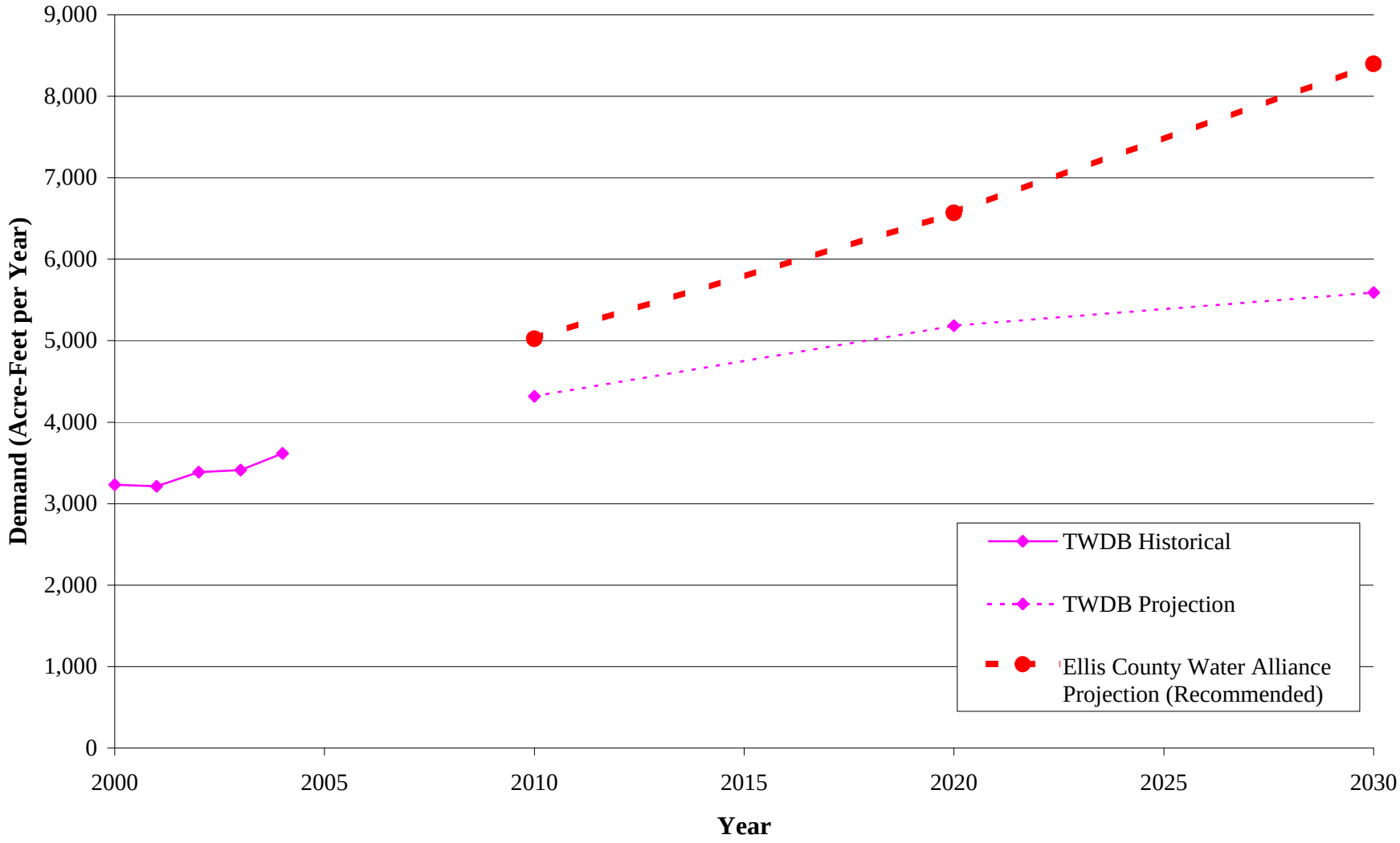


Figure E-22
Sardis-Lone Elm WSC Water Use Estimates and Demand Projections

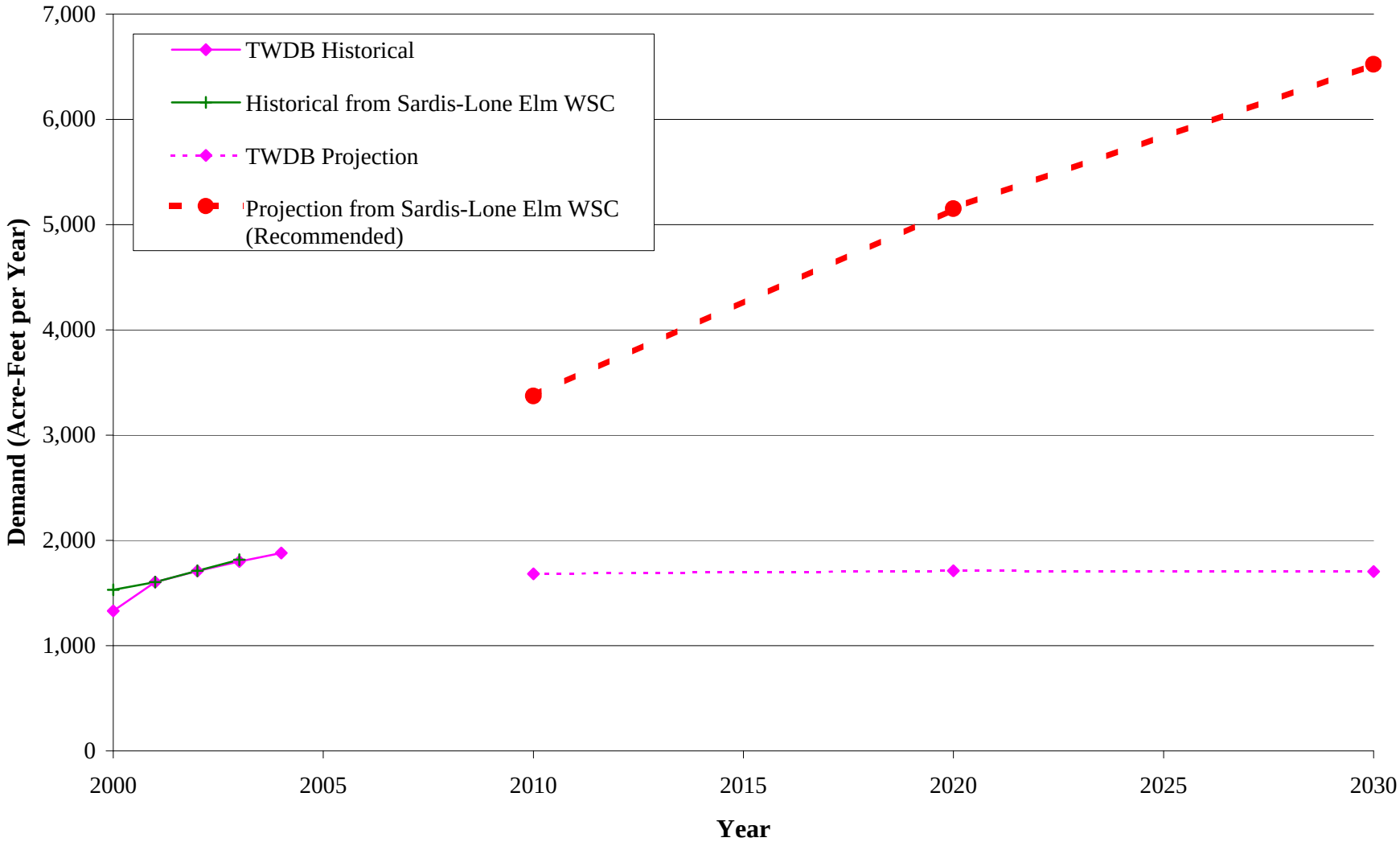


Figure E-23
Venus Water Use Estimates and Demand Projections

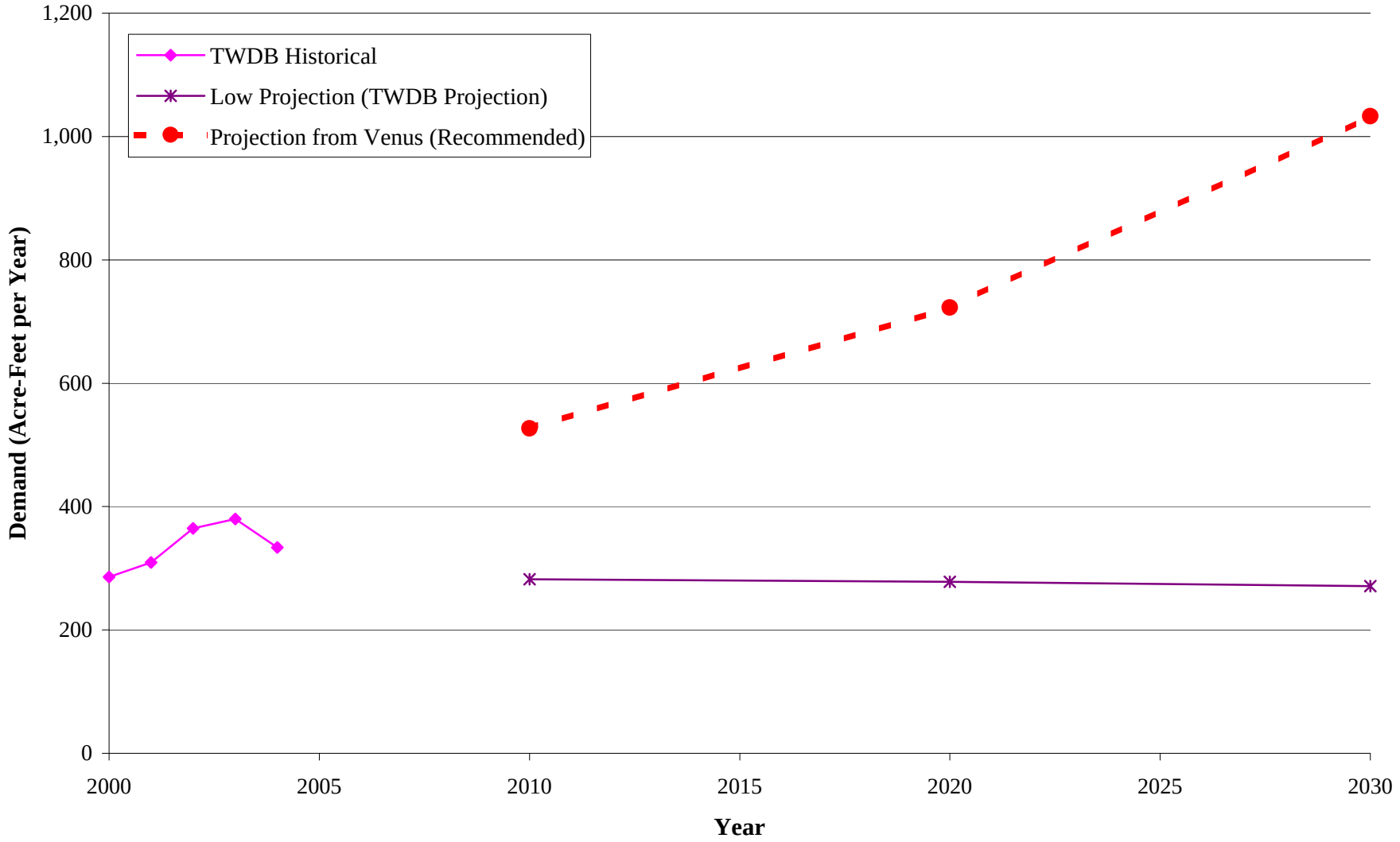
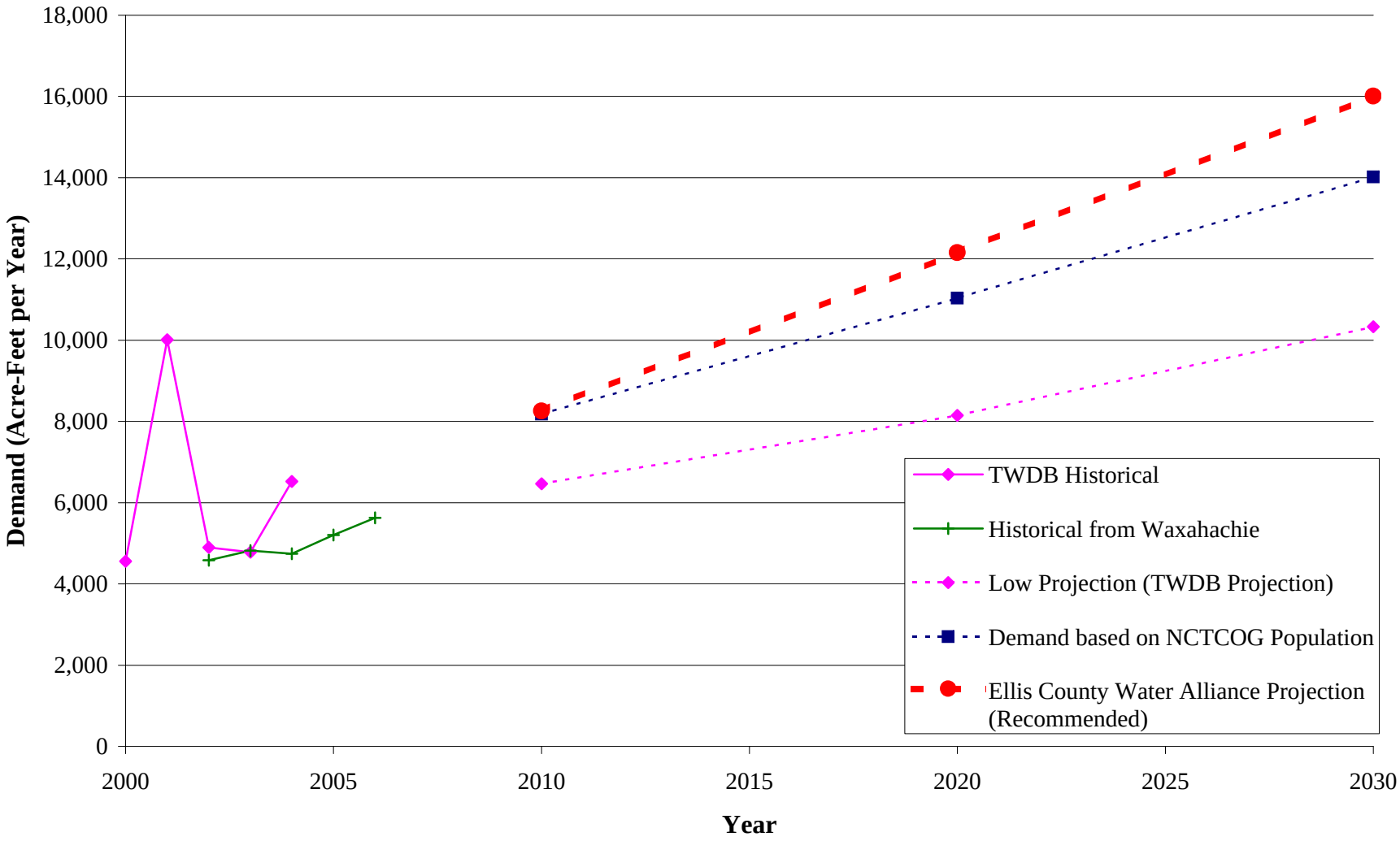


Figure E-24
Waxahachie Water Use Estimates and Demand Projections



APPENDIX F

COMPARISON OF DEMAND AND SUPPLY BY WATER USER GROUP

Appendix F
Comparison of Demand and Supply by Water User Group

This appendix includes a summary table and figure for each water user group in the study area. The table for each entity provides the recommended population and demand projections. Any water demands placed on the entity by a current or potential customer are also shown in the table. The table also lists the currently contracted supplies and recommended strategies, as appropriate. Entities without shortages will not necessarily have recommended water management strategies.

The corresponding figure for each entity shows the currently contracted supplies as stacked bars. The recommended water demand (for the entity and its current customers) is shown by a heavy black line. The heavy, dashed red line represents the demand of the entity plus current and potential customer demands. Recommended water management strategies are shown as stacked bars with diagonal striping pattern. The tables and figures are presented alphabetically in this appendix.

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Table F-1
Acton MUD

Population	**2010**	**2020**	**2030**	**Notes**
Johnson Co.	133	171	211	2006 Plan
Hood Co.	15,036	18,435	21,599	2006 Plan
Total Population	**15,169**	**18,606**	**21,810**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Johnson Co.	21	27	33	2006 Plan
Hood Co.	2,425	2,912	3,363	2006 Plan
Total Demand	**2,446**	**2,939**	**3,396**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	1,320	1,321	1,323	2006 Plan
BRA SWATS	*3,098*	*4,585*	*4,585*	*Based on interest in current SWATS treatment capacity (10.5 MGD) and buildout to design capacity (15.54 MGD) by 2020.*
Total Supply	**4,418**	**5,906**	**5,908**	

Surplus/Shortage (AF/Y)	**1,972**	**2,967**	**2,512**

Units: Acre-Feet per Year (AF/Y)
Acton MUD did not have any shortages in the 2006 Plan. No strategies were recommended.
No additional strategies are recommended in this study.

Figure F-1
Acton MUD
Comparison of Currently Contracted Supplies to Recommended Demand

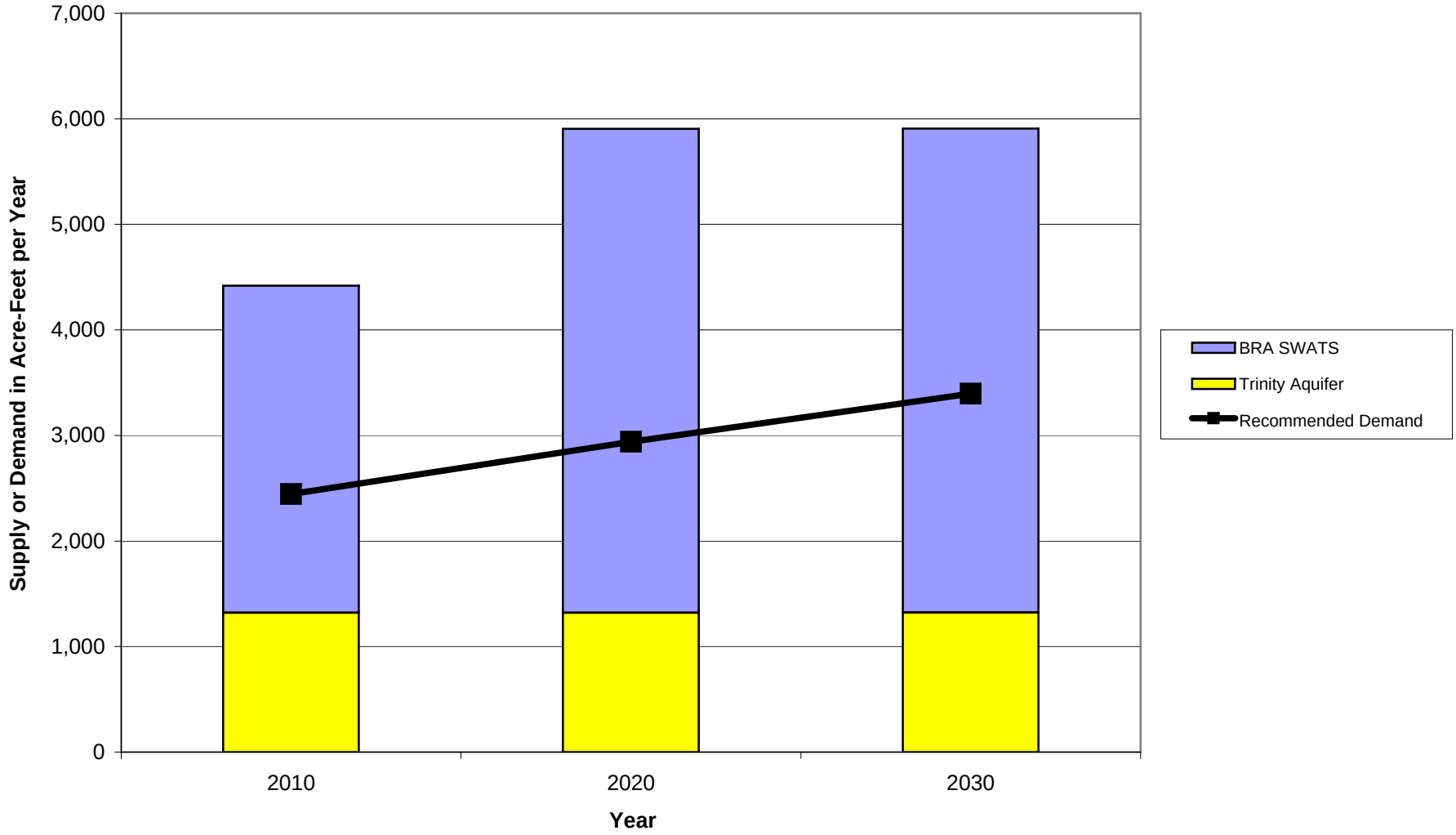


Table F-2
City of Alvarado

Population	**2010**	**2020**	**2030**	**Notes**
In City	*4,439*	*7,535*	*10,766*	*recommended*

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In City Demand	*602*	*988*	*1,387*	*recommended*

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Johnson County SUD	11	11	11	2006 Plan
Trinity Aquifer	75	75	75	2006 Plan
Total Supply	**86**	**86**	**86**	

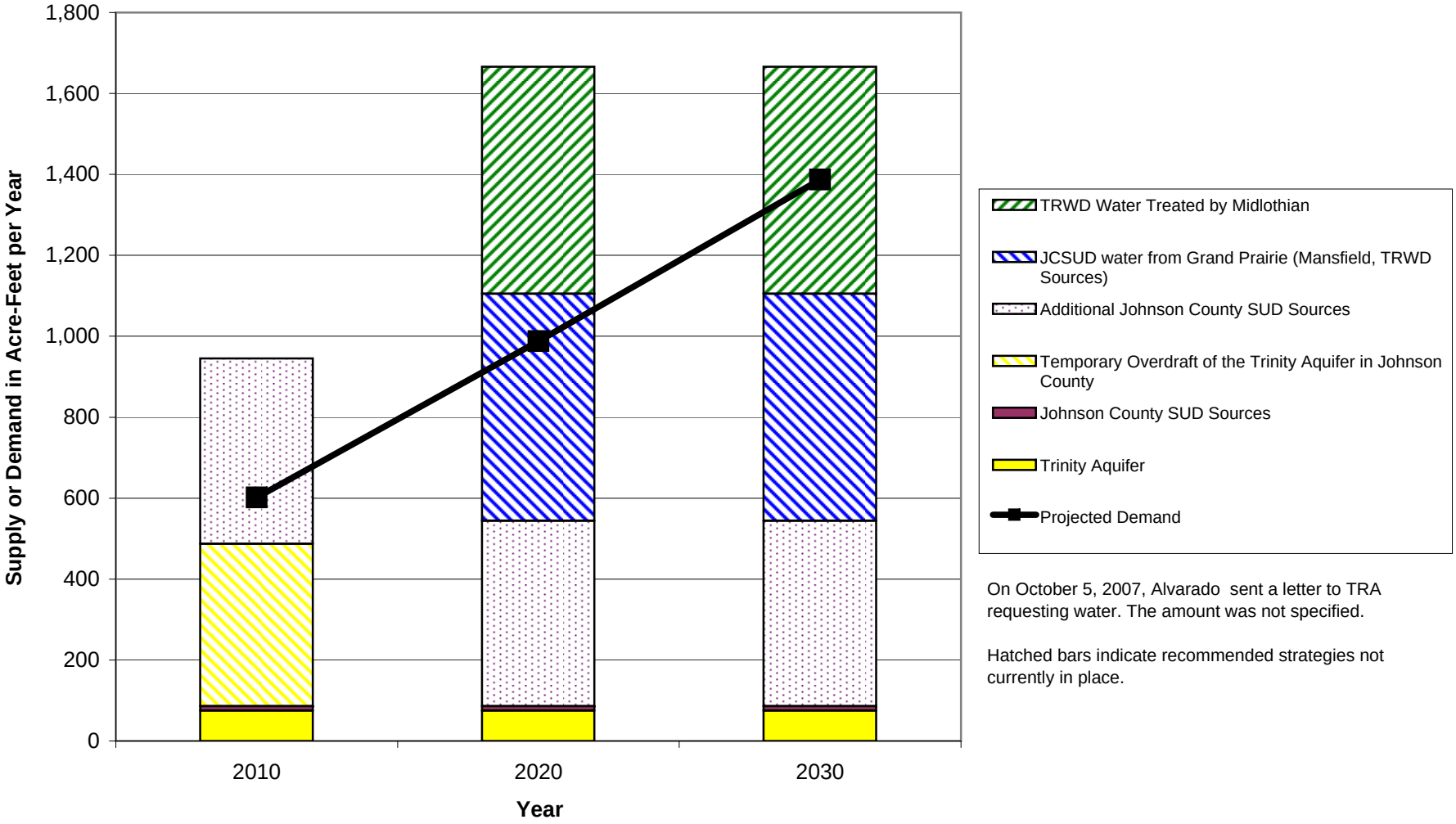
Surplus/Shortage (AF/Y)	**-516**	**-902**	**-1,301**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Temporarily overdraft Trinity aquifer (Brazos G) with two new wells	401	0	0	strategy in the 2006 Plan
Additional JCSUD Sources	*458*	*458*	*458*	*increase current contract*
Additional Johnson County SUD (Mansfield, TRWD Sources)	*0*	*561*	*561*	*discussing a contract for 2 MGD (peak day) from Mansfield (TRWD supply); assume 1 MGD (peak) for initial need*
Purchase TRWD Sources (through TRA) with Midlothian providing water treatment	*0*	*561*	*561*	*new strategy, amount is assumed*
Total	**859**	**1,580**	**1,580**	

Final Surplus/Shortage (AF/Y)	**343**	**678**	**279**

Notes: a. Alvarado has requested surface water from TRA (TRWD sources).
b. Alvarado is selling surface water from Lake Alvarado to two gas drilling operations in hopes of protecting the groundwater supply.
c. Significant changes from the 2006 Brazos G Water Plan are shown in italics.
d. Units: Acre-Feet per Year (AF/Y)

Figure F-2
Alvarado Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



On October 5, 2007, Alvarado sent a letter to TRA requesting water. The amount was not specified.

Hatched bars indicate recommended strategies not currently in place.

Table F-3
City of Bardwell

Population	**2010**	**2020**	**2030**	**Notes**
In-City	838	1,075	1,308	2006 Plan

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	103	130	155	2006 Plan

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Woodbine Aquifer	78	78	78	2006 Plan
Water Conservation - Basic Package	2	7	9	2006 Plan
Total Supply	**80**	**85**	**87**	

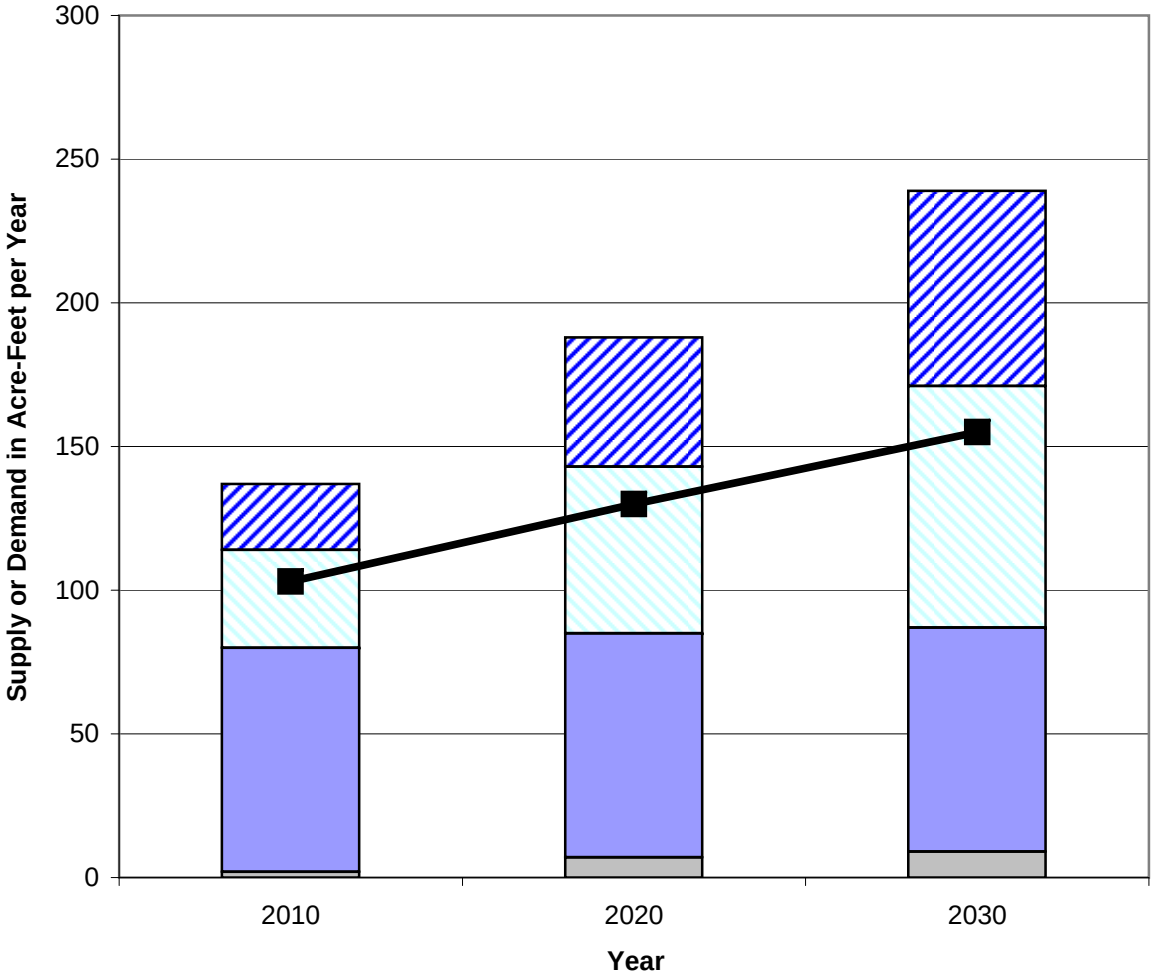
Surplus/Shortage (AF/Y)	**-23**	**-45**	**-68**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Additional Woodbine Aquifer (New Wells)	34	58	84	2006 Plan
Purchase water from Ennis (TRWD Sources)	*23*	*45*	*68*	*new strategy; amount assumed*
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Total	**57**	**103**	**152**	

Final Surplus/Shortage (AF/Y)	***34***	***58***	***84***

Notes: a. Bardwell has asked Ennis for surface water supply. Ennis has not committed to providing water supply.
b. Changes from the 2006 Region C Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-3
City of Bardwell Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



*Bardwell has asked Ennis for water supply. Ennis has not committed to providing this supply.

Hatched bars indicate recommended strategies not currently in place.

2006 Plan showed additional groundwater would meet projected needs.

Table F-4
Bethany WSC

Population	**2010**	**2020**	**2030**	**Notes**
Service Area	*4,300*	*4,500*	*4,750*	*recommended*

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Service Area Demand	*470*	*480*	*500*	*recommended*

Current Supply (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	87	87	87	2006 Plan showed 87 AF/Y; current well capacity is 0.8064 MGD
Total Supply	**87**	**87**	**87**	

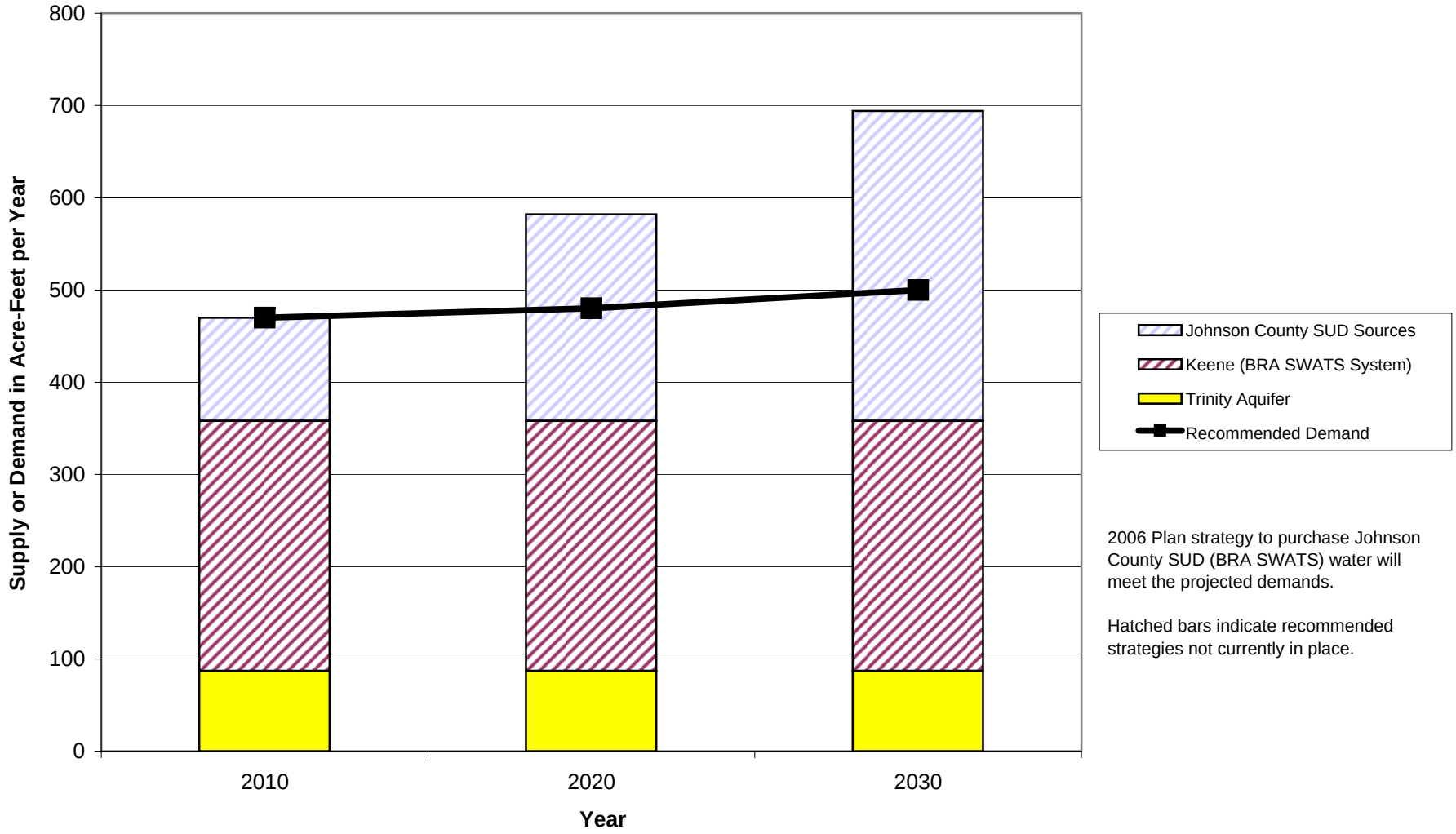
Surplus/Shortage (AF/Y)	**-383**	**-393**	**-413**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Keene (BRA SWATS System)	*271*	*271*	*271*	*new strategy; amount assumed based on maximum need with JCSUD supplies*
Johnson County SUD	112	224	336	strategy in the 2006 Plan; updated amounts
Total	**383**	**495**	**607**	

Final Surplus/Shortage (AF/Y)	**0**	**102**	**194**

Note: a. Bethany WSC plans to purchase water from Johnson County SUD (BRA SWATS System) as recommended in the 2006 Plan. Bethany WSC is also considering purchasing water from Keene.
b. Significant changes from the 2006 Brazos G Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-4
Bethany WSC Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



2006 Plan strategy to purchase Johnson County SUD (BRA SWATS) water will meet the projected demands.

Hatched bars indicate recommended strategies not currently in place.

Figure F-5
Bethesda WSC
(Includes Johnson and Tarrant Counties)

Population	**2010**	**2020**	**2030**	**Notes**
Johnson Co. Portion	19,035	24,199	29,625	recommended
Tarrant Co. Portion	10,585	13,110	15,707	recommended
	29,620	**37,309**	**45,332**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Johnson Co. Portion	2,751	3,415	4,115	recommended
Tarrant Co. Portion	1,530	1,850	2,182	recommended
Total Demand	**4,281**	**5,265**	**6,297**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer (Region C)	35	35	35	2006 Plan
Trinity Aquifer (Brazos G)	393	393	393	2006 Plan
Fort Worth (TRWD Sources)	*2,466*	*2,466*	*2,466*	*revised current supply based on this study; current contract is 2.2 MGD (avg day)*
Water Conservation - Basic Package	21	82	106	2006 Plan
Total Supply	**2,915**	**2,976**	**3,000**	

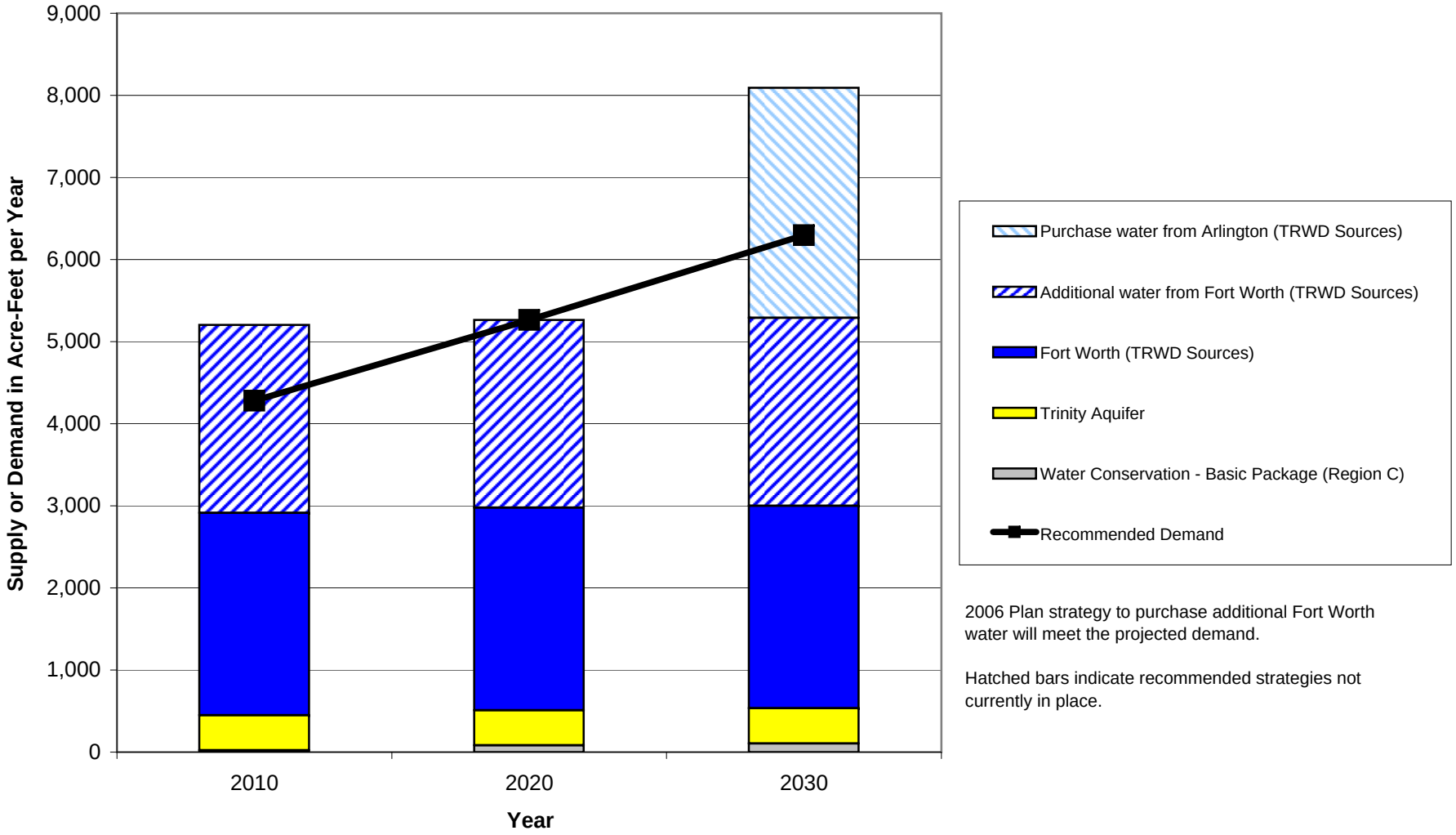
Surplus/Shortage (AF/Y)	**-1,366**	**-2,289**	**-3,297**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Additional water from Fort Worth (TRWD)	2,289	2,289	2,289	revised 2006 Plan; keep strategy
Purchase water from Arlington (TRWD)	*0*	*0*	*2,803*	*considering 5 MGD (peak)*
Supplemental Wells in Trinity Aquifer	0	0	0	keep strategy
Total	**2,289**	**2,289**	**5,092**	

Final Surplus/Shortage (AF/Y)	**923**	**0**	**1,795**

Notes: a. Bethesda WSC contract with Fort Worth expires in 2010. Bethesda WSC plans to renegotiate a contract and request additional supply. Bethesda WSC is interested in purchasing water from Arlington on the east side of Bethesda's system.
b. Changes from the 2006 Brazos G Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-5
Bethesda WSC Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



2006 Plan strategy to purchase additional Fort Worth water will meet the projected demand.

Hatched bars indicate recommended strategies not currently in place.

Table F-6
Brandon-Irene WSC
(Includes Ellis, Navarro and Hill Counties)

Population	**2010**	**2020**	**2030**	**Notes**
Ellis Co.	79	89	99	2006 Plan
Navarro Co.	221	238	256	2006 Plan
Hill Co.	2,059	2,128	2,207	2006 Plan
Total Population	**2,359**	**2,455**	**2,562**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Ellis Co.	10	11	11	2006 Plan
Navarro Co.	27	28	30	2006 Plan
Hill Co.	251	253	255	2006 Plan
Total Demand	**288**	**292**	**296**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Aquilla WSD (Lake Aquilla)	293	270	248	2006 Plan
Trinity Aquifer (Hill Co)	99	99	99	2006 Plan
Water Conservation - Basic Package	1	2	2	2006 Plan
Total Supply	**393**	**371**	**349**	

Surplus/Shortage (AF/Y)	**105**	**79**	**53**

No strategies were recommended in the 2006 Plan because Brandon-Irene WSC did not have any shortages.
No additional strategies are recommended in this study.
Units: Acre-Feet per Year (AF/Y)

Figure F-6
Brandon Irene WSC
Comparison of Currently Contracted Supplies to Recommended Demand

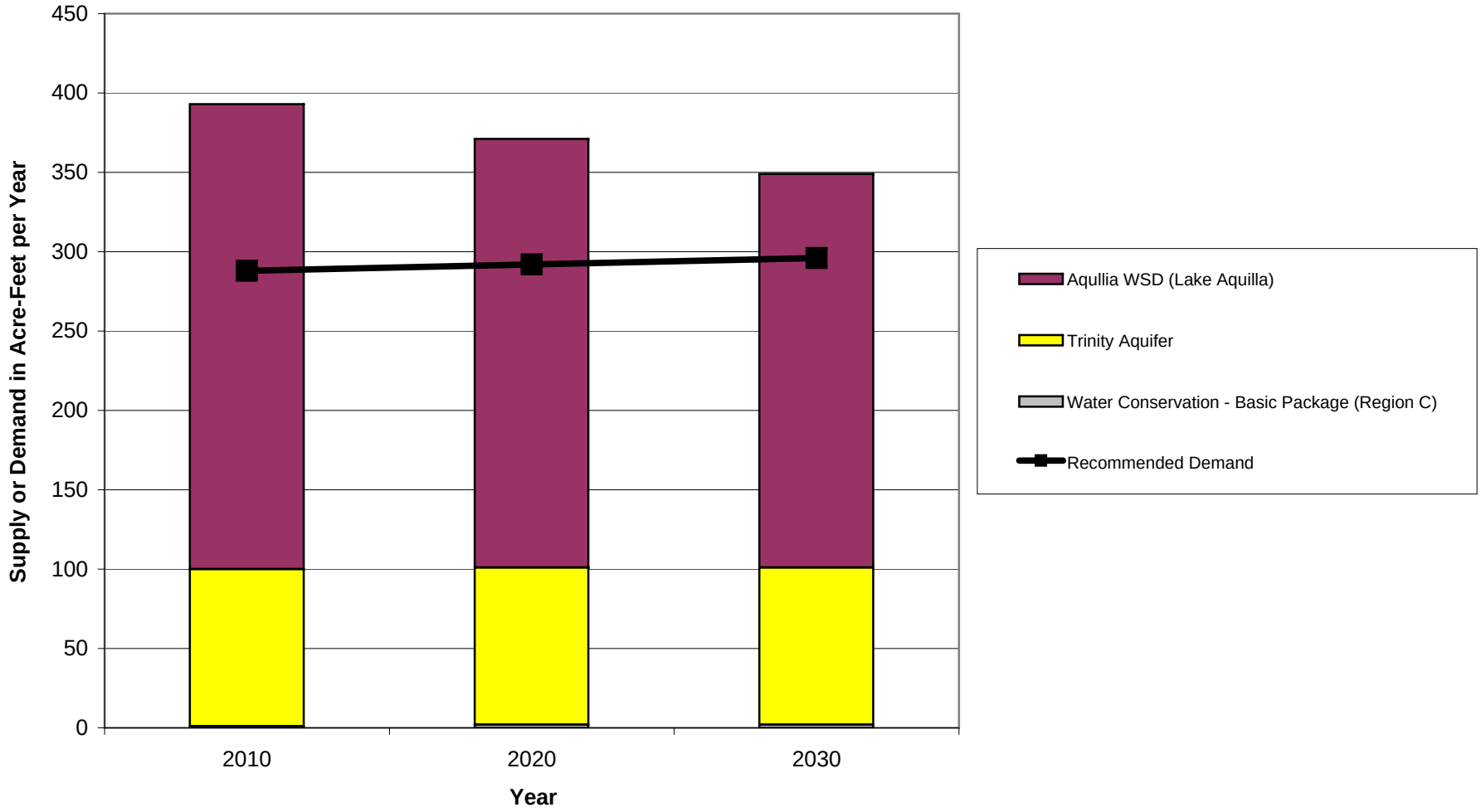


Table F-7
Buena Vista - Bethel SUD

Population	**2010**	**2020**	**2030**	**Notes**
Service Area	*4,144*	*5,423*	*6,925*	*recommended*

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Service Area Demand	*961*	*1,239*	*1,567*	*recommended*

Potential Wholesale Customers (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Files Valley WSC	*0*	*100*	*100*	assume 100 AF/Y
Ellis County-Other (3 private systems)	*0*	*100*	*100*	Includes South Ellis Co WSC and several private systems; assumed 100 AF/Y of Ellis County-Other Demand
Total Potential New Customer Demand	**0**	**200**	**200**	

Total Current and Potential Customer Demand (AF/Y)	**961**	**1,439**	**1,767**

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	305	305	305	2006 Plan
TRWD (from TRA through Waxahachie)	*953*	*953*	*953*	*0.85 MGD (avg day) contract with TRA; not connected, revised current supply based on this study*
Water Conservation - Basic Package	17	40	49	2006 Plan
Water Conservation - Expanded Package	0	2	3	2006 Plan
Total Supply	**1,275**	**1,300**	**1,310**	

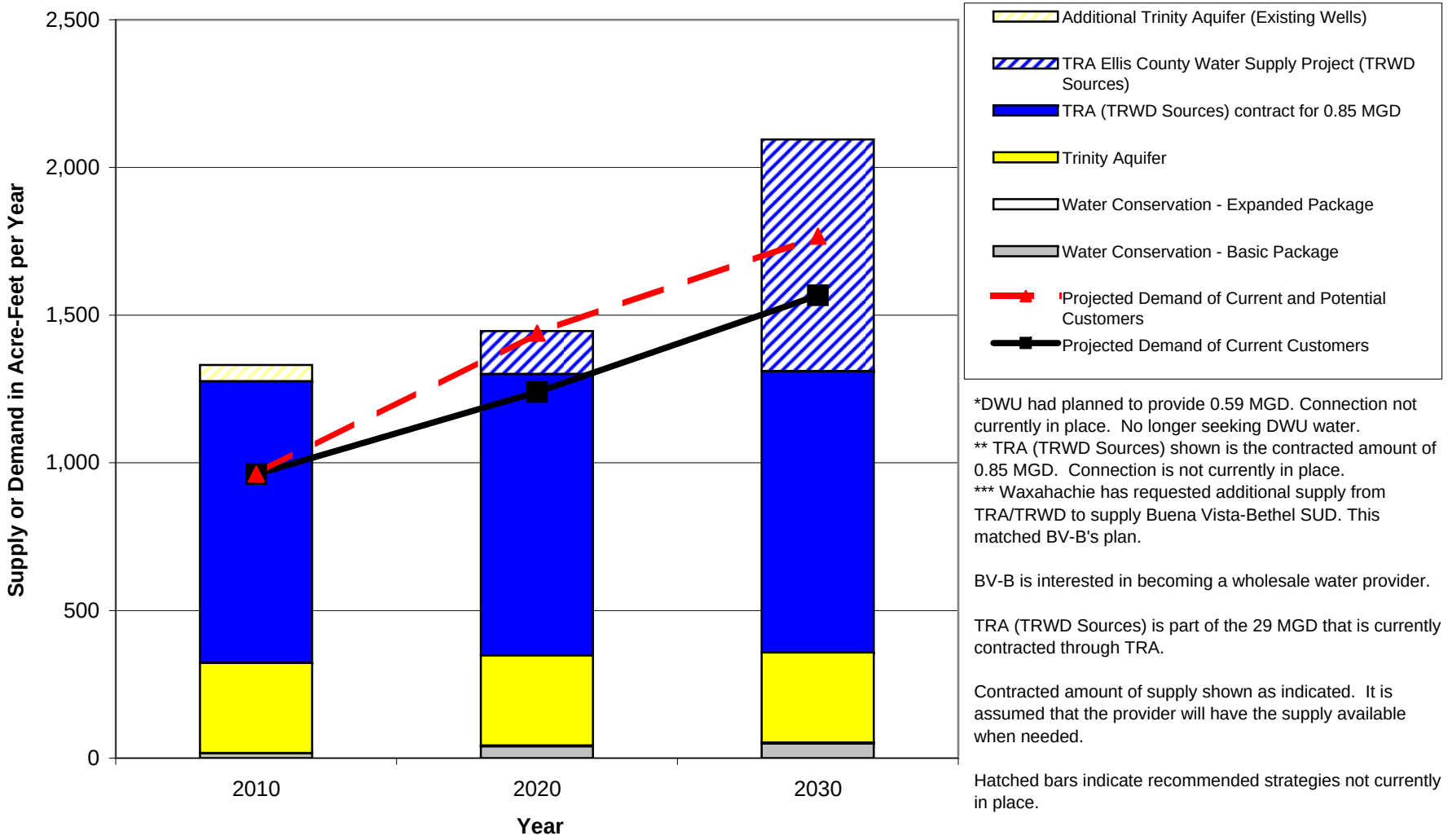
Surplus/Shortage (Current Customers) (AF/Y)	**314**	**61**	**-257**
Surplus/Shortage (Current and Potential Customers) (AF/Y)	**314**	**-139**	**-457**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Additional TRWD (from TRA through Waxahachie)	*0*	*146*	*785*	*additional water needed from Waxahachie Assumes groundwater may not be used in 2030.*
Additional Trinity Aquifer (Existing Wells)	56	0	0	keep strategy
Supplemental Wells in Trinity Aquifer	0	0	0	keep strategy
Total	**56**	**146**	**785**	

Final Surplus/Shortage (Current Customers) (AF/Y)	**371**	**207**	**528**
Final Surplus/Shortage (Current and Pot. Customers) (AF/Y)	**371**	**7**	**328**

Notes: a. Waxahachie has requested an additional contract from TRA (TRWD) to supply Buena Vista-Bethel SUD.
Files Valley WSC did not mention the idea of purchasing water from Buena Vista-Bethel SUD.
b. Changes from the 2006 Region C Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-7
Buena Vista - Bethel SUD and Potential Customers Comparison of Current Supply and Recommended Water Management Strategies to Recommended Demand



*DWU had planned to provide 0.59 MGD. Connection not currently in place. No longer seeking DWU water.
** TRA (TRWD Sources) shown is the contracted amount of 0.85 MGD. Connection is not currently in place.
*** Waxahachie has requested additional supply from TRA/TRWD to supply Buena Vista-Bethel SUD. This matched BV-B's plan.

BV-B is interested in becoming a wholesale water provider.

TRA (TRWD Sources) is part of the 29 MGD that is currently contracted through TRA.

Contracted amount of supply shown as indicated. It is assumed that the provider will have the supply available when needed.

Hatched bars indicate recommended strategies not currently in place.

Figure F-8
City of Burleson
(Includes Johnson and Tarrant Counties)

Population	**2010**	**2020**	**2030**	**Notes**
Johnson Co. Portion	*27,206*	*42,037*	*52,747*	*recommended*
Tarrant Co. Portion	*6,801*	*10,509*	*13,187*	*recommended*
Total Population	**34,007**	**52,546**	**65,934**	

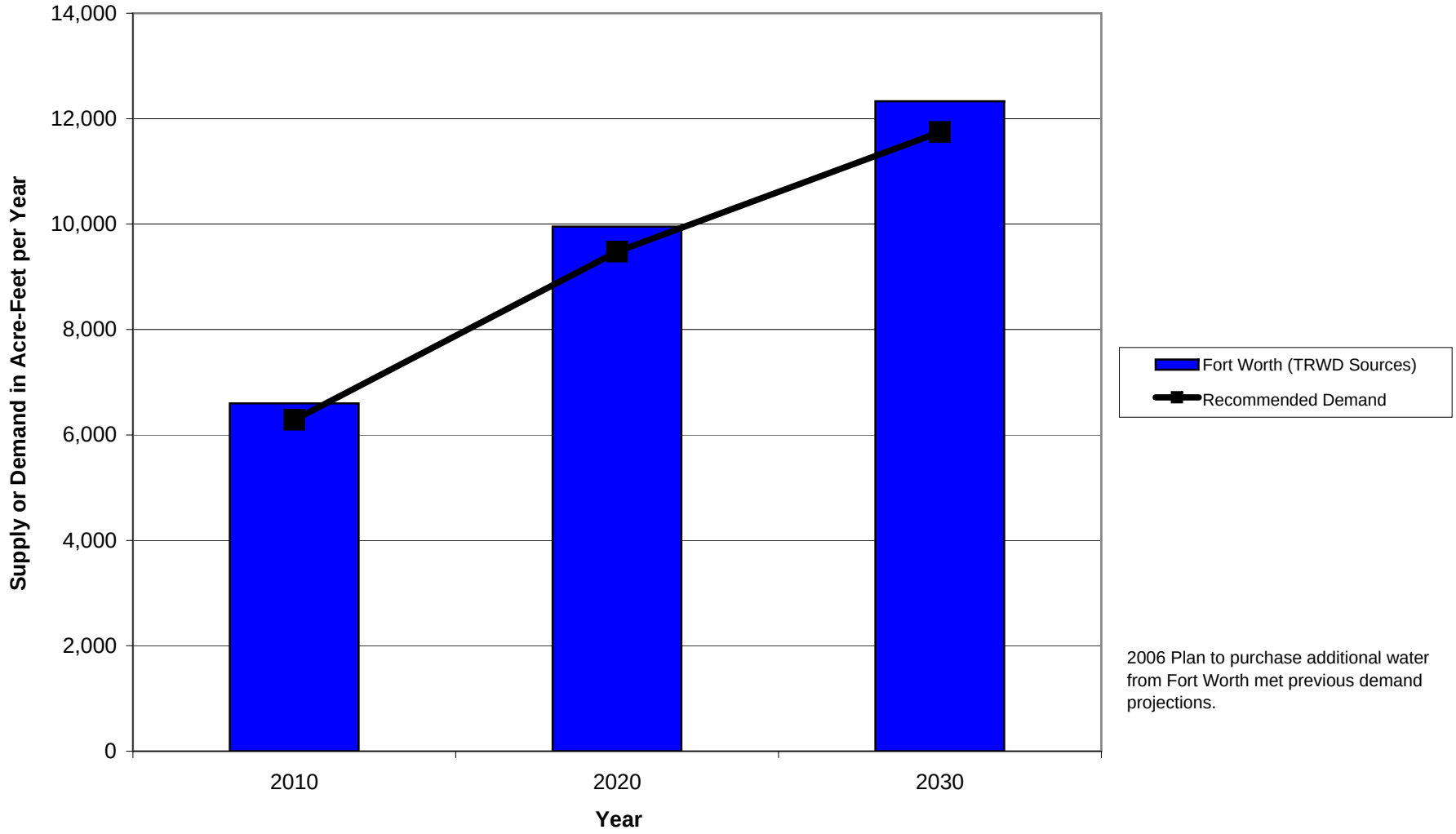
Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Johnson Co. Portion	*5,029*	*7,582*	*9,395*	*recommended*
Tarrant Co. Portion	*1,257*	*1,895*	*2,349*	*recommended*
Total Demand	**6,286**	**9,477**	**11,744**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Fort Worth (TRWD Sources) Johnson Co.	*5,280*	*7,961*	*9,865*	*revised current supply based on this study*
Fort Worth (TRWD Sources) Tarrant Co.	*1,320*	*1,990*	*2,466*	*revised current supply based on this study*
Total Supply	**6,600**	**9,951**	**12,331**	

Surplus/Shortage (AF/Y)	**314**	**474**	**587**

Notes: a. Contract with Fort Worth expires in 2010. Burleson plans to renew that contract. Additional pipeline capacity needed before 2020.
b. Changes from the 2006 Region C and Brazos G Water Plans are shown in italics
c. Units: Acre-Feet per Year (AF/Y)

Figure F-8
City of Burleson
Comparison of Currently Contracted Supplies to Recommended Demand



2006 Plan to purchase additional water from Fort Worth met previous demand projections.

Table F-9
City of Cedar Hill
(Includes Dallas and Ellis Counties)

Population of Existing Customers	**2010**	**2020**	**2030**	**Notes**
City Population (Dallas County)	*48,637*	*66,612*	*77,958*	*recommended*
City Population Demand (Ellis County)	*49*	*67*	*78*	*recommended*
Total Population	**48,686**	**66,679**	**78,036**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand (Dallas County)	*10,897*	*14,700*	*17,116*	*recommended*
In-City Demand (Ellis County)	*11*	*15*	*17*	*recommended*
Dallas County Manufacturing	68	76	82	2006 Plan
Ellis County Manufacturing	7	7	8	2006 Plan
Total Demand	**10,983**	**14,798**	**17,223**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
DWU Sources	*8,968*	*13,138*	*15,122*	*supply based on Dallas Long Range Water Plan*
Joe Pool Lake	0	0	0	2006 Plan
Trinity Aquifer	275	275	275	2006 Plan
Water Conservation - Basic Package	694	2,258	2,753	2006 Plan
Water Conservation - Expanded Package	65	182	233	2006 Plan
Total Supply	**10,002**	**15,853**	**18,383**	

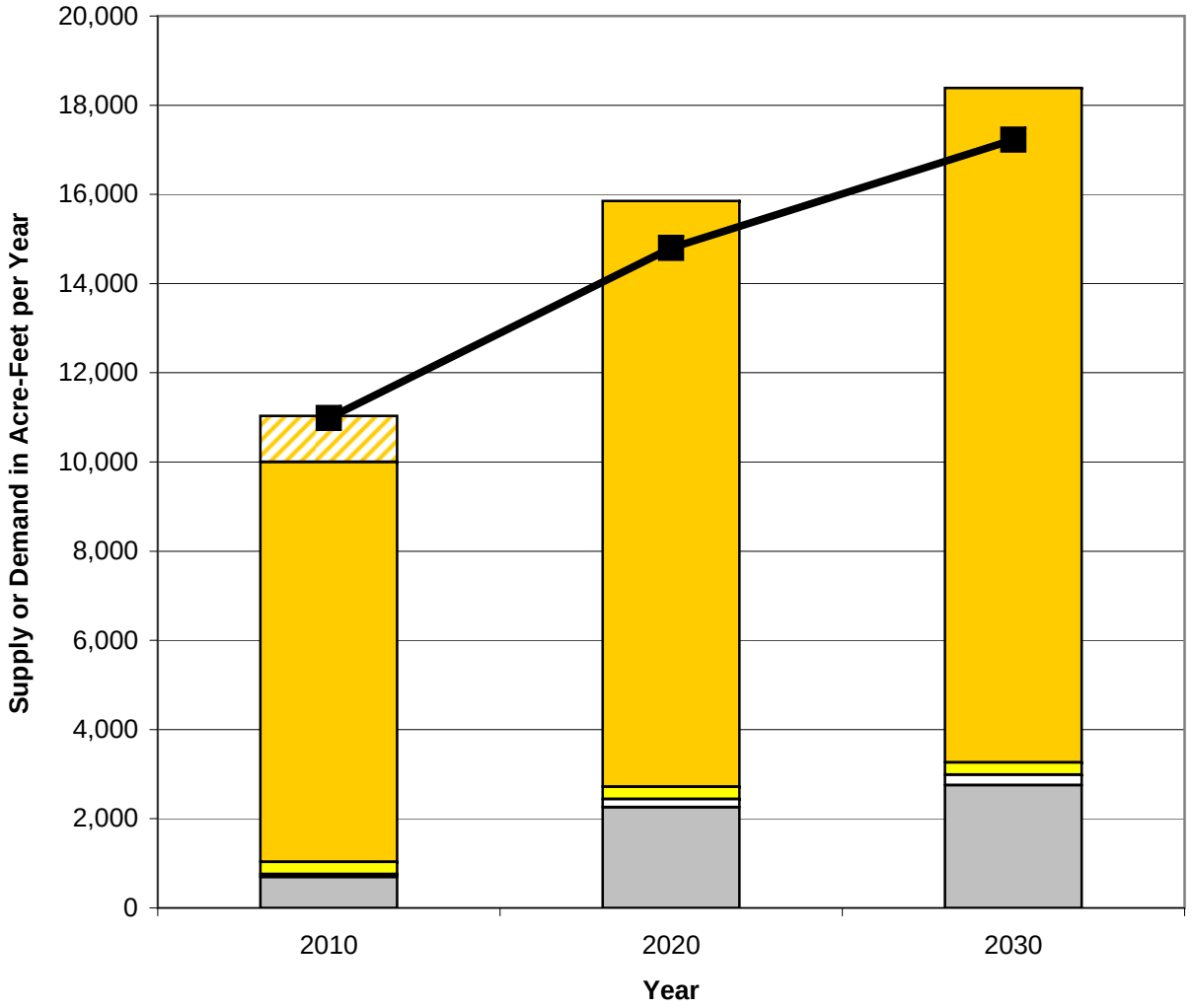
Surplus/Shortage (AF/Y)	**-981**	**1,055**	**1,160**

Additional Water Management Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Supplemental wells in Trinity aquifer	0	0	0	2006 Plan
Purchase additional water from DWU	*1,030*	*0*	*0*	*Request additional supply from Dallas*
Total Supply	**1,030**	**0**	**0**	

Final Surplus/Shortage (AF/Y)	**49**	**1,055**	**1,160**

Note: a. Cedar Hill is no longer a wholesale water provider to Ovilla. Cedar Hill's contract with Dallas for water supply expires in 2009. City plans to renew the contract.
b. Changes from the 2006 Region C Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-9
City of Cedar Hill Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



*Cedar Hill has a contract with TRA for 6.55 MGD (average day) supply from Lake Joe Pool. Cedar Hill does not have the infrastructure to divert this water and has no immediate plans to use this water.
** Cedar Hill no longer sells to Ovilla.

Hatched bars indicate recommended strategies not currently in place.

Table F-10
City of Cleburne

Population	**2010**	**2020**	**2030**	**Notes**
In-City	*30,946*	*38,683*	*48,353*	*recommended*
Total Population	**30,946**	**38,683**	**48,353**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	*6,244*	*7,802*	*9,753*	*recommended*
Industrial Demand	*2,758*	*4,883*	*6,148*	*recommended*
Steam Electric Power Demand	*2,959*	*2,959*	*2,959*	*recommended*
Mining Demand (Barnett Shale)	*1,009*	*673*	*673*	*recommended*
Total Demand	**12,970**	**16,317**	**19,533**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Lake Pat Cleburne	5,183	5,104	5,025	2006 Plan
BRA Lake Aquilla	4,790	4,280	3,770	Reduction due to sedimentation. Contract is 5,300 AF/Y.
BRA Lake Whitney	*9,700*	*9,700*	*9,700*	*Contract is 15,000 AF/Y with 9,700 AF/Y from Lake Whitney and the rest from Lake Aquilla; Infrastructure is not currently in place.*
Reuse for Steam Electric Power	*1,344*	*1,344*	*1,344*	*FNI Study*
Trinity Aquifer	*1,120*	*1,120*	*1,120*	*recommended*
Conservation	229	515	454	2006 Plan
Total Supply	**22,366**	**22,063**	**21,413**	

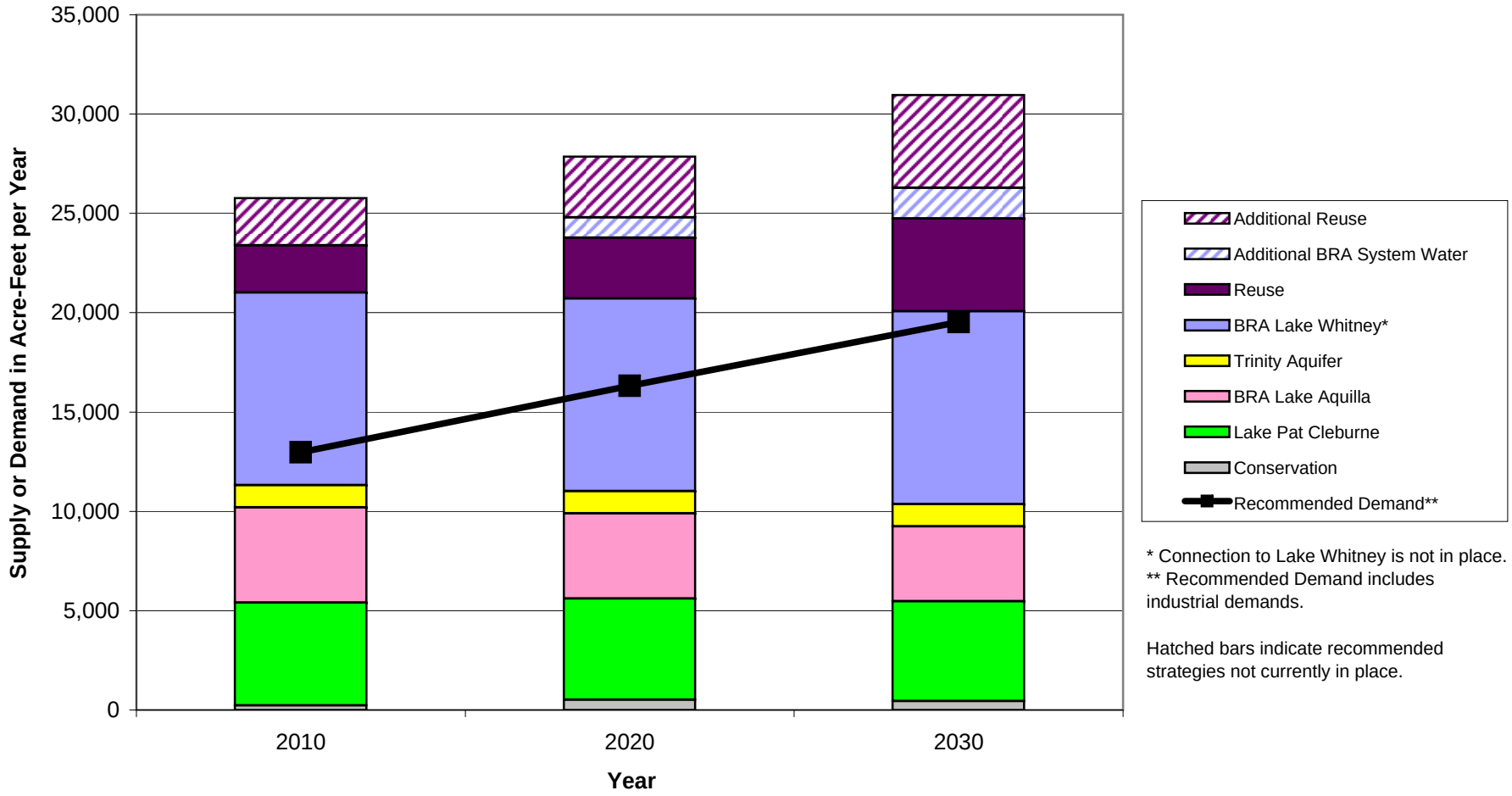
Surplus/Shortage (AF/Y)	**9,396**	**5,746**	**1,880**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Additional Reuse	2,375	3,058	4,682	FNI Study
Additional BRA supply through system operations to mitigate loss of yield for BRA Lake Aquilla supplies due to sedimentation	*0*	*1,020*	*1,530*	*Supply likely from Lake Whitney. Calculated: 15,000 ac-ft (BRA contract) - BRA Lake Aquilla - BRA Lake Whitney*
Total	**2,375**	**4,078**	**6,212**	

Final Surplus/Shortage (AF/Y)	**11,771**	**9,824**	**8,092**

Notes: Changes from the 2006 Brazos G Water Plan are shown in italics.
Units: Acre-Feet per Year (AF/Y)

Figure F-10
City of Cleburne Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand (Including Manufacturing, Steam Electric, and Mining)



* Connection to Lake Whitney is not in place.
** Recommended Demand includes industrial demands.

Hatched bars indicate recommended strategies not currently in place.

Table F-11
Community Water Company
(Ellis County only)

Recommended Population	**2010**	**2020**	**2030**	**Notes**
Community Water Company	1,134	1,414	1,690	2006 Plan

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Service Area in Ellis County	116	171	201	2006 Plan

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	
Lake Bardwell (through Ennis)	*133*	*133*	*133*	*Contract is for 0.2376 MGD (peak day)*
Water Conservation - Basic Package	4	16	21	2006 Plan
Total Supply	**137**	**149**	**154**	

Surplus/Shortage (AF/Y)	**21**	**-22**	**-47**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
TRA Ellis County Water Supply Project (Ennis)	0	23	67	2006 Plan
Total	**0**	**23**	**67**	

Final Surplus/Shortage (AF/Y)	**21**	**1**	**20**

Notes: a. Ennis has requested additional supply from TRA (TRWD Sources).
b. Changes from the 2006 Region C Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-11
Community Water Company (Ellis County only)
Comparison of Currently Contracted Supplies and
Recommended Strategies to Recommended Demand

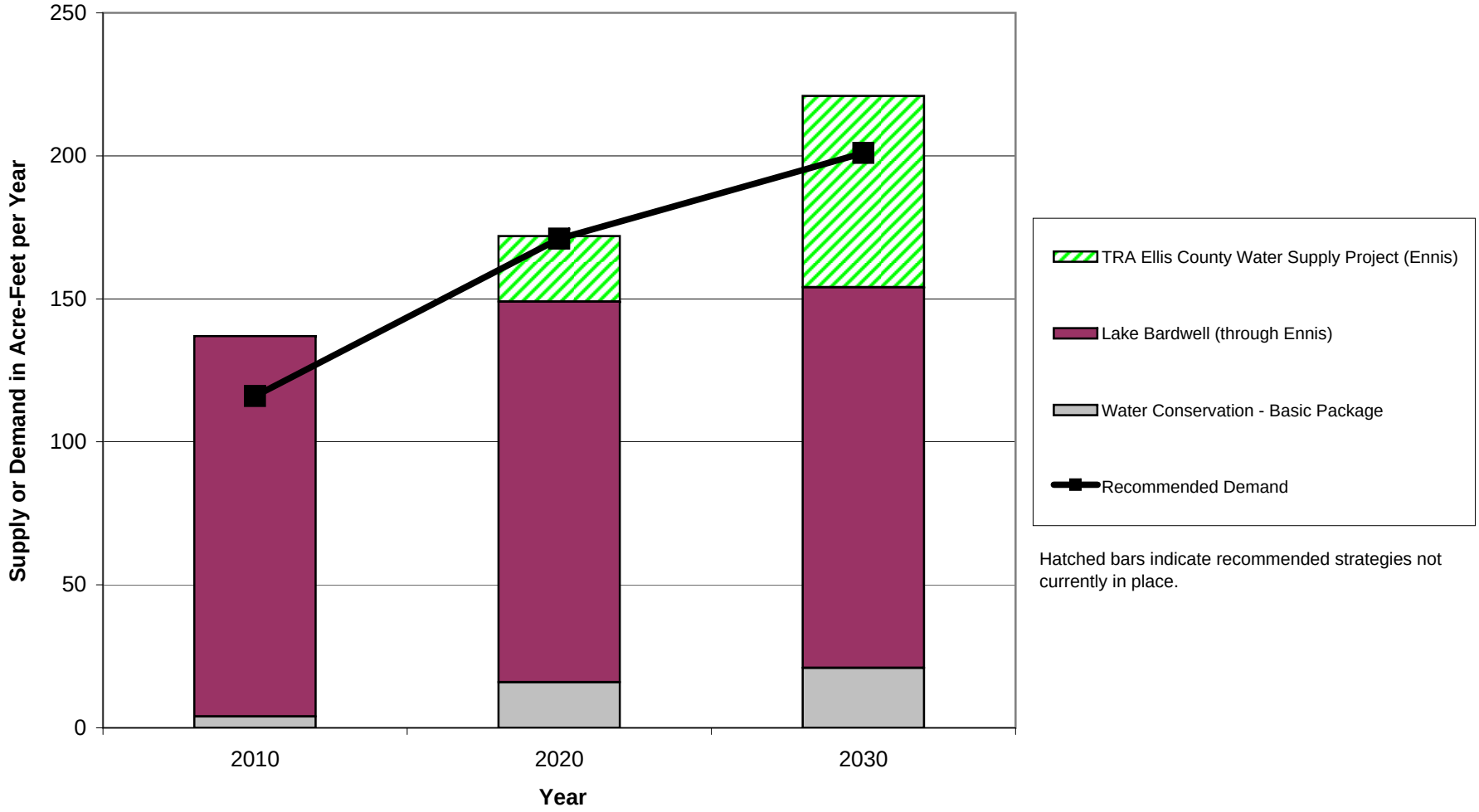


Table F-12
City of Duncanville

Population	**2010**	**2020**	**2030**	**Notes**
City	*38,400*	*38,800*	38,988	*recommended*

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	*7,399*	*7,345*	*7,206*	*recommended*

Current Supply (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Dallas Sources	*6,849*	*7,107*	*7,511*	*supply based on Dallas Long Range Water Supply Plan*
Joe Pool Lake	0	0	0	2006 Plan
Water Conservation - Basic Package	226	439	513	2006 Plan
Water Conservation - Expanded Package	5	29	50	2006 Plan
Total Supply	**7,080**	**7,575**	**8,074**	

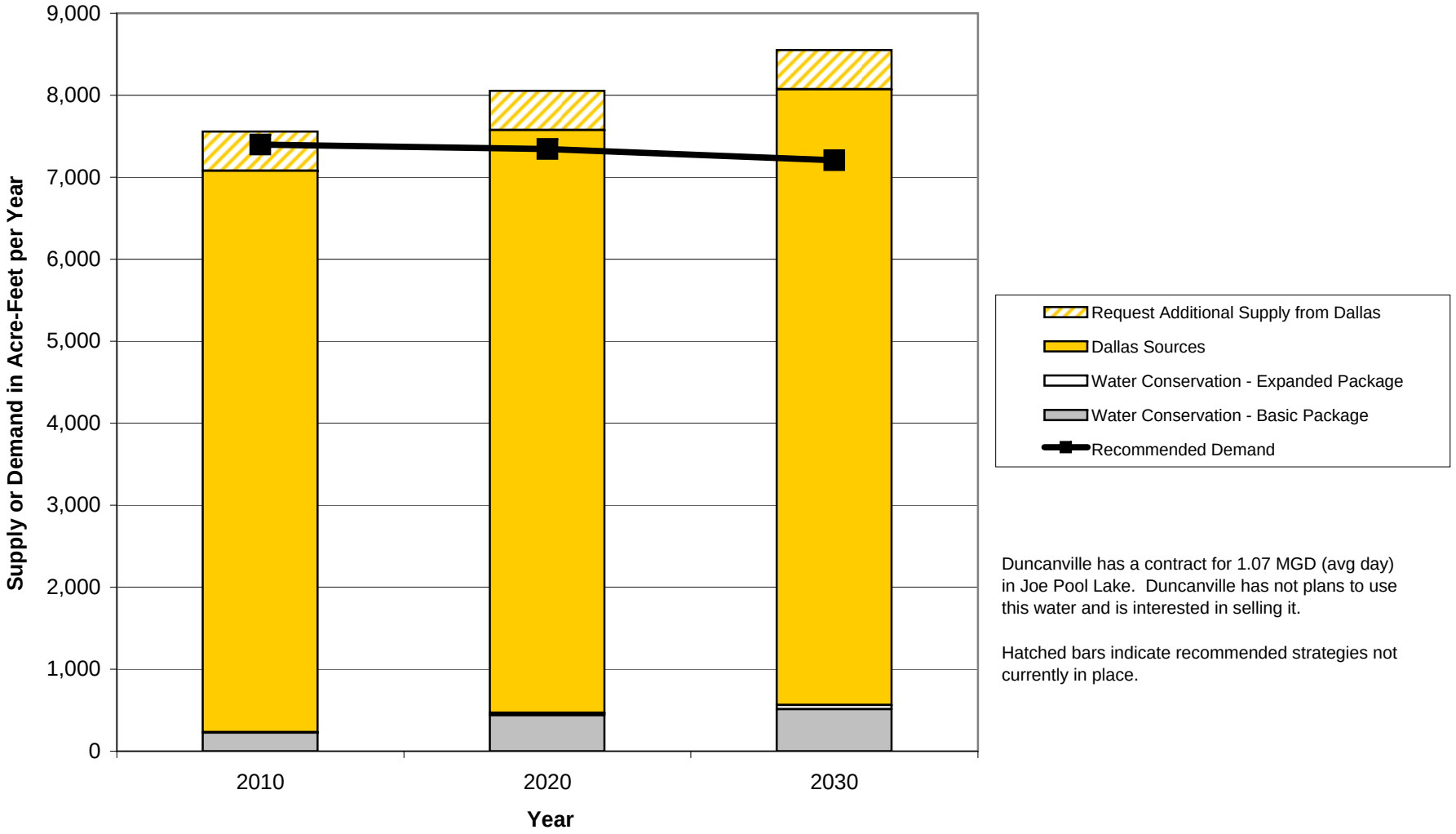
Surplus/Shortage (AF/Y)	**-318**	**230**	**867**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Purchase additional water from DWU	*478*	*478*	*478*	*Request additional supply from Dallas*
Total Strategies	**478**	**478**	**478**	

Total Surplus/Shortage with Strategies (AF/Y)	**160**	**708**	**1,345**

Note: a. Contract with DWU was 12.5 MGD. The contract is now for 12 MGD.
b. Changes from the 2006 Region C Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-12
City of Duncanville Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



Duncanville has a contract for 1.07 MGD (avg day) in Joe Pool Lake. Duncanville has not plans to use this water and is interested in selling it.

Hatched bars indicate recommended strategies not currently in place.

Table F-13
Ellis County-Other

Population	**2010**	**2020**	**2030**	**Notes**
Population	10,707	10,707	10,707	2006 Plan

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Demand	2,015	2,003	1,979	2006 Plan

Current Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Lake Bardwell (through Ennis)	*56*	*56*	*56*	*Contract is for 0.1 MGD (peak day)*
Waxahachie Sources	*242*	*240*	*237*	*revised current supply based on this study, includes Nash-Forreston WSC*
Rockett SUD Sources	*70*	*70*	*70*	*current contracts with Boyce WSC and Brystol WSC*
Trinity Aquifer	497	497	497	2006 Plan
Woodbine Aquifer	260	260	260	2006 Plan
Water Conservation - Basic Package	19	68	74	2006 Plan
Total Supply	**1,144**	**1,191**	**1,194**	

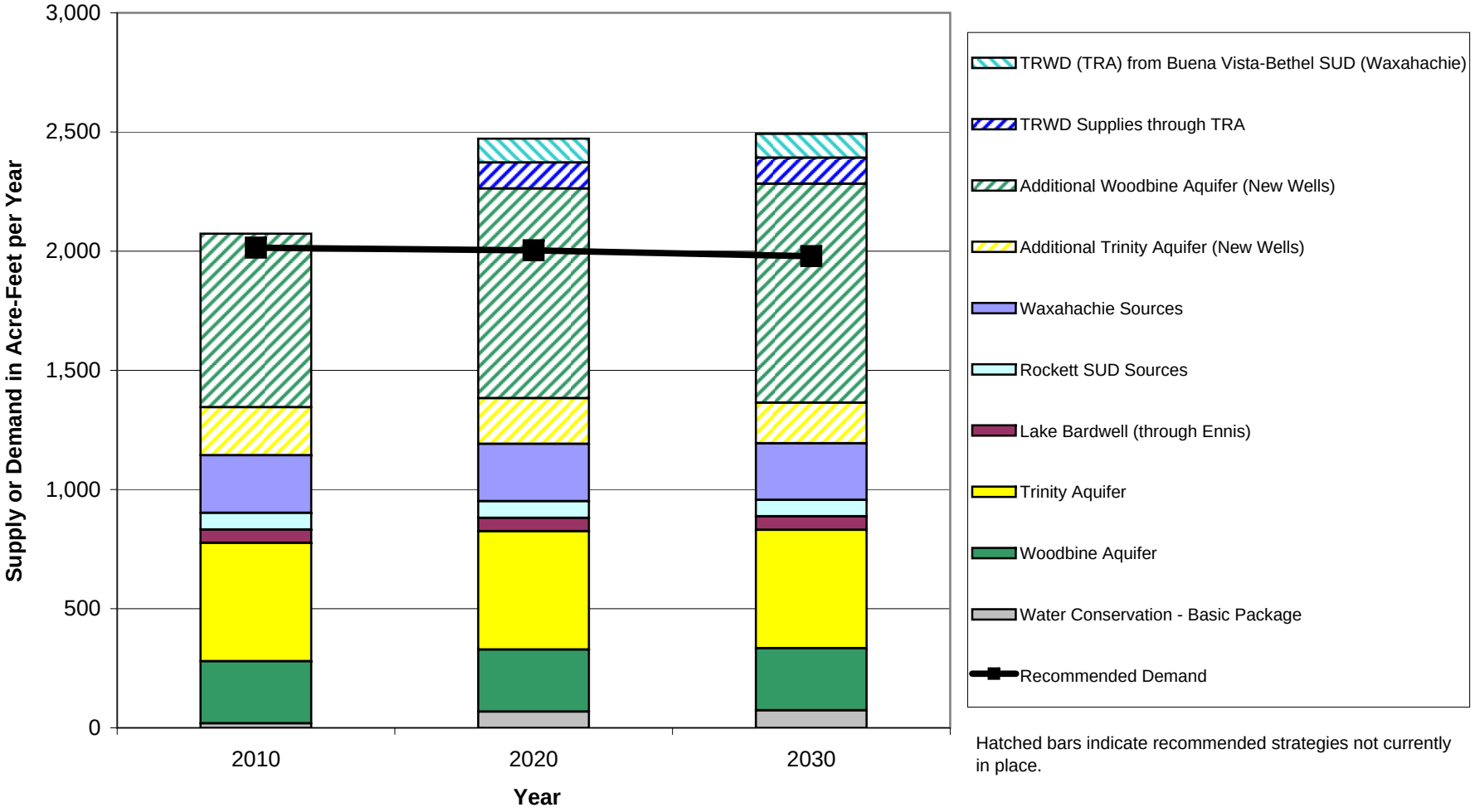
Surplus/Shortage (AF/Y)	**-871**	**-812**	**-785**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Additional Rockett SUD	*0*	*9*	*9*	*East Garrett WSC considering 8,000 gal/d*
TRWD (TRA) (from Buena Vista-Bethel SUD through Waxahachie)	*0*	*100*	*100*	*Includes South Ellis Co WSC and several private systems; assumed 100 AF/Y of Ellis County-Other Demand*
Additional Trinity Aquifer (New Wells)	201	192	170	2006 Plan
Additional Woodbine Aquifer (New Wells)	729	880	919	2006 Plan
Supplemental wells in Trinity aquifer	0	0	0	2006 Plan
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Total	**930**	**1,181**	**1,198**	

Final Surplus/Shortage (AF/Y)	**59**	**369**	**413**

Notes: a. *Ellis County-Other will receive some of its future water supply from the TRA Ellis County Water Supply Project (Waxahachie).*
b. Changes from the 2006 Region C Water Plan are shown in italics.
c. Buena Vista-Bethel SUD plans to sell water to three private suppliers in Ellis County.
d. Units: Acre-Feet per Year (AF/Y)

Figure F-13
Ellis County-Other Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



Hatched bars indicate recommended strategies not currently in place.

Table F-14
City of Ennis

Population of Existing Customers	**2010**	**2020**	**2030**	**Notes**
Ennis	*21,600*	*30,000*	*37,922*	*recommended*
Community Water Company (Ellis County)	1,134	1,414	1,690	recommended
East Garrett WSC (Ellis County-Other)	2,054	2,629	3,366	2006 Plan (10% of County-Other)
Rice WSC	*406*	*417*	*421*	*revised based on contract*
Total Population	**25,194**	**34,460**	**43,399**	

Existing Customer Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	*4,573*	*6,217*	*7,774*	*recommended*
Community Water Company (Ellis County)	*133*	*133*	*133*	*Contract is for 0.2376 MGD (peak day)*
East Garrett WSC (Ellis County-Other)	*56*	*56*	*56*	*Contract is for 0.1 MGD (peak day)*
Rice WSC	*50*	*50*	*50*	*Contract is for 0.090 MGD (peak day)*
Ellis County Manufacturing	347	367	384	2006 Plan
Ellis County Steam Electric Power	2,098	2,615	3,302	2006 Plan
Total Demand	**7,257**	**9,438**	**11,699**	

Potential New Customers (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Bardwell	23	45	68	recommended demand less other supplies
Total Potential New Customer Demand	**23**	**45**	**68**	

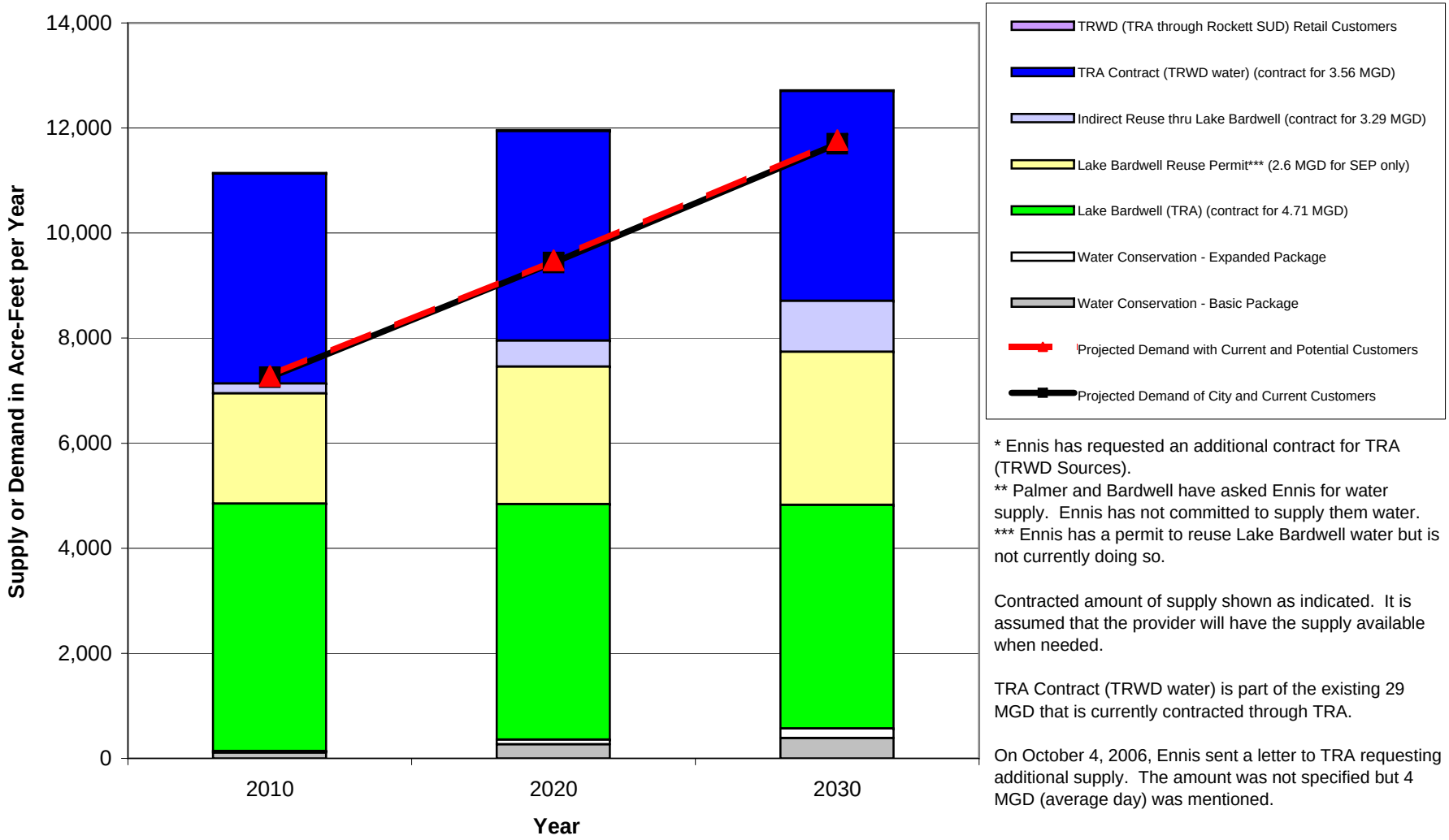
Total Demand of Current and Potential Customers (AF/Y)	**7,280**	**9,483**	**11,767**

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Lake Bardwell (TRA)	*4,712*	*4,485*	*4,257*	*TRA contract allows for 5,280 AF/Y; supply limited by sedimentation as shown in 2006 Plan*
Direct Reuse (SEP purposes only)	*2,098*	*2,615*	*2,915*	*Reuse is direct to steam electric plant. Contract allows for up to 2.6 MGD (avg).*
Indirect Reuse from Lake Bardwell (TRA)	*189*	*494*	*972*	*contract allows for up to 3,696 AF/Y, revised current supply based on this study*
TRWD (through TRA)	*3,991*	*3,991*	*3,991*	*3.56 MGD (avg day) contract with TRA (TRWD water). Connection is now in place. Revised current supply based on this study*
TRWD (TRA through Rockett SUD)	*17*	*17*	*17*	*23 connections (retail customer)*
Water Conservation - Basic Package	110	266	384	2006 Plan
Water Conservation - Expanded Package	28	91	183	2006 Plan
Total Supply	**11,145**	**11,959**	**12,719**	

Surplus/Shortage (Current Customers) (AF/Y)	**3,888**	**2,521**	**1,020**
Surplus/Shortage (Current and Potential Customers) (AF/Y)	**3,865**	**2,476**	**952**

Notes: a. Ennis has requested additional TRWD (through TRA) above 3.56 MGD that is currently contracted.
b. Palmer and Bardwell have requested water supply from Ennis. Ennis has not committed to supplying them water.
c. Ennis may provide water to Palmer as an alternative water management strategy.
d. No shortages are projected through 2030.
e. No additional strategies are recommended.
f. Changes from the 2006 Region C Water Plan are shown in italics.
g. Ennis will need water treatment plant expansions.
h. Total reuse cannot exceed one-half of the In-City demand.
i. Units: Acre-Feet per Year (AF/Y)

Figure F-14
City of Ennis and Customers Comparison of Currently Contracted Supplies to Recommended Demands



* Ennis has requested an additional contract for TRA (TRWD Sources).
** Palmer and Bardwell have asked Ennis for water supply. Ennis has not committed to supply them water.
*** Ennis has a permit to reuse Lake Bardwell water but is not currently doing so.

Contracted amount of supply shown as indicated. It is assumed that the provider will have the supply available when needed.

TRA Contract (TRWD water) is part of the existing 29 MGD that is currently contracted through TRA.

On October 4, 2006, Ennis sent a letter to TRA requesting additional supply. The amount was not specified but 4 MGD (average day) was mentioned.

Table F-15
City of Ferris

Population	**2010**	**2020**	**2030**	**Notes**
In-City	*2,631*	*3,183*	*3,851*	*recommended*

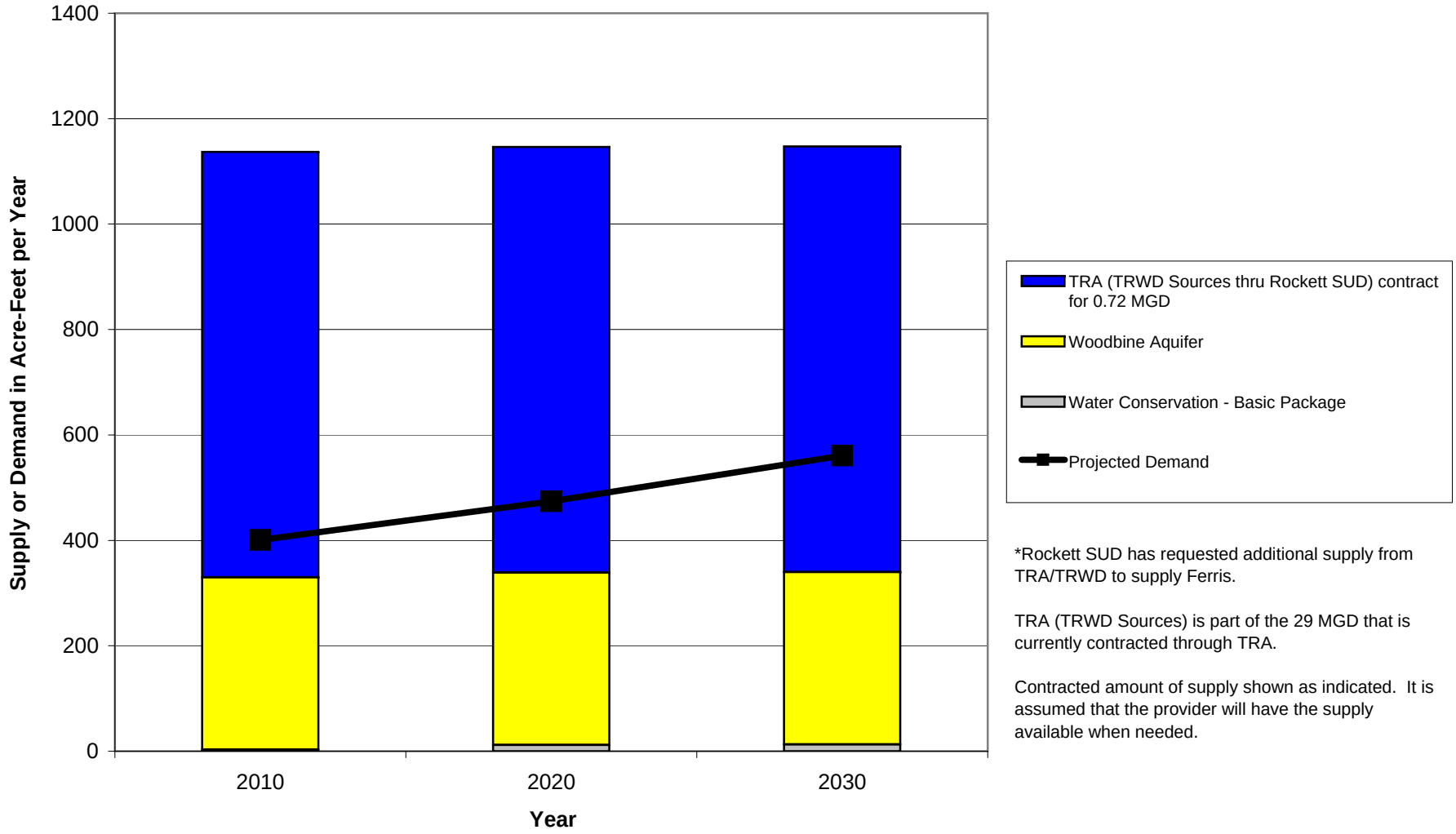
Proposed Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand (AF/Y)	*401*	*474*	*561*	*recommended*

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
TRWD (from TRA through Rockett SUD)	*807*	*807*	*807*	*contract for 0.72 MGD (avg day); connection in place, revised current supply based on this study*
Woodbine Aquifer	327	327	327	2006 Plan showed 327 AF/Y; current well capacity is 782 AF/Y (max)
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Water Conservation - Basic Package	3	12	13	2006 Plan
Total Supply	**1,137**	**1,146**	**1,147**	

Surplus/Shortage (AF/Y)	**736**	**672**	**586**

Notes: a. Rockett SUD has requested an additional contract from TRA (TRWD) to supply Ferris. Rockett SUD currently serves retail water to a portion of Ferris.
b. Changes from 2006 Region Water C Plan shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-15
City of Ferris Comparison of Currently Contracted Supplies to Recommended Demand



*Rockett SUD has requested additional supply from TRA/TRWD to supply Ferris.

TRA (TRWD Sources) is part of the 29 MGD that is currently contracted through TRA.

Contracted amount of supply shown as indicated. It is assumed that the provider will have the supply available when needed.

Table F-16
Files Valley WSC
(Includes Ellis and Hill Counties)

Population	**2010**	**2020**	**2030**	**Notes**
Ellis County portion (outside city limits)	*108*	*142*	*174*	*recommended*
Hill County, Brazos Basin (outside city limits)	*-715*	*-785*	*-839*	*recommended*
Hill County, Trinity Basin (outside city limits)	*412*	*411*	*415*	*recommended*
Milford (Ellis Co.)	670	688	707	
Parker WSC	2,564	2,631	2,702	
Total Population	**3,039**	**3,087**	**3,159**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Ellis County portion (outside city limits)	*102*	*115*	*127*	*recommended*
Hill County, Brazos Basin (outside city limits)	*109*	*107*	*112*	*recommended*
Hill County, Trinity Basin (outside city limits)	*99*	*99*	*100*	*recommended*
Milford (Ellis Co.)	0	0	0	total less other supplies
Parker WSC	300	302	306	total less other supplies
Total Demand	**610**	**623**	**645**	

Demand Based on Contracts (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Ellis County portion (outside city limits)	*102*	*115*	*127*	*recommended*
Hill County, Brazos Basin (outside city limits)	*109*	*107*	*112*	*recommended*
Hill County, Trinity Basin (outside city limits)	*99*	*99*	*100*	*recommended*
Milford (Ellis Co.)	84	84	84	contract for 75,000 gal/d (avg)
Parker WSC	336	336	336	contract for 300,000 gal/d (avg)
Total Demand	**730**	**741**	**759**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Lake Aquilla (through Aquilla WSD)	*1,063*	*985*	*907*	*2006 Plan showed slightly lower values; contract is for 1,125 AF/Y for Lake Aquilla*
Water Conservation - Basic Package	1	5	6	2006 Plan
Total Supply	**1,064**	**990**	**913**	

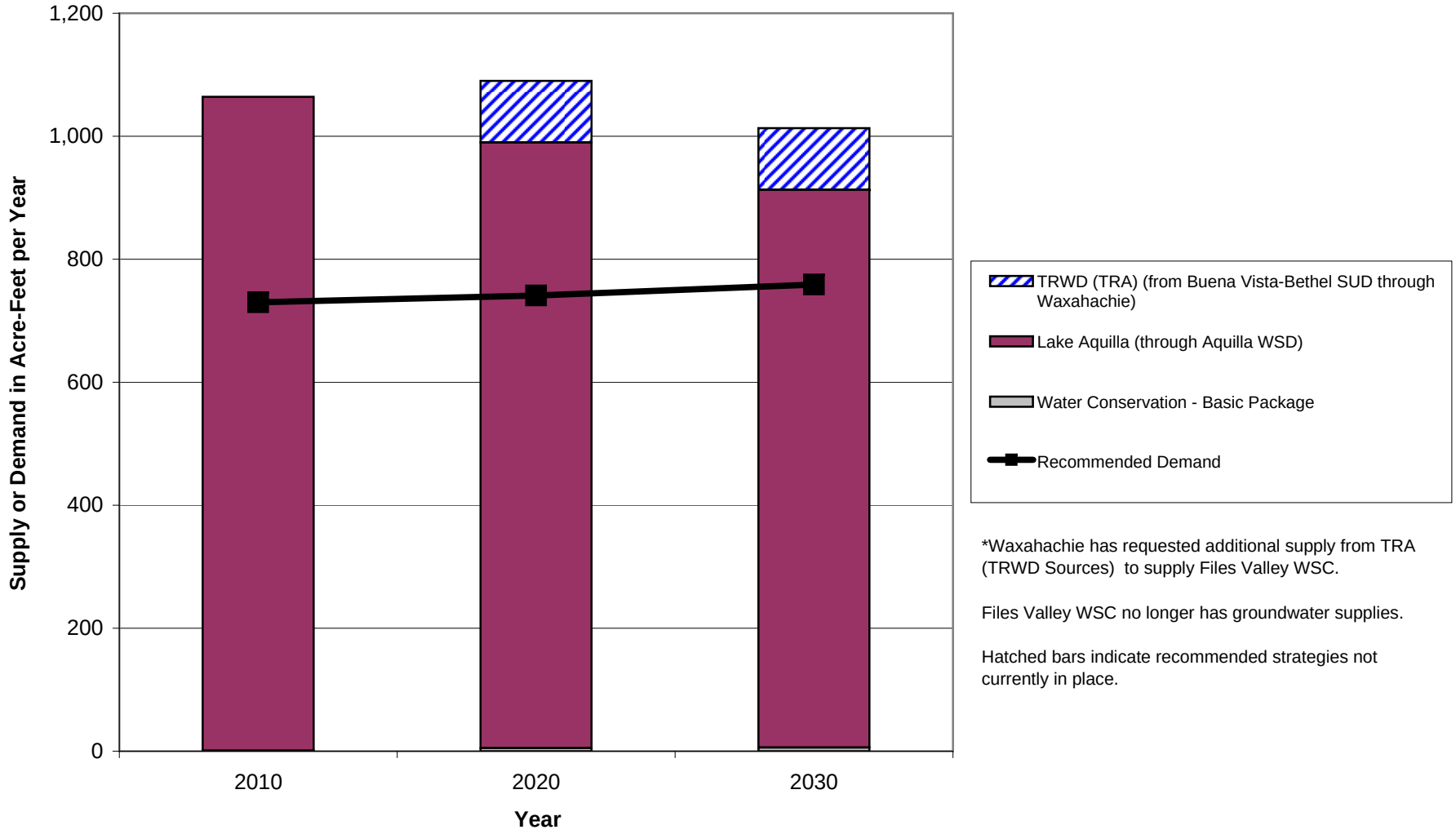
Surplus/Shortage (AF/Y)	**334**	**249**	**154**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
TRWD (TRA) (from Buena Vista-Bethel SUD through Waxahachie)	*0*	*100*	*100*	*new strategy; amount is assumed*
Total	**0**	**100**	**100**	

Final Surplus/Shortage (AF/Y)	**980**	**1,006**	**929**

Notes: a. Waxahachie has requested an additional contract from TRA (TRWD) to supply Files Valley WSC.
b. Changes from the 2006 Region C and Brazos G Water Plans are shown in italics.
c. Buena Vista-Bethel SUD plans to supply water to Files Valley WSC.
d. Units: Acre-Feet per Year (AF/Y)

Figure F-16
Files Valley WSC Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



*Waxahachie has requested additional supply from TRA (TRWD Sources) to supply Files Valley WSC.

Files Valley WSC no longer has groundwater supplies.

Hatched bars indicate recommended strategies not currently in place.

Table F-17
City of Glenn Heights
(Includes Dallas and Ellis Counties)

Population	**2010**	**2020**	**2030**	**Notes**
In-City Demand (Ellis Co.)	2,660	3,638	4,602	2006 Plan
In-City Demand (Dallas Co.)	7,332	8,919	10,390	2006 Plan
Oak Leaf	1,502	1,774	2,042	2006 Plan
Total Population	**11,494**	**14,331**	**17,034**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand (Ellis Co.)	328	440	546	2006 Plan
In-City Demand (Dallas Co.)	903	1,079	1,234	2006 Plan
Oak Leaf	273	316	363	total demand less retail supply provided by Rockett SUD
Total Demand	**1,504**	**1,835**	**2,143**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Dallas Sources	*1,838*	*3,150*	*3,621*	*supply based on Dallas Long Range Water Supply Plan*
Trinity Aquifer	229	229	229	2006 Plan
Water Conservation - Basic Package	20	77	98	2006 Plan
Supplemental wells in Trinity aquifer	0	0	0	2006 Plan
Total Supply	**2,087**	**3,456**	**3,948**	

Surplus/Shortage (AF/Y)	**583**	**1,621**	**1,804**

Notes: a. Rockett SUD mentioned Glenn Heights as a potential future customer. Glenn Heights did not respond to the survey. Rockett SUD might be an alternative strategy for Glenn Heights.
b. Changes from the 2006 Region C Water Plan are shown in italics
c. Units: Acre-Feet per Year (AF/Y)

Figure F-17
City of Glenn Heights and Customers
Comparison of Currently Contracted Supplies to Recommended Demand

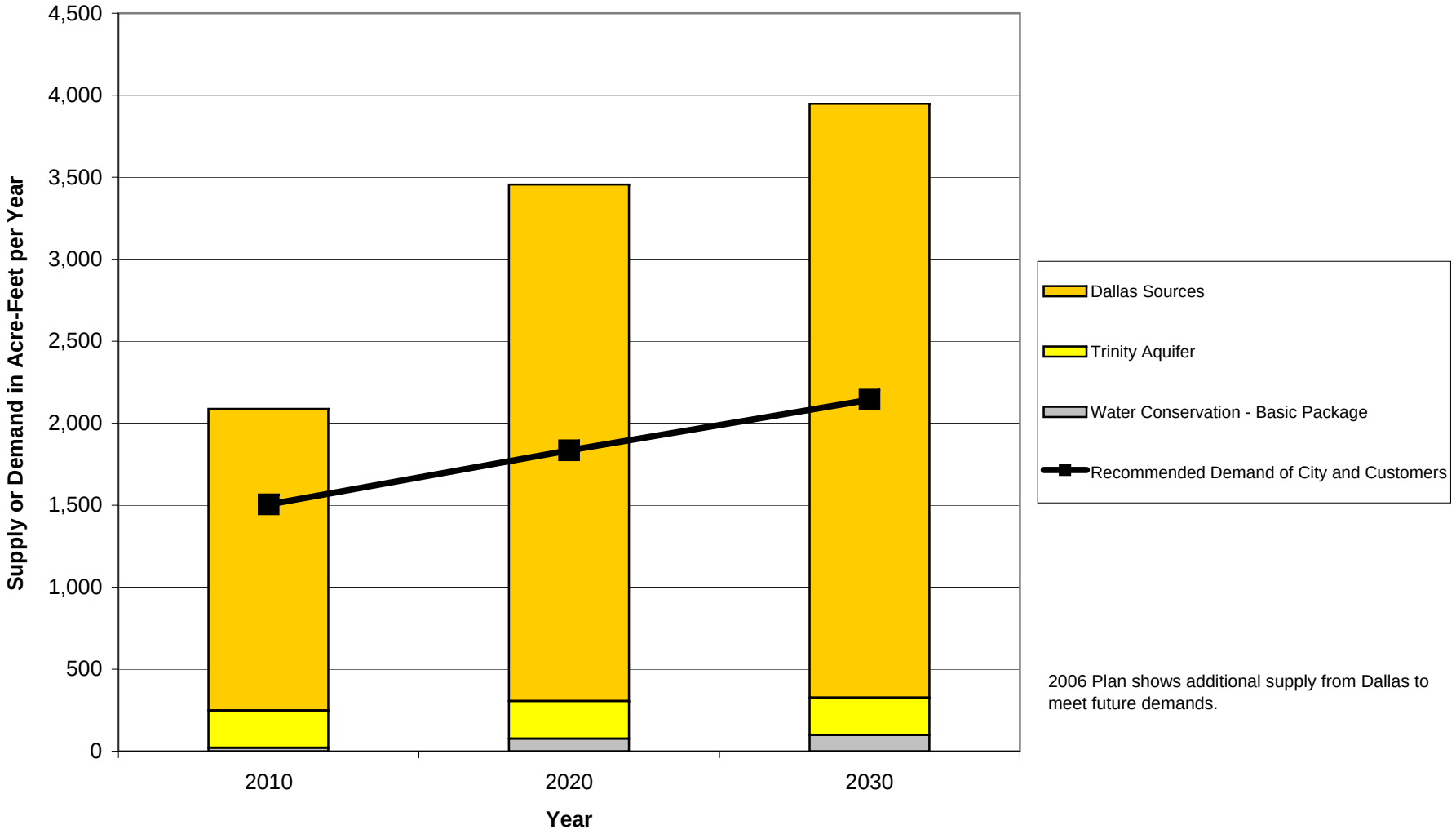


Table F-18
City of Godley

Population	2010	2020	2030	Notes
In-City	1,136	1,439	1,757	2006 Plan

Demand (AF/Y)	2010	2020	2030	Notes
In-City Demand	167	206	250	2006 Plan

Current Supply (AF/Y)	2010	2020	2030	Notes
Trinity Aquifer	26	26	26	2006 Plan
Total Supply	**26**	**26**	**26**	

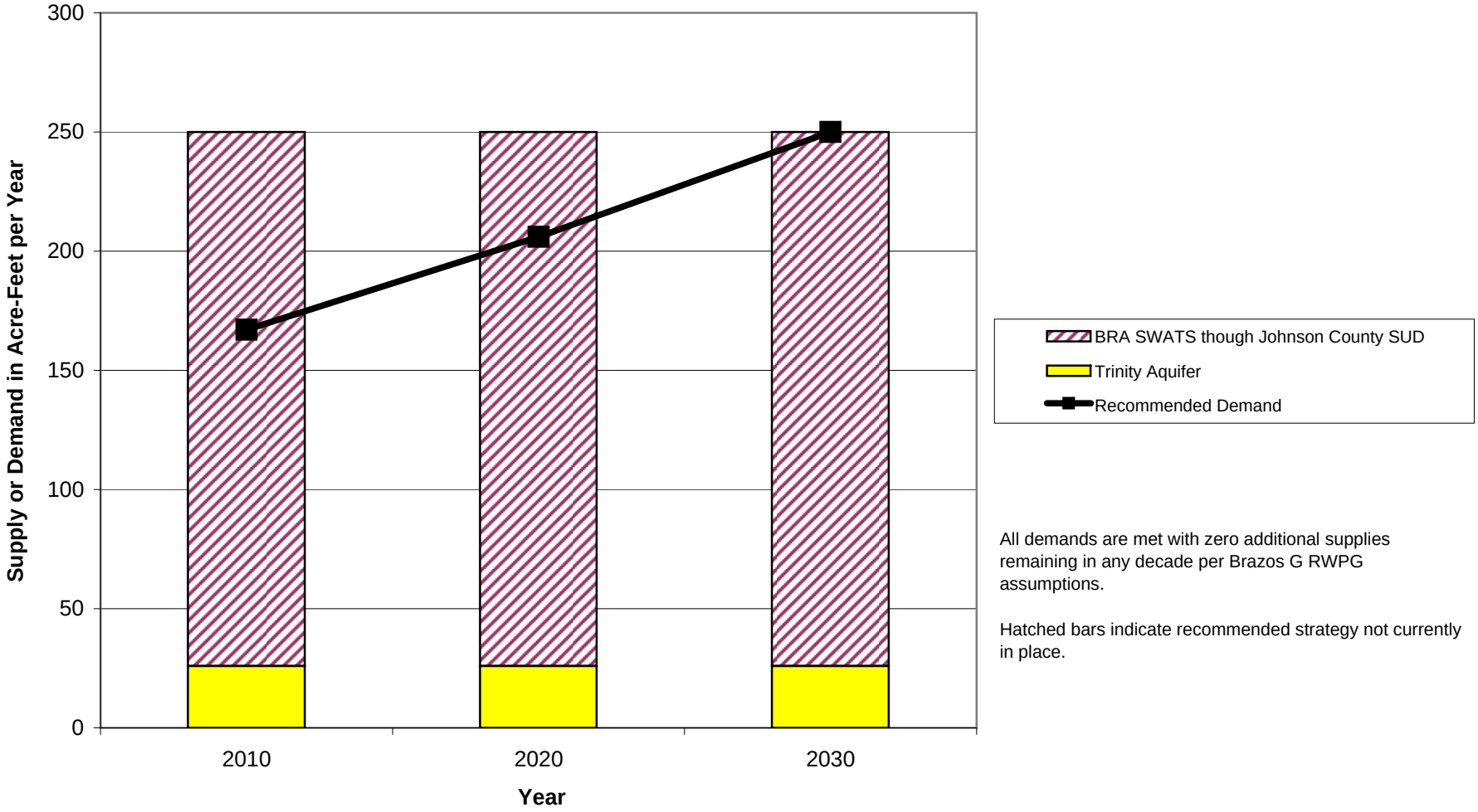
Surplus/Shortage (AF/Y)	-141	-180	-224

Recommended Strategies (AF/Y)	2010	2020	2030	Notes
BRA SWATS (through Johnson County SUD)	224	224	224	Revised 2006 Plan
Total	**224**	**224**	**224**	

Final Surplus/Shortage (AF/Y)	83	44	0

No changes are recommended to the water management strategy for Godley.
Units: Acre-Feet per Year (AF/Y)

Figure F-18
City of Godley Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



All demands are met with zero additional supplies remaining in any decade per Brazos G RWPG assumptions.

Hatched bars indicate recommended strategy not currently in place.

Table F-19
City of Grand Prairie

Population	**2010**	**2020**	**2030**	**Notes**
In City, Ellis County Portion	450	*2,166*	*5,422*	*recommended*
In City, Dallas County Portion	138,883	*170,517*	*200,098*	*recommended*
In City, Tarrant County Portion	36,654	*46,424*	*52,085*	*recommended*
Total Population	**175,987**	**219,107**	**257,605**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In City, Ellis County Portion	*88*	*410*	*1,008*	*recommended*
In City, Dallas County Portion	*27,070*	*32,281*	*37,209*	*recommended*
In City, Tarrant County Portion	*7,144*	*8,789*	*9,685*	*recommended*
Total Demand	**34,302**	**41,480**	**47,902**	

Potential Customer Demand (AF/Y)	**2010**	**2020**	**2030**	
Johnson County SUD (Mansfield, TRWD supply)	*0*	*6,726*	*6,726*	*12 MGD (peak day) contract being negotiated*
Total Potential Customer Demand	***0***	***6,726***	***6,726***	

Total Customer Demand (AF/Y)	**34,302**	**48,206**	**54,628**

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Dallas Sources	*25,772*	*31,119*	*36,522*	*supply based on Dallas Long Range Water Plan*
Trinity Aquifer	1,637	1,637	1,637	2006 Plan showed 1,637 AF/Y; current production is 3 MGD
Fort Worth (TRWD)	*1,121*	*1,121*	*1,121*	*contract is for 2 MGD (peak day)*
Joe Pool Lake (TRA)	1,794	1,794	1,794	contract for 1.6 MGD (avg day) for irrigation
Midlothian Sources	*2,242*	*2,242*	*2,242*	*contract for 2 MGD (avg day); connection not in place*
Water Conservation - Basic Package	899	1,994	2,661	2006 Plan
Water Conservation - Expanded Package	21	207	434	2006 Plan
Total Supply	**33,486**	**40,114**	**46,411**	

Surplus/Shortage (AF/Y)	**-816**	**-8,092**	**-8,217**

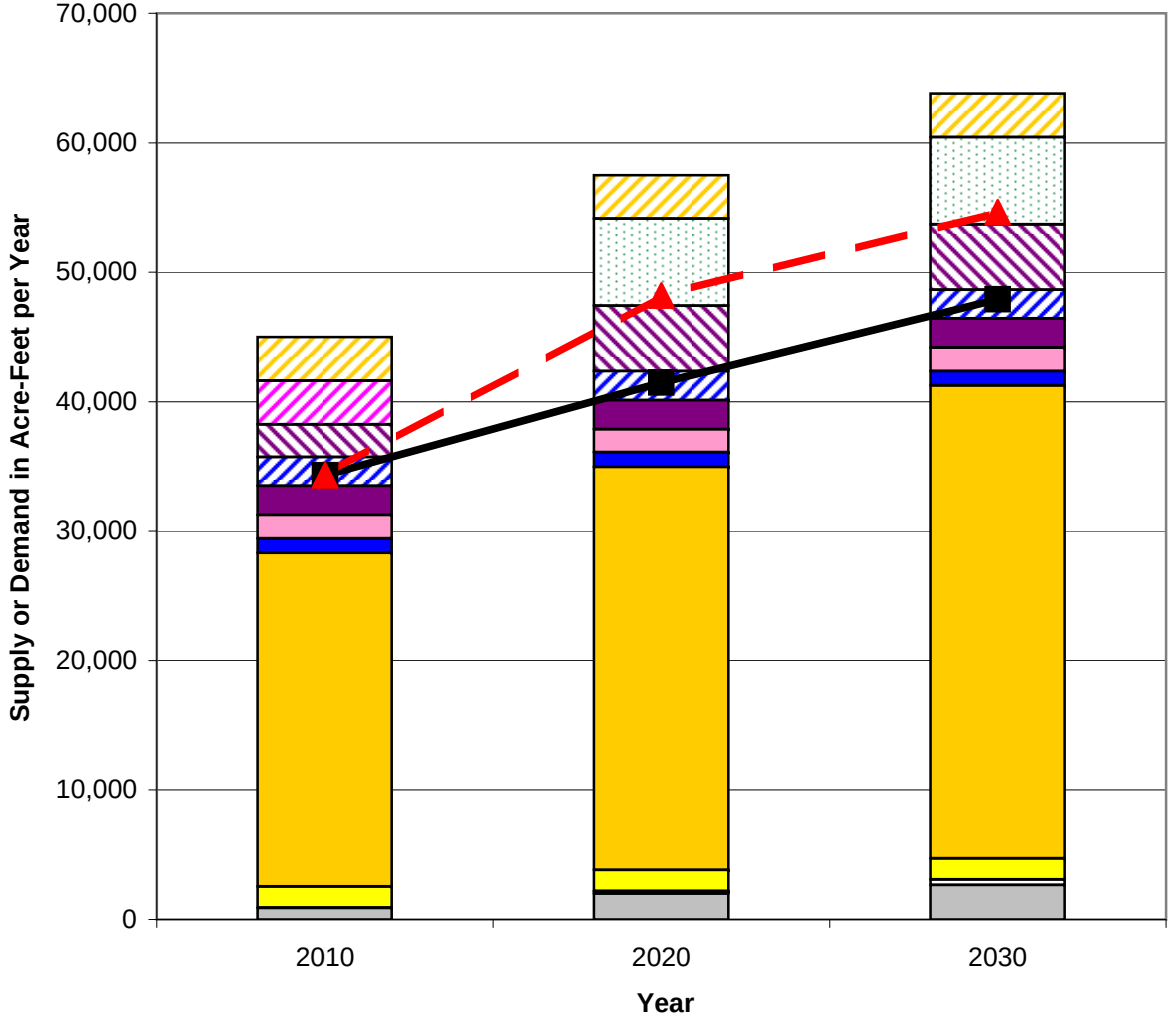
Table F-19, Continued

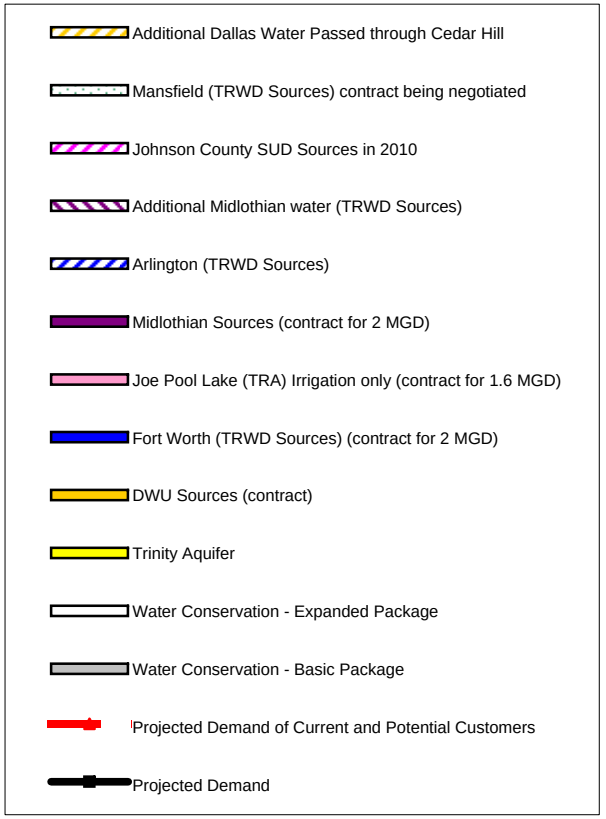
Additional Water Management Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Supplemental wells in Trinity aquifer	0	0	0	2006 Plan
Additional Midlothian	*2,522*	*5,045*	*5,045*	*Considering 9 MGD (peak day) contract; ramp up shown*
Johnson County SUD Supplies	*3,363*	*0*	*0*	*Considering contract for 2010*
Mansfield (TRWD Sources)	*0*	*6,726*	*6,726*	*negotiating a contract for 12 MGD (peak day); not connected; to be sent to JCSUD*
Arlington (TRWD Sources)	*2,242*	*2,242*	*2,242*	*negotiating a contract for 4 MGD (peak day); not connected*
Dallas water passed through Cedar Hill	*3,363*	*3,363*	*3,363*	*assumed 6 MGD (peak day) contract*
Total Additional Strategies	***11,490***	***17,376***	***17,376***	

Final Surplus/Shortage (AF/Y)	**10,674**	**9,284**	**9,159**

Notes: a. Adding Johnson County SUD will make Grand Prairie a wholesale water provider.
b. Grand Prairie and Midlothian have requested an additional contract from TRA (TRWD Sources).
c. Significant changes from the 2006 Region C Water Plan are shown in italics.
d. Units: Acre-Feet per Year (AF/Y)

Figure F-19
City of Grand Prairie and Potential Customers
Comparison of Currently Contracted Supplies and
Recommended Water Management Strategies to Recommended Demand





*Grand Prairie and Midlothian have requested an additional contract for TRA (TRWD Sources).
**Contracted amount of supply shown as indicated. It is assumed that the provider will have the supply available when needed.
Hatched bars indicate recommended strategies not currently in place.

Table F-20
City of Grandview

Population	**2010**	**2020**	**2030**	**Notes**
In-City	*1,600*	*2,000*	*2,500*	*recommended*

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	*229*	*280*	*341*	*recommended*

Current Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Woodbine Aquifer	129	129	129	2006 Plan
Trinity Aquifer	0	0	0	2006 Plan showed 0; City data shows avg day capacity of 0.36 MGD
Total Supply	**129**	**129**	**129**	

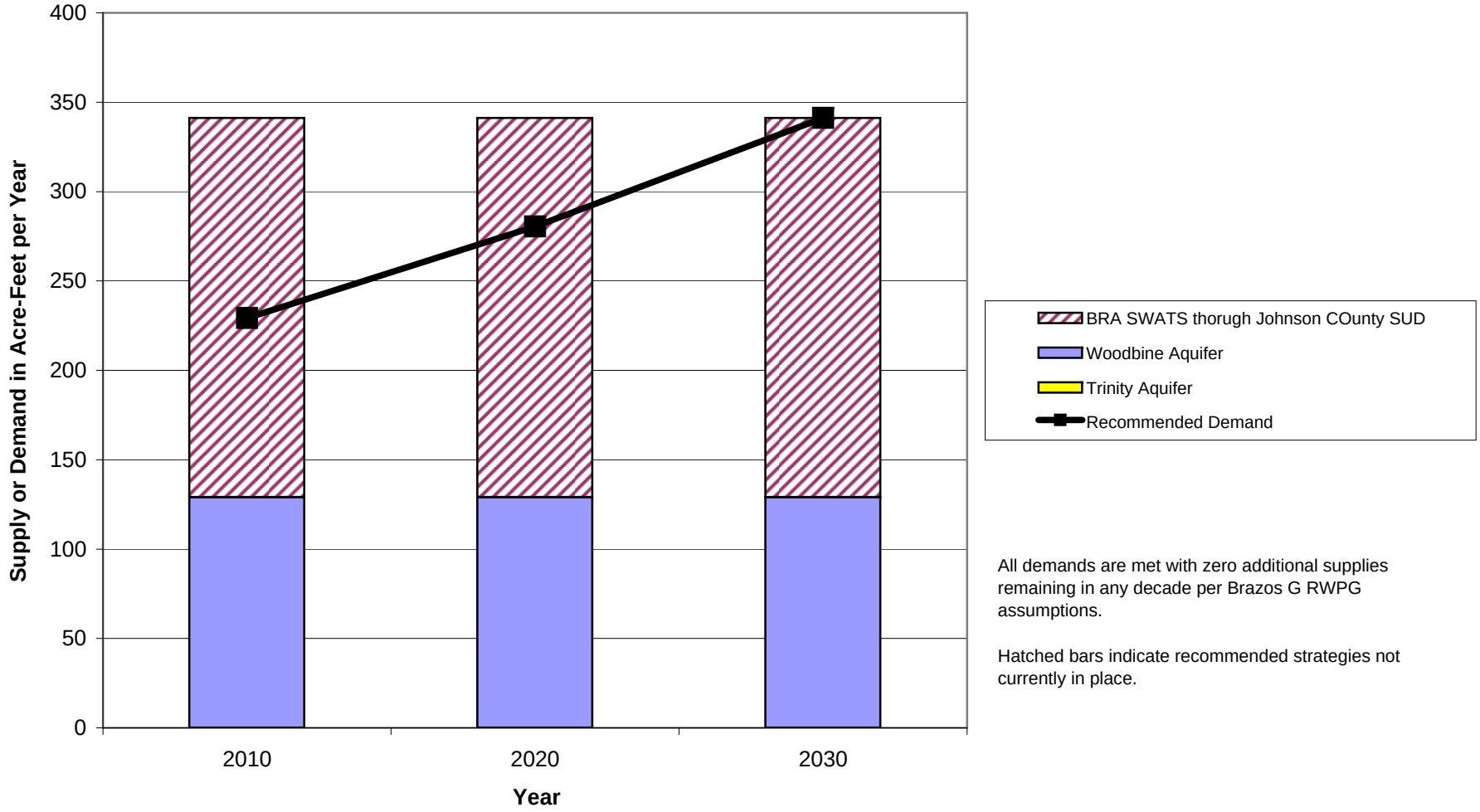
Surplus/Shortage	**-100**	**-151**	**-212**

Recommended Strategies	**2010**	**2020**	**2030**	**Notes**
BRA SWATS (through Johnson County SUD)	*212*	*212*	*212*	*new strategy*
Total	**212**	**212**	**212**	

Final Surplus/Shortage	**112**	**61**	**0**

Note: Significant changes from the 2006 Brazos G Water Plan are shown in italics.
Units: Acre-Feet per Year (AF/Y)

Figure F-20
City of Grandview Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



All demands are met with zero additional supplies remaining in any decade per Brazos G RWPG assumptions.

Hatched bars indicate recommended strategies not currently in place.

Table F-21
City of Italy

Population	**2010**	**2020**	**2030**	**Notes**
In-City	2,376	2,731	3,081	recommended

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	282	330	362	recommended

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	111	111	111	2006 Plan
Woodbine Aquifer	79	79	79	2006 Plan
TRWD (from TRA through Waxahachie)	*561*	*561*	*561*	*0.5 MGD (avg day) contract with TRA; not connected, revised current supply based on this study*
Water Conservation - Basic Package	4	16	20	2006 Plan
Total Supply	**755**	**767**	**771**	

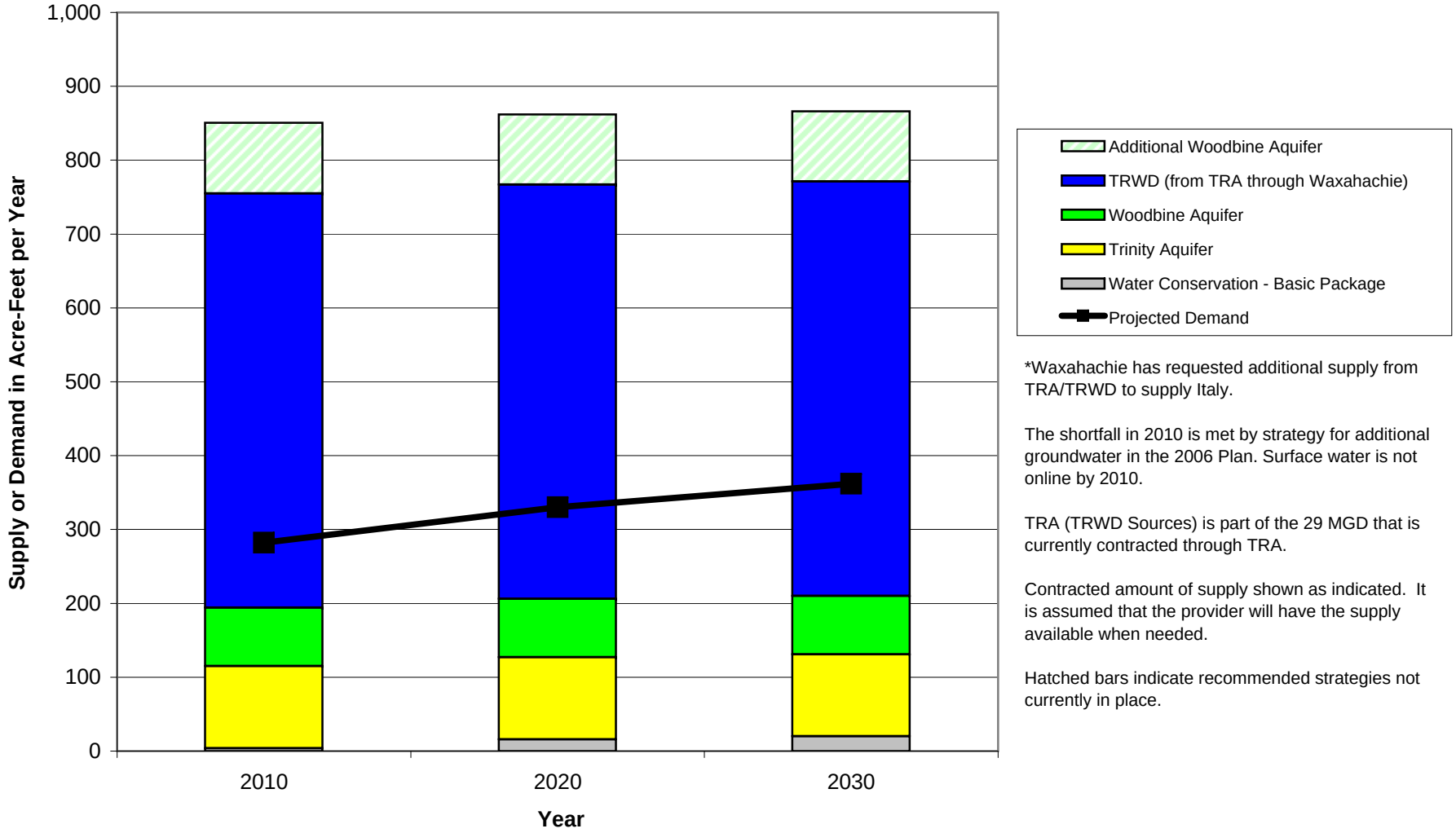
Surplus/Shortage (AF/Y)	**473**	**437**	**409**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Additional Woodbine Aquifer (New Wells)	95	*95*	*95*	2006 Plan, 2020, and 2030 amounts remain at 2010 amount
Supplemental wells in Trinity aquifer	0	0	0	2006 Plan
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Total	**95**	**95**	**95**	

Final Surplus/Shortage (AF/Y)	**568**	**532**	**504**

Notes: a. Waxahachie has requested an additional contract from TRA (TRWD) to supply Italy.
b. Changes from the 2006 Region C Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-21
City of Italy Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



*Waxahachie has requested additional supply from TRA/TRWD to supply Italy.

The shortfall in 2010 is met by strategy for additional groundwater in the 2006 Plan. Surface water is not online by 2010.

TRA (TRWD Sources) is part of the 29 MGD that is currently contracted through TRA.

Contracted amount of supply shown as indicated. It is assumed that the provider will have the supply available when needed.

Hatched bars indicate recommended strategies not currently in place.

Table F-22
Johnson County-Other

Population	2010	2020	2030	Notes
Population	11,115	11,596	12,102	2006 Plan

Demand (AF/Y)	2010	2020	2030	Notes
Demand	2,776	2,871	2,969	2006 Plan

Current Supply (AF/Y)	2010	2020	2030	Notes
Trinity Aquifer	350	350	350	2006 Plan
Woodbine Aquifer	103	103	103	2006 Plan
Total Supply	**453**	**453**	**453**	

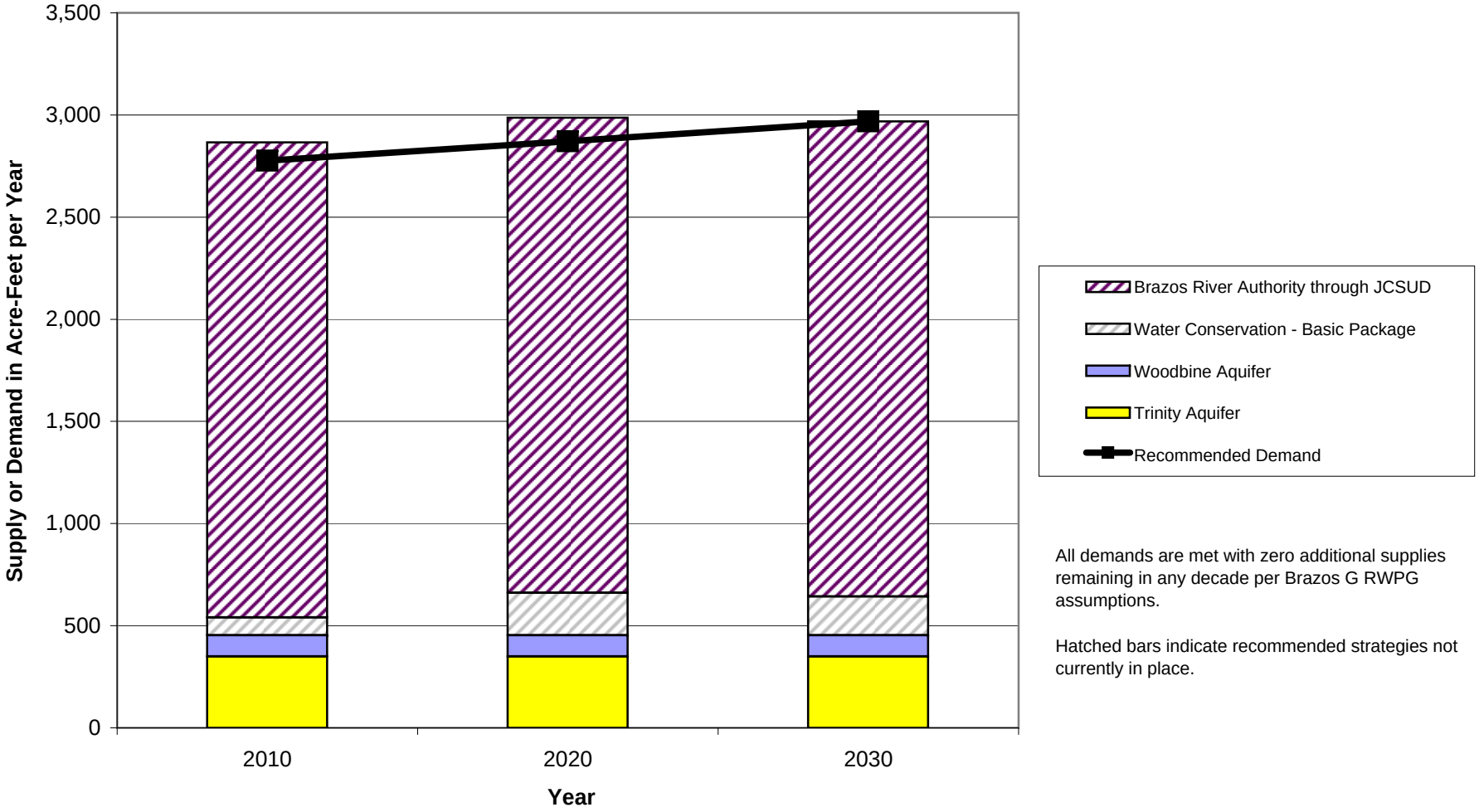
Surplus/Shortage (AF/Y)	-2,323	-2,418	-2,516

Recommended Strategies (AF/Y)	2010	2020	2030	Notes
Water Conservation - Basic Package	87	208	190	2006 Plan
Brazos River Authority through JCSUD	2,326	2,326	2,326	2006 Plan; set equal to maximum project need over 30 year period
Total	**2,413**	**2,534**	**2,516**	

Final Surplus/Shortage (AF/Y)	90	116	0

Units: Acre-Feet per Year (AF/Y)
No additional strategies are recommended in this plan.

Figure F-22
Johnson County-Other Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



All demands are met with zero additional supplies remaining in any decade per Brazos G RWPG assumptions.

Hatched bars indicate recommended strategies not currently in place.

Table F-23
Johnson County SUD

Population	**2010**	**2020**	**2030**	**Notes**
Ellis Co. portion	*146*	*281*	*428*	*recommended*
Hill Co. portion	*109*	*209*	*319*	*recommended*
Johnson Co. portion	*32,281*	*62,090*	*94,540*	*recommended*
Tarrant Co. portion	*1,426*	*2,744*	*4,177*	*recommended*
Alvarado	81	84	85	
Johnson County FWSD (Joshua)	5,523	7,895	11,369	
Total Population	**39,566**	**73,303**	**110,918**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Ellis Co. portion	*27*	*52*	*82*	*recommended*
Hill Co. portion	*20*	*39*	*61*	*recommended*
Johnson Co. portion	*5,963*	*11,571*	*18,100*	*recommended*
Tarrant Co. portion	*263*	*511*	*800*	*recommended*
Alvarado	11	11	11	recommended
Johnson County FWSD (Joshua)	804	1,114	1,566	total demand
Johnson Co. Mining	561	561	561	assume 0.5 MGD
Total Demand	**7,649**	**13,859**	**21,181**	

Potential Future Customer Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Additional Alvarado	458	1,019	1,019	potential demand
Bethany WSC	112	224	336	requested 100,000 gal/d increasing up to 300,000 gal/d
Grand Prairie	3,363	0	0	potential sale in 2010
Potential loss of Ellis County Connections	-27	-52	-82	
Potential loss of 200 connections to Fort Worth	0	-100	-102	potential buy-out of subdivision
Potential loss of 200 connections to Burleson	0	-100	-102	potential buy-out of subdivision
Total Potential Customer Demand	**3,906**	**991**	**1,069**	

Total Demand of City and Potential Customers (AF/Y)	**11,555**	**14,850**	**22,250**
Additional Demand on Water Treatment Plant for Parker WSC, Godley, Grandview, and Rio Vista	**686**	**686**	**686**

Table F-23, Continued

Currently Supplies, based on contracts and treatment capacity (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Lake Granbury (BRA SWATS) (Region C)	231	231	231	2006 Plan
Lake Granbury (BRA SWATS) (Brazos G)	6,381	9,555	9,555	Revised based on 56.2% interest in current treatment capacity (10.5 MGD) for 2010 and interest in full-design 15.54 MGD treatment capacity by 2020.
Trinity Aquifer (Region C)	1	0	0	2006 Plan
Trinity Aquifer (Brazos G)	428	427	427	2006 Plan
Water Conservation - Basic Package (Region C)	5	20	27	2006 Plan
Water Conservation (Brazos G)	423	1,307	1,883	2006 Plan
Mansfield (TRWD Sources)	*307*	*0*	*0*	*contract for 100 MG/Y*
Total Supply	**7,776**	**11,540**	**12,123**	

Surplus/Shortage (Current Customers) (AF/Y)	**127**	**-2,319**	**-9,058**
Surplus/Shortage (Current and Potential Customers) (AF/Y)	**-3,779**	**-3,310**	**-10,127**

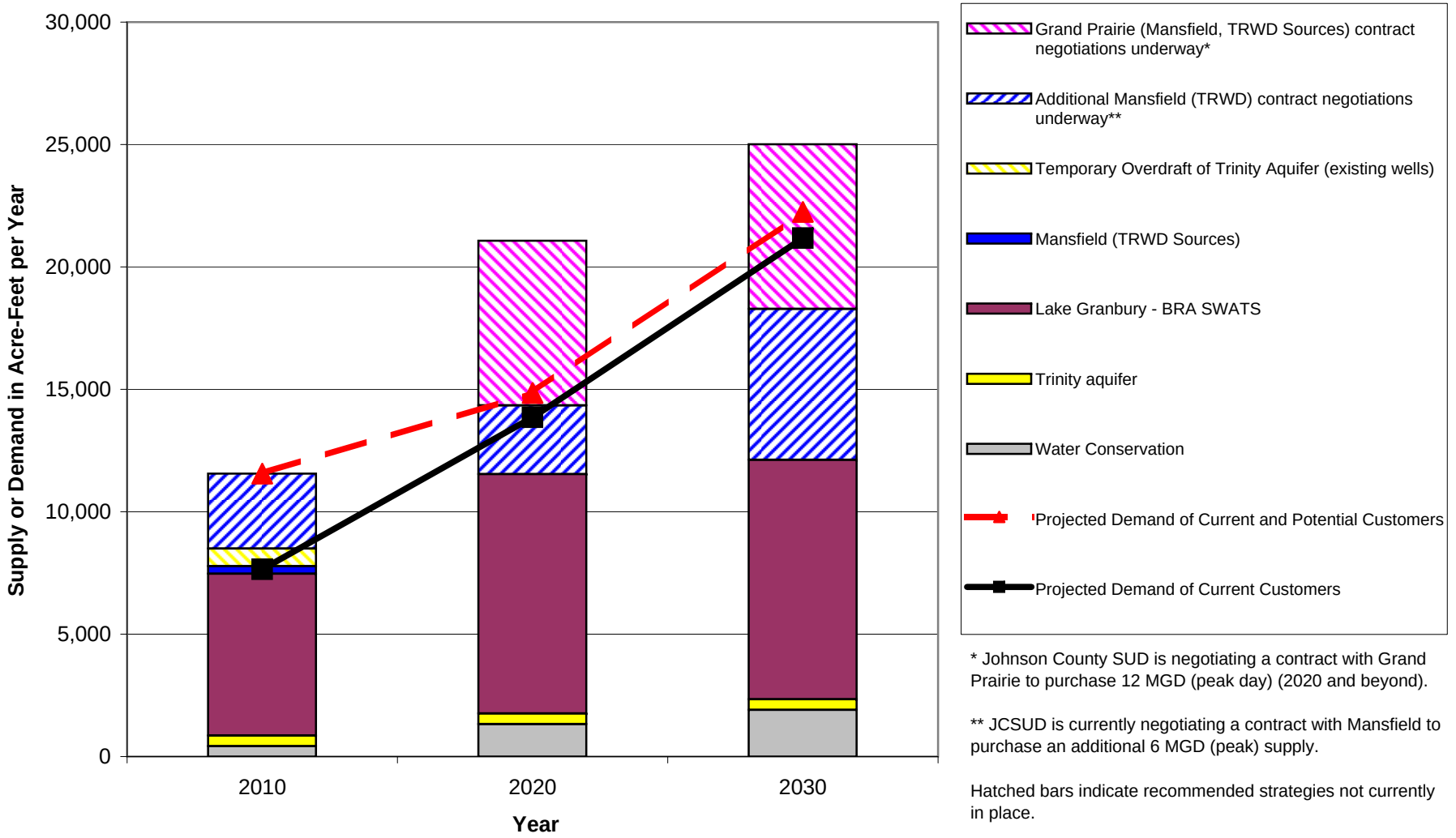
Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Temporary overdraft of Trinity aquifer (existing wells)	723	0	0	According to JCSUD water supply report, existing wells would be capable of production capacity of up to 2.9 MGD in 2010.
Additional Mansfield (TRWD Sources)	*3,056*	*2,802*	*6,165*	*negotiating a contract for 6 MGD (peak); existing 8" line, revised current supply based on this study; assumed another 6 MGD peak day contract would be negotiated prior to 2030; the amount needed for Alvarado has been subtracted from this row*
Potential Supply for Alvarado (Mansfield, TRWD Sources)	*0*	*561*	*561*	*discussing a contract for 2 MGD (peak day) from Mansfield (TRWD supply); assume 1 MGD (peak) for initial need*
Grand Prairie (Mansfield, TRWD Sources)	*0*	*6,726*	*6,726*	*negotiating a contract for 12 MGD (peak day) for 2020 and beyond; not connected*
Total	**3,779**	**10,089**	**13,452**	

Table F-23, Continued

Final Surplus/Shortage (AF/Y)	**3,906**	**7,770**	**4,394**
Final Surplus/Shortage (Current and Pot. Customers) (AF/Y)	**0**	**6,779**	**3,325**

Note: a. Johnson County SUD is negotiating a contract with Grand Prairie for 6 MGD (peak day). SUD is also requesting additional supply from Mansfield.
b. JCSUD sells water to Rio Vista and Godley, as needed.
c. Significant changes from 2006 Brazos G Water plan are shown in italics.
d. Removed Grand Prairie from Dallas that was in 2006 Plan.
e. Removed TRA reuse that was in 2006 Plan.
f. JCSUD is willing to provide future treatment for Parker WSC, Godley, Grandview, and Rio Vista. These entities are projected to purchase BRA SWATS water directly from BRA in the future.
g. Units: Acre-Feet per Year (AF/Y)

Figure F-23
Johnson County SUD and Customers Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



* Johnson County SUD is negotiating a contract with Grand Prairie to purchase 12 MGD (peak day) (2020 and beyond).

** JCSUD is currently negotiating a contract with Mansfield to purchase an additional 6 MGD (peak) supply.

Hatched bars indicate recommended strategies not currently in place.

Table F-24
City of Joshua

Population	**2010**	**2020**	**2030**	**Notes**
Brazos Basin portion	*3,148*	*4,500*	*6,480*	*recommended*
Trinity Basin portion	*2,375*	*3,395*	*4,889*	*recommended*
Total Population	**5,523**	**7,895**	**11,369**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Brazos Basin portion	*458*	*635*	*893*	*recommended*
Trinity Basin portion	*346*	*479*	*673*	*recommended*
Total Demand	**804**	**1,114**	**1,566**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Johnson County SUD (BRA SWATS)	*804*	*1,114*	*1,566*	*not included in 2006 Plan; demand less current supplies*
Total Supply	**804**	**1,114**	**1,566**	

Surplus/Shortage	**0**	**0**	**0**

Notes: a. Johnson Co. FWSD has been absorbed by Johnson Co. SUD. JCSUD now serves Joshua directly.
b. Removed the BRA SWATS System strategy that was recommended in the 2006 Plan.
C. Significant changes from the 2006 Brazos G Water Plan are shown in italics.

Figure F-24
City of Joshua Comparison of Currently Contracted Supplies to Recommended Demand

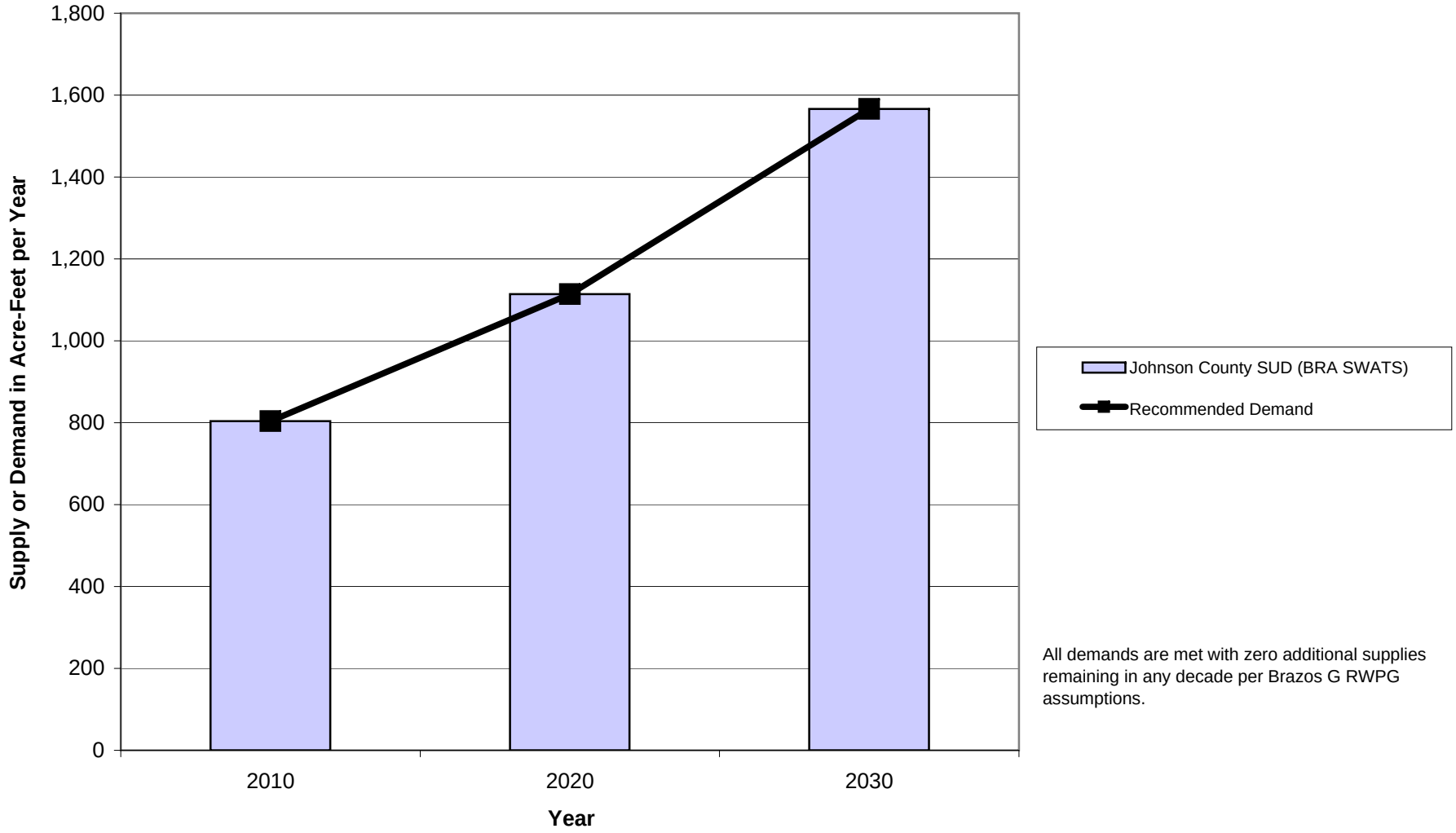


Table F-25
City of Keene

Population	**2010**	**2020**	**2030**	**Notes**
Johnson Co. Trinity Basin	5,041	5,928	6,860	2006 Plan
Johnson Co. Brazos Basin	841	989	1,144	2006 Plan
Total Population	**5,882**	**6,917**	**8,004**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Johnson Co. Trinity Basin	531	604	684	2006 Plan
Johnson Co. Brazos Basin	89	101	114	2006 Plan
Total	**620**	**705**	**798**	

Potential Customer Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Bethany WSC	271	271	271	amount assumed
Total Potential Demand	**271**	**271**	**271**	

Total Projected Demand	**891**	**976**	**1,069**

Current Supply (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	96	96	96	2006 Plan
Lake Granbury (BRA SWATS)	757	1,121	1,121	Based on interest in current SWATS treatment capacity (10.5 MGD) and 6.4% interest in design capacity (15.54 MGD) by 2020.
Total Supply	**853**	**1,217**	**1,217**	

Surplus/Shortage	**-38**	**241**	**148**

Recommended Strategies	**2010**	**2020**	**2030**	**Notes**
Temporary Overdraft of Trinity Aquifer (existing wells)	*38*	*0*	*0*	*Temporary Overdraft of Trinity Aquifer*
Total	**38**	**0**	**0**	

Final Surplus/Shortage	**0**	**241**	**148**

Units: Acre-Feet per Year (AF/Y)
Keene may sell water wholesale to Bethany WSC.

Figure F-25
City of Keene Comparison of Current Supply and Recommended Water Management Strategies to Recommended Demand

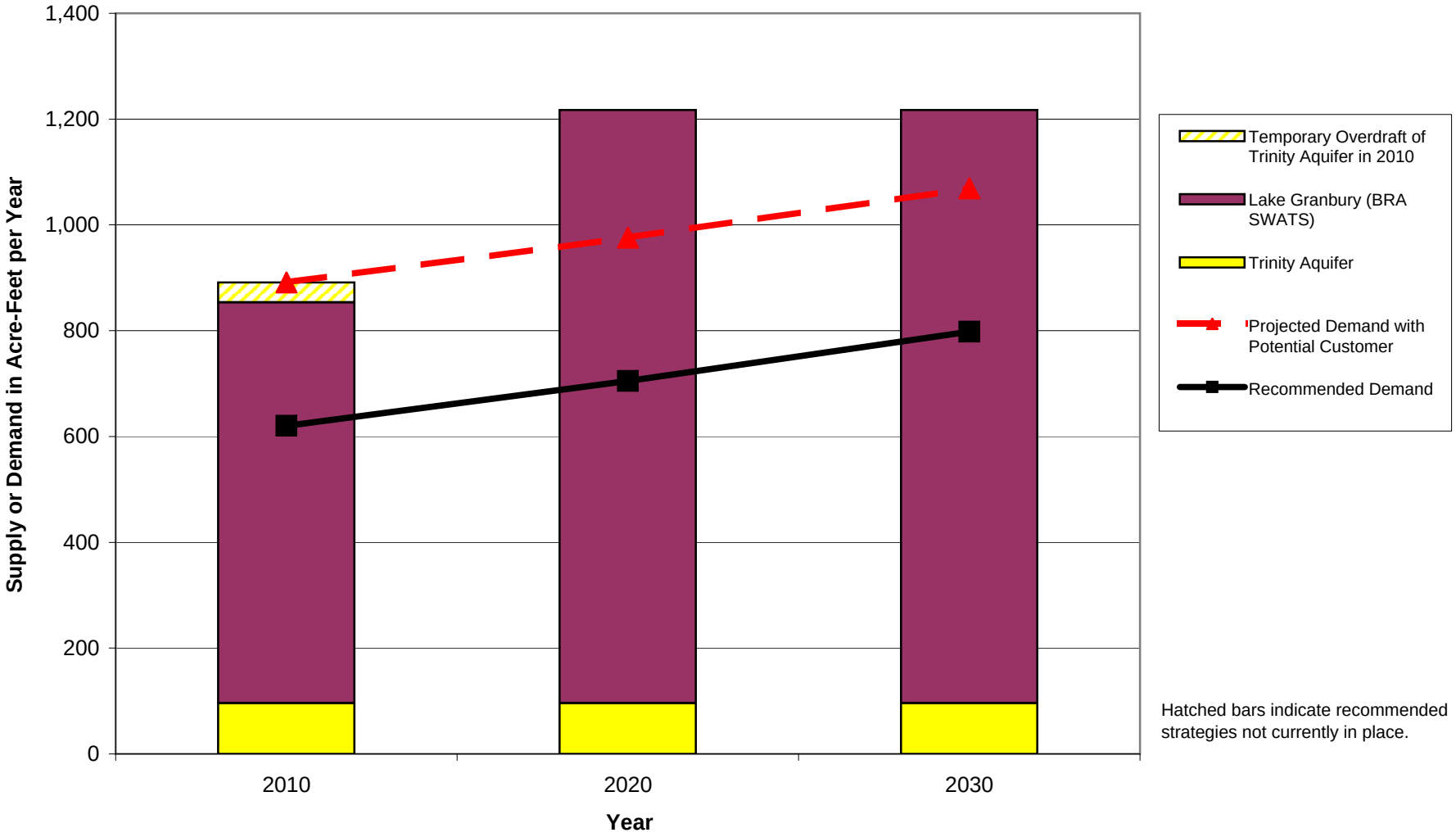


Table F-26
City of Kennedale

Population	**2010**	**2020**	**2030**	**Notes**
In-City	*7,715*	*10,720*	*13,412*	*recommended*

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	*1,530*	*2,089*	*2,584*	*recommended*

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	805	805	805	2006 Plan
Fort Worth (TRWD Sources)	*725*	*1,284*	*2,584*	*pipeline is complete; contract amt not specified; revised current supply based on this study demand less groundwater in 2010 and 2020 and total demand in 2030*
Supplemental wells in Trinity aquifer	0	0	0	2006 Plan
Water Conservation - Basic Package	57	151	181	2006 Plan
Water Conservation - Expanded Package	1	6	18	2006 Plan
Total Supply	**1,588**	**2,246**	**3,588**	

Surplus/Shortage (AF/Y)	**58**	**157**	**1,004**

Note: a. City of Kennedale has constructed a pipeline to Fort Worth to purchase treated water. Capacity of pipeline is 10 MGD. Kennedale plans to continue using groundwater along with the surface water from Fort Worth.
b. Changes from the 2006 Region C Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-26
City of Kennedale Comparison of Currently Contracted Supplies to Recommended Demand

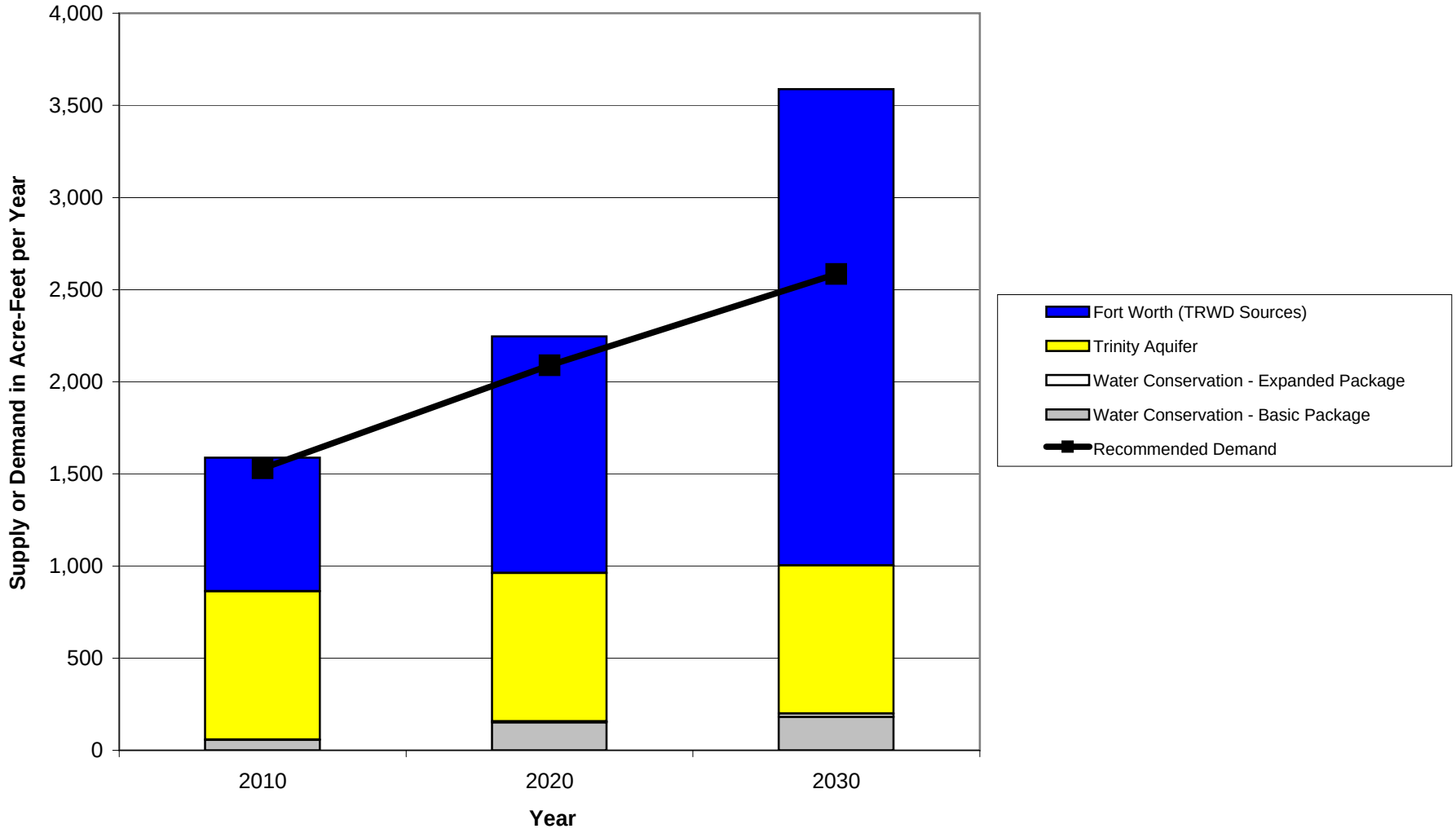


Table F-27
City of Mansfield

Population of Current Customers	**2010**	**2020**	**2030**	**Notes**
In-City Demand (Ellis Co.)	460	*474*	*483*	*recommended*
In-City Demand (Johnson Co.)	*10,833*	*23,472*	*37,827*	*recommended*
In-City Demand (Tarrant Co.)	50,000	*51,515*	*52,551*	*recommended*
Johnson County SUD	*1,713*	*0*	*0*	*recommended*
Total Population	**63,006**	**75,461**	**90,861**	

Current Customer Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand (Ellis Co.)	*113*	*116*	*117*	*recommended*
In-City Demand (Johnson Co.)	*2,670*	*5,732*	*9,153*	*recommended*
In-City Demand (Tarrant Co.)	*12,322*	*12,580*	*12,715*	*recommended*
Johnson County SUD	307	0	0	contract for 100 MG/Y
Current Customer Demand (AF/Y)	**15,412**	**18,428**	**21,985**	

Potential Customer Demand (AF/Y)	**2010**	**2020**	**2030**	
Johnson County SUD (additional)	*3,056*	*3,363*	*6,726*	*negotiating a contract for an additional 6 MGD (peak)*
Grand Prairie	*0*	*6,726*	*6,726*	*negotiating a contract for 12 MGD (peak day)*
Johnson County Mining	*561*	*561*	*561*	*assume 0.5 MGD*
Total Potential Customer Demand	**3,617**	**10,650**	**14,013**	

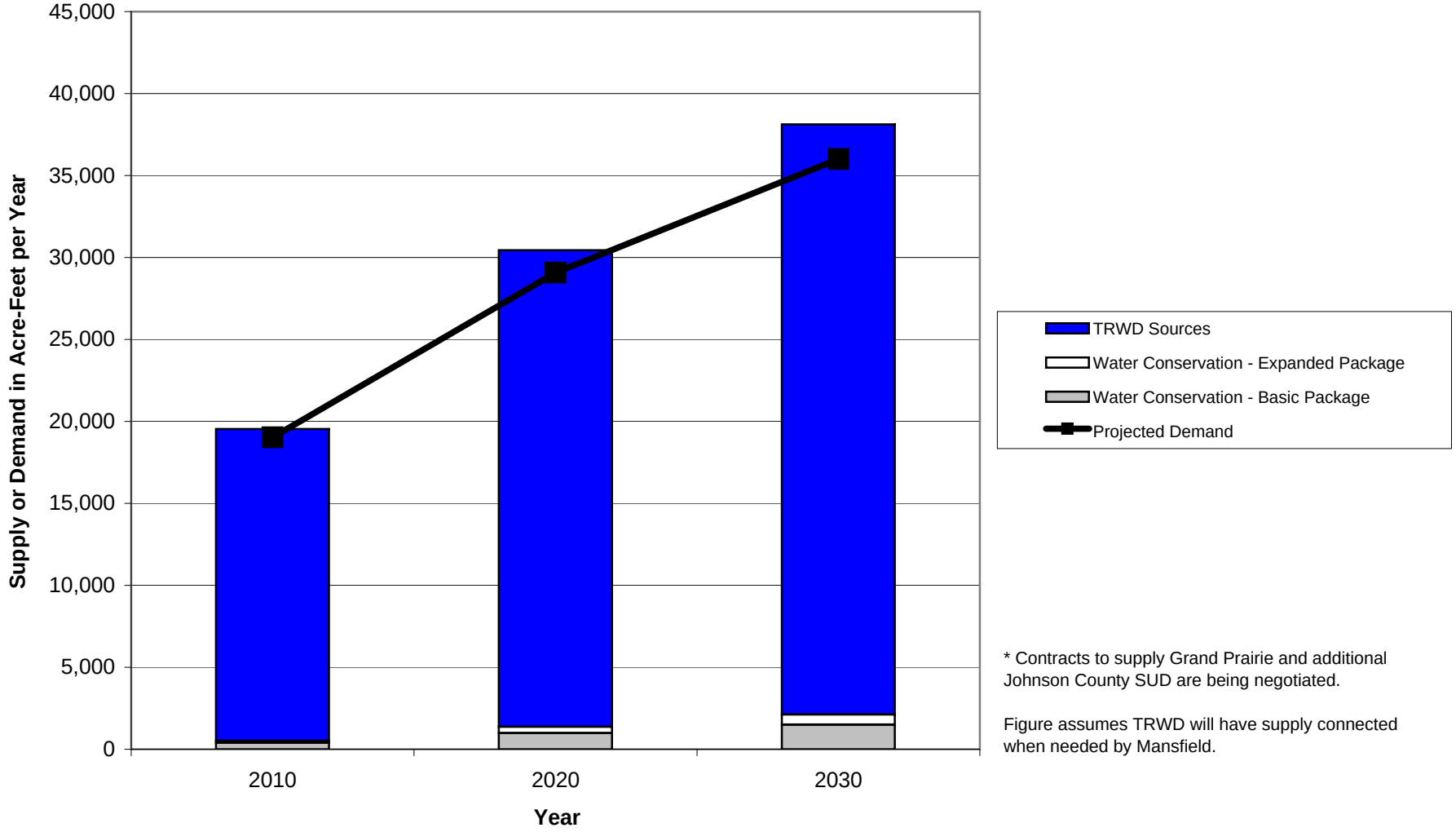
Total Customer Demand (AF/Y)	**19,029**	**29,078**	**35,998**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
TRWD Sources	*19,029*	*29,078*	*35,998*	*revised current supply based on this study*
Water Conservation - Basic Package	401	994	1,491	2006 Plan
Water Conservation - Expanded Package	111	381	634	2006 Plan
Total Supply	**19,541**	**30,453**	**38,123**	

Surplus/Shortage (AF/Y)	**15,924**	**19,803**	**24,110**

Note: a. Water treatment plant expansions in the 2006 Region C Water Plan are needed.
b. Significant changes from the 2006 Region C Water Plan are shown in italics.
c. Mansfield will need water treatment plant expansions.
d. Units: Acre-Feet per Year (AF/Y)

Figure F-27
City of Mansfield and Customers
Comparison of Currently Contracted Supplies to Recommended Demand



* Contracts to supply Grand Prairie and additional Johnson County SUD are being negotiated.

Figure assumes TRWD will have supply connected when needed by Mansfield.

Table F-28
City of Maypearl

Population	**2010**	**2020**	**2030**	**Notes**
In-City	746	746	746	recommended

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	145	142	140	recommended

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	55	55	55	2006 Plan
Woodbine Aquifer	49	49	49	2006 Plan
TRWD (from TRA through Waxahachie)	*415*	*415*	*415*	*0.37 MGD (avg day) contract with TRA; not connected, revised current supply based on this study*
Water Conservation - Basic Package	4	9	10	2006 Plan
Water Conservation - Expanded Package	0	1	1	2006 Plan
Total Supply	**523**	**529**	**530**	

Surplus/Shortage (AF/Y)	**378**	**387**	**390**

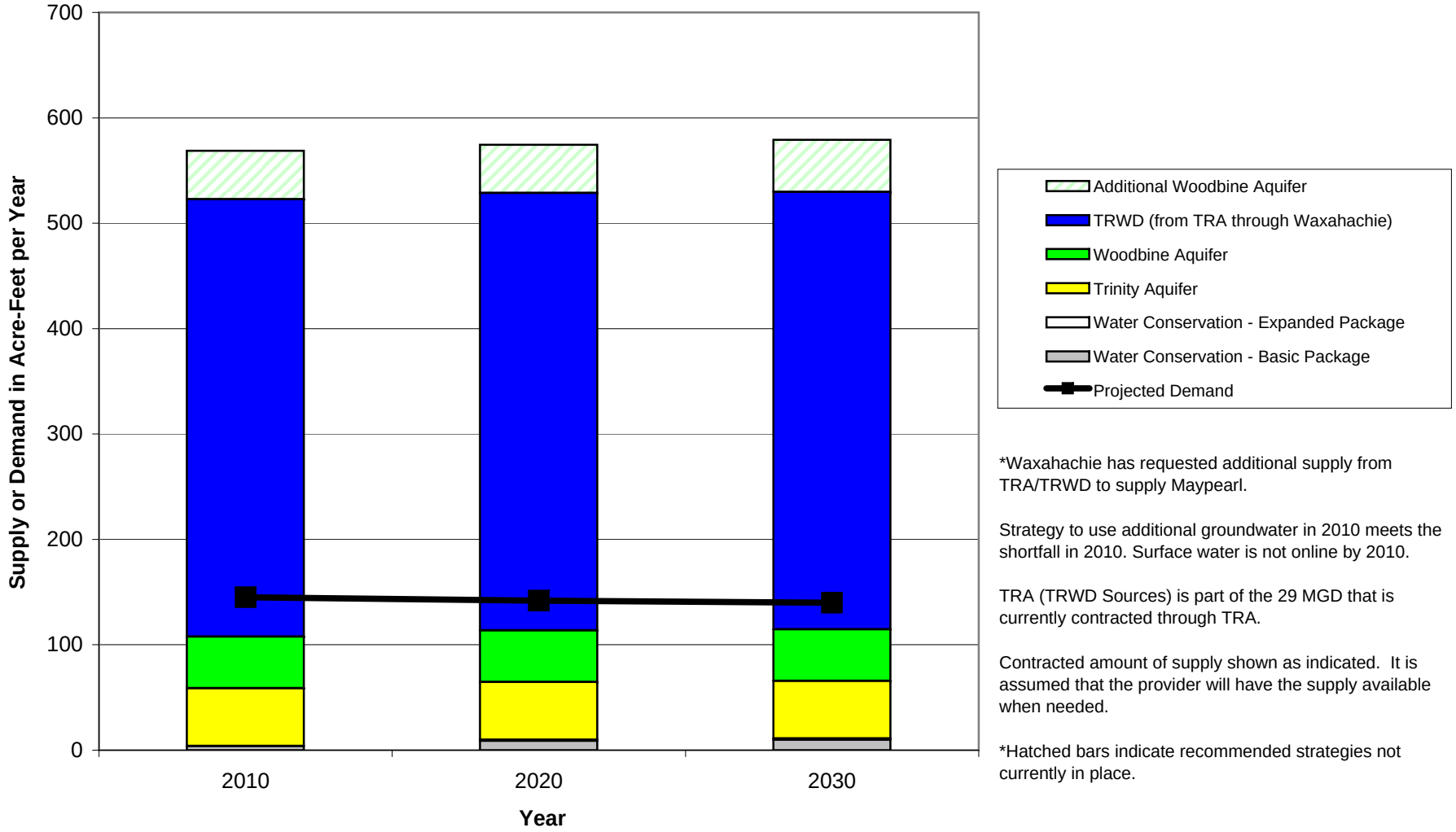
Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Additional Woodbine Aquifer (Existing Wells)	19	0	0	2006 Plan
Additional Woodbine Aquifer (New Wells)	27	46	49	2006 Plan
Supplemental wells in Trinity aquifer	0	0	0	2006 Plan
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Total	**46**	**46**	**49**	

Final Surplus/Shortage (AF/Y)	**424**	**433**	**439**

Notes: a. Waxahachie has requested an additional contract from TRA (TRWD) to supply Maypearl.

b. Mountain Peak SUD mentioned that they may wholesale water to Maypearl. Maypearl did not mention this in their survey response. This is not a recommended strategy in this study, but it could be an alternative strategy.
c. Changes from the 2006 Region C Water Plan are shown in italics.
d. Units: Acre-Feet per Year (AF/Y)

Figure F-28
City of Maypearl Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



*Waxahachie has requested additional supply from TRA/TRWD to supply Maypearl.

Strategy to use additional groundwater in 2010 meets the shortfall in 2010. Surface water is not online by 2010.

TRA (TRWD Sources) is part of the 29 MGD that is currently contracted through TRA.

Contracted amount of supply shown as indicated. It is assumed that the provider will have the supply available when needed.

*Hatched bars indicate recommended strategies not currently in place.

Table F-29
City of Midlothian

Population of Current Customers	**2010**	**2020**	**2030**	**Notes**
In-City Demand	*19,682*	*35,962*	*50,466*	*recommended*
City of Grand Prairie	*11,502*	*11,843*	*12,057*	*recommended*
Mountain Peak SUD	4,889	7,919	11,403	contract amounts (linked)
Rockett SUD	11,027	12,012	12,012	recommended
City of Venus	1,381	2,589	4,506	recommended
Current Customer Population	**48,481**	**70,325**	**90,444**	

Current Customer Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	*5,297*	*9,558*	*13,356*	*recommended*
City of Grand Prairie	*2,242*	*2,242*	*2,242*	*contract for 2 MGD (avg day); connection not in place*
Mountain Peak SUD (Ellis and Johnson Counties)	816	1,304	1,865	total less groundwater
Rockett SUD	1,544	1,682	1,682	contract
City of Venus	*263*	*493*	*858*	*based on ramp up schedule per current contract*
Ellis County Steam Electric Power	224	224	224	2006 Plan
Ellis County Mining	*280*	*280*	*280*	*assume 0.25 MGD*
Current Customer Demand (Aft/Y)	**10,666**	**15,783**	**20,507**	

Potential Customer Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Alvarado	*0*	*561*	*561*	*Alvarado will contract directly with TRWD and Midlothian will provide water treatment; amount is assumed*
Additional Grand Prairie	*2,522*	*5,045*	*5,045*	*contract being discussed*
Total Potential Customer Demand	**2,522**	**5,606**	**5,606**	

Total Demand Current and Potential Customers	**13,188**	**21,389**	**26,113**

Table F-29, Continued

Currently Contracted Supplies (AF/Y)	2010	2020	2030	Notes
Joe Pool Lake (TRA)	*6,670*	*6,496*	*6,156*	*contract allows for 5.95 MGD (avg day); supply limited due to sedimentation as shown in 2006 Plan*
TRWD (through TRA)	*10,459*	*10,459*	*10,459*	*9.33 MGD (avg day) contract with TRWD/TRA (6 to Midlothian, 2 to Grand Prairie, 1 to Venus)*
Sardis-Lone Elm WSC	*242*	*243*	*244*	*300 retail customers within city limits of Midlothian*
Water Conservation - Basic Package	89	248	421	2006 Plan
Water Conservation - Expanded Package	21	94	268	2006 Plan
Total Supply	**17,481**	**17,540**	**17,548**	

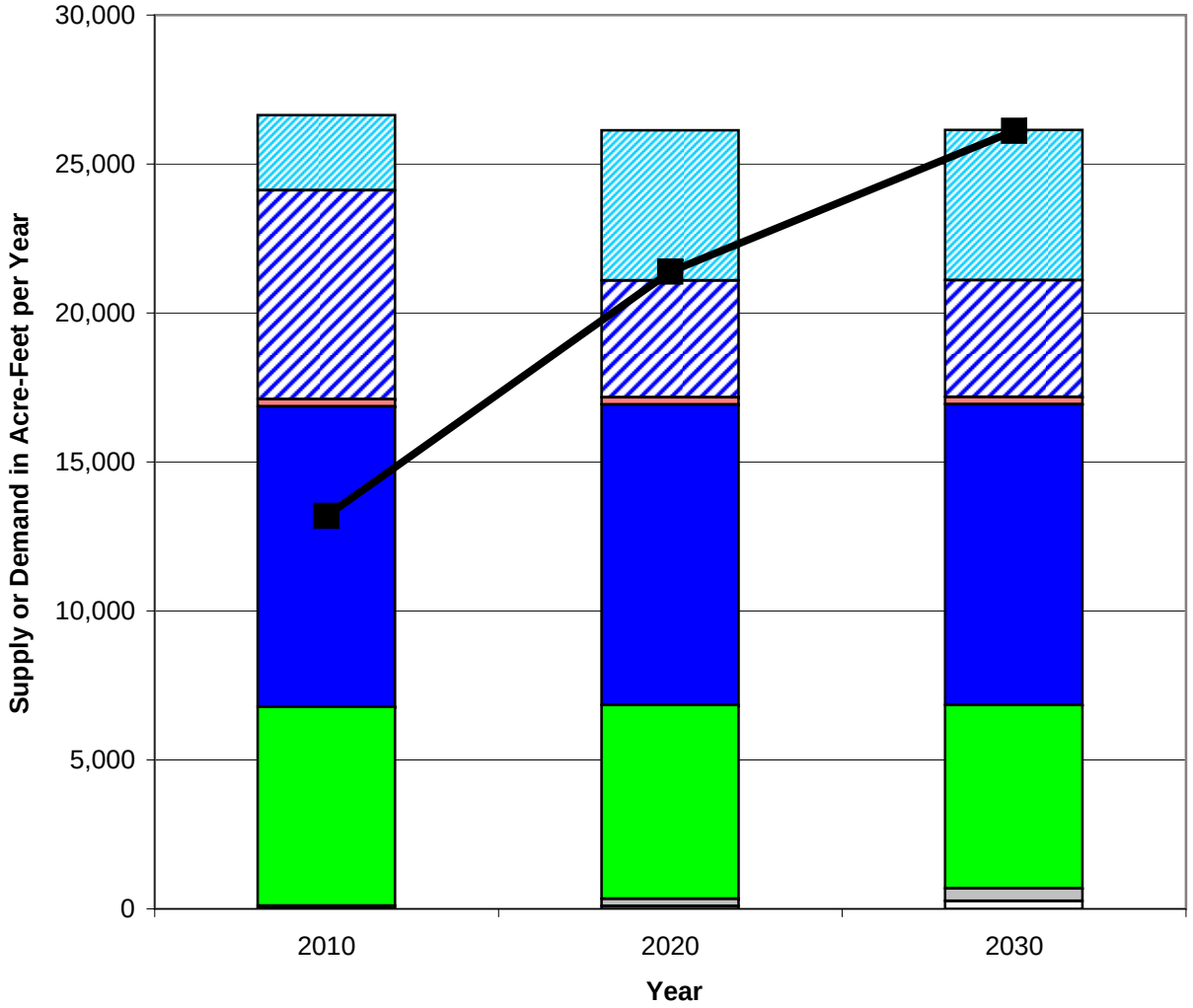
Surplus/Shortage of Current & Potential Cust.	**4,293**	**-3,849**	**-8,565**

Recommended Strategies (AF/Y)	2010	2020	2030	Notes
Additional TRWD (through TRA) for Alvarado	*0*	*561*	*561*	*amount is assumed*
Additional TRWD (through TRA) for Grand Prairie	*2,522*	*5,045*	*5,045*	*contract being discussed*
Additional TRWD (through TRA)	*7,007*	*3,923*	*3,923*	*amount is assumed*
Total	**9,529**	**9,529**	**9,529**	

Final Surplus/Shortage (AF/Y)	**13,822**	**5,680**	**964**

Notes: a. Trinity well not in operation & scheduled to be plugged.
b. Midlothian and Grand Prairie have requested an additional contract for TRA (TRWD Sources).
c. Alvarado has requested water.
d. No industrial customers based on information obtained in September 2007.
e. Significant changes from the 2006 Region C Water Plan are shown in italics.
f. The contract for an additional 4.5 MGD from Joe Pool Lake is assumed to begin after 2030.
g. Midlothian has emergency connections with Mountain Peak SUD and Sardis-Lone Elm WSC.
h. Units: Acre-Feet per Year (AF/Y)

Figure F-29
City of Midlothian and Customers Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



TRA (TRWD Sources) contracted amount shown as currently available supply. It is assumed that TRWD will have this supply available when needed.

TRA (TRWD Sources) is part of the 29 MGD that is currently contracted through TRA.

On December 14, 2007, Midlothian sent a letter to TRA requesting an additional 4.5 MGD (average day) supply.

Hatched bars indicate recommended strategies not currently in place.

Table F-30
City of Milford

Population	2010	2020	2030	Notes
In-City	685	685	685	2006 Plan

Demand (AF/Y)	2010	2020	2030	Notes
In-City Demand	86	84	81	2006 Plan

Current Supply (AF/Y)	2010	2020	2030	Notes
Files Valley WSD (Lake Aquilla)	84	84	84	contract for 75,000 gal/d (avg)
Woodbine Aquifer	53	53	53	2006 Plan
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Water Conservation - Basic Package	1	4	4	2006 Plan
Total Supply	**138**	**141**	**141**	

Surplus/Shortage	52	57	60

Notes: A portion of Milford is served by Files Valley WSC (retail).

Milford did not have a shortage in the 2006 Region C Water Plan. Water conservation (as shown above) and supplemental wells were recommended. Supplemental wells remain a recommended strategy.

Figure F-30
City of Milford Comparison of Current Supply to Recommended Demand

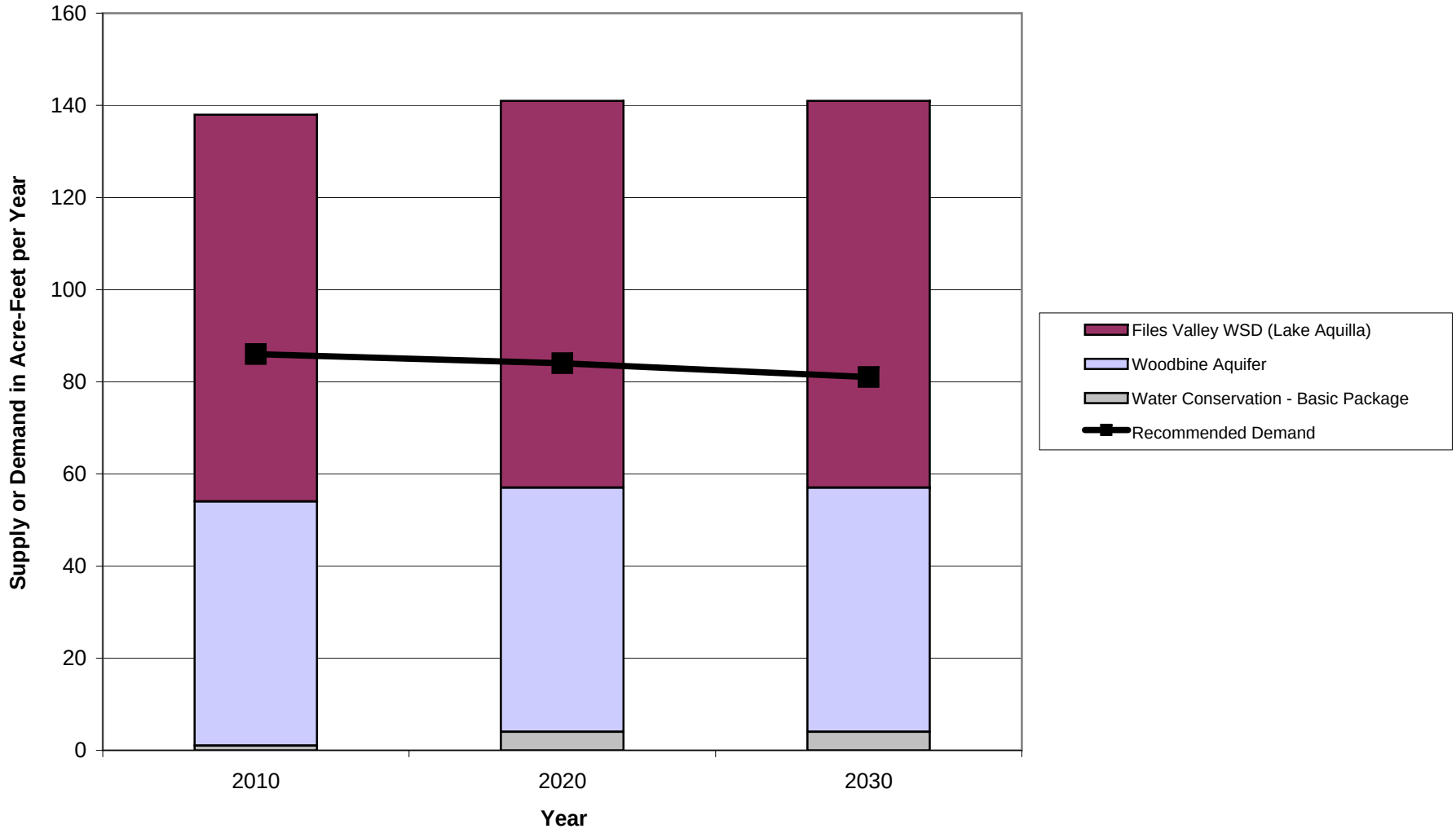


Table F-31
Mountain Peak SUD
(includes Ellis and Johnson County portions)

Population	**2010**	**2020**	**2030**	**Notes**
Service Area (Ellis County)	*7,639*	*9,669*	*11,767*	*recommended*
Service Area (Johnson County)	*1,979*	*3,039*	*4,460*	*recommended*
Total Population	**9,618**	**12,708**	**16,227**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Service Area (Ellis County)	1,275	1,593	1,924	recommended
Service Area (Johnson County)	330	500	730	recommended
Ellis County Mining	*75*	*75*	*75*	*currently supplying 2 MG/month*
Total Demand	**1,680**	**2,168**	**2,729**	

Current Supply (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Midlothian Sources	*816*	*1,304*	*1,865*	*revised current supply based on this study*
Trinity Aquifer	864	864	864	2006 Plan
Water Conservation - Basic Package	148	443	479	2006 Plan
Water Conservation - Expanded Package	1	4	8	2006 Plan
Conservation (Brazos G)	10	37	44	2006 Plan
Total Supply	**1,839**	**2,652**	**3,260**	

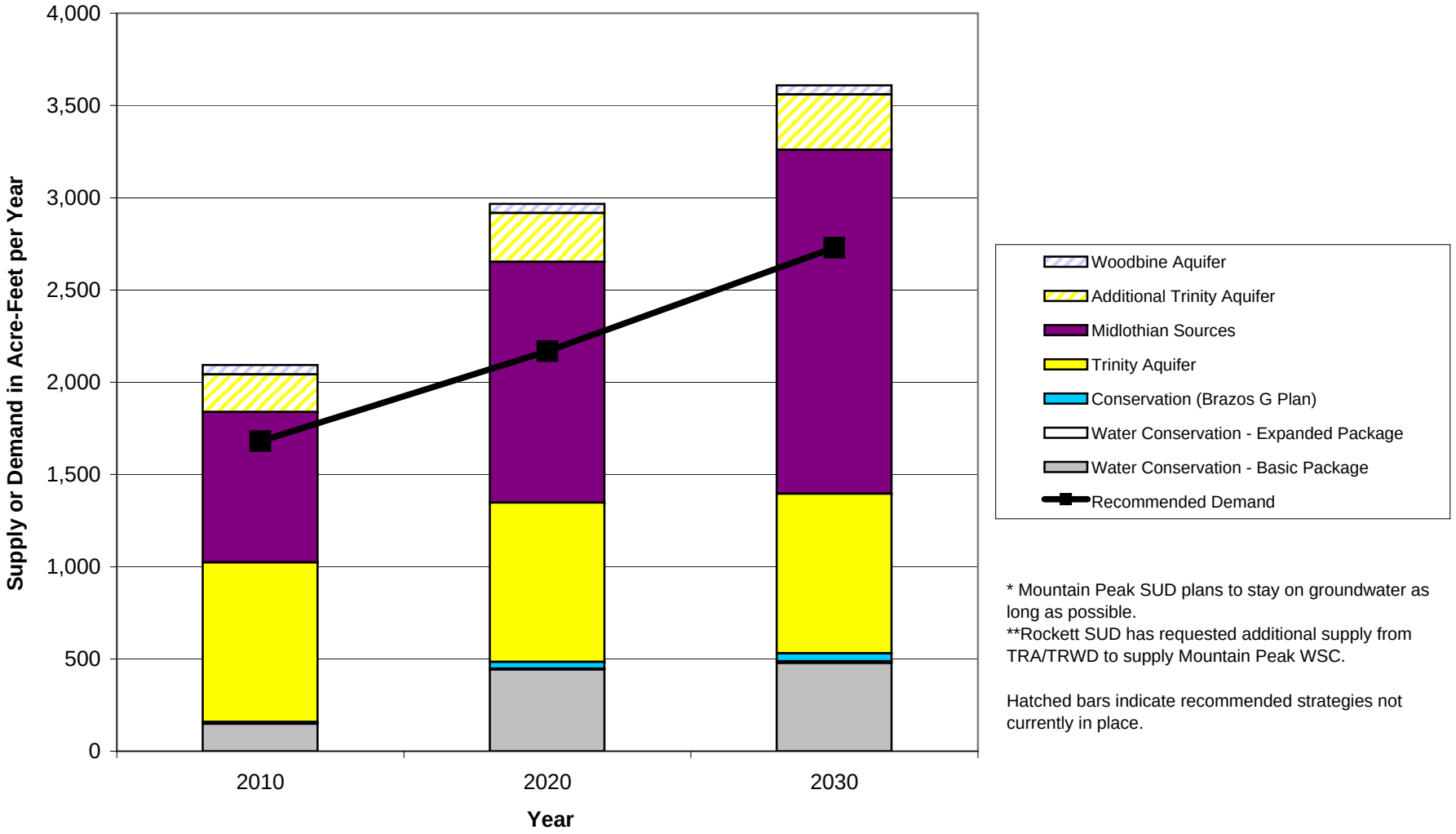
Surplus/Shortage (AF/Y)	**159**	**484**	**531**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Additional Trinity aquifer (new wells) (Region C)	204	265	300	2006 Plan
Woodbine aquifer (new wells) (Region C)	*50*	*50*	*50*	*city plans to drill 5 new wells in Woodbine aquifer; amount assumed*
Supplemental wells in Trinity aquifer	0	0	0	2006 Plan
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Total	**254**	**315**	**350**	

Final Surplus/Shortage (AF/Y)	**413**	**799**	**881**

Note: a. Mountain Peak SUD plans to use groundwater as long as possible.
b. Rockett SUD has requested an additional contracts from TRA (TRWD) to supply Mountain Peak SUD.
c. Mountain Peak SUD mentioned that it may sell to Maypearl. Maypearl did not mention this in their survey response. This could be an alternative strategy for Maypearl.
d. Mountain Peak plans to drill five Woodbine wells in near future.
e. Changes from the 2006 Region C Water Plan are shown in italics.
f. Mountain Peaks SUD has an emergency connection with Midlothian.
g. Units: Acre-Feet per Year (AF/Y)

Figure F-31
Mountain Peak SUD Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



* Mountain Peak SUD plans to stay on groundwater as long as possible.
**Rockett SUD has requested additional supply from TRA/TRWD to supply Mountain Peak WSC.

Hatched bars indicate recommended strategies not currently in place.

Table F-32
City of Oak Leaf

Population	**2010**	**2020**	**2030**	**Notes**
In-City	1,502	1,774	2,042	2006 Plan

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	338	393	448	2006 Plan

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
DWU Sources (Glenn Heights)	*338*	*393*	*448*	*revised current supply based on this study*
TRWD (from TRA through Rockett SUD)	*55*	*55*	*56*	*68 connections (retail customer)*
Water Conservation - Basic Package	10	22	29	2006 Plan
Total Supply	**403**	**470**	**533**	

Surplus/Shortage (AF/Y)	**65**	**77**	**85**

Notes: a. Rockett SUD serves a small portion of Oak Leaf retail.
b. Changes from the 2006 Region C Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-32
City of Oak Leaf Comparison of Currently Contracted Supplies to Recommended Demand

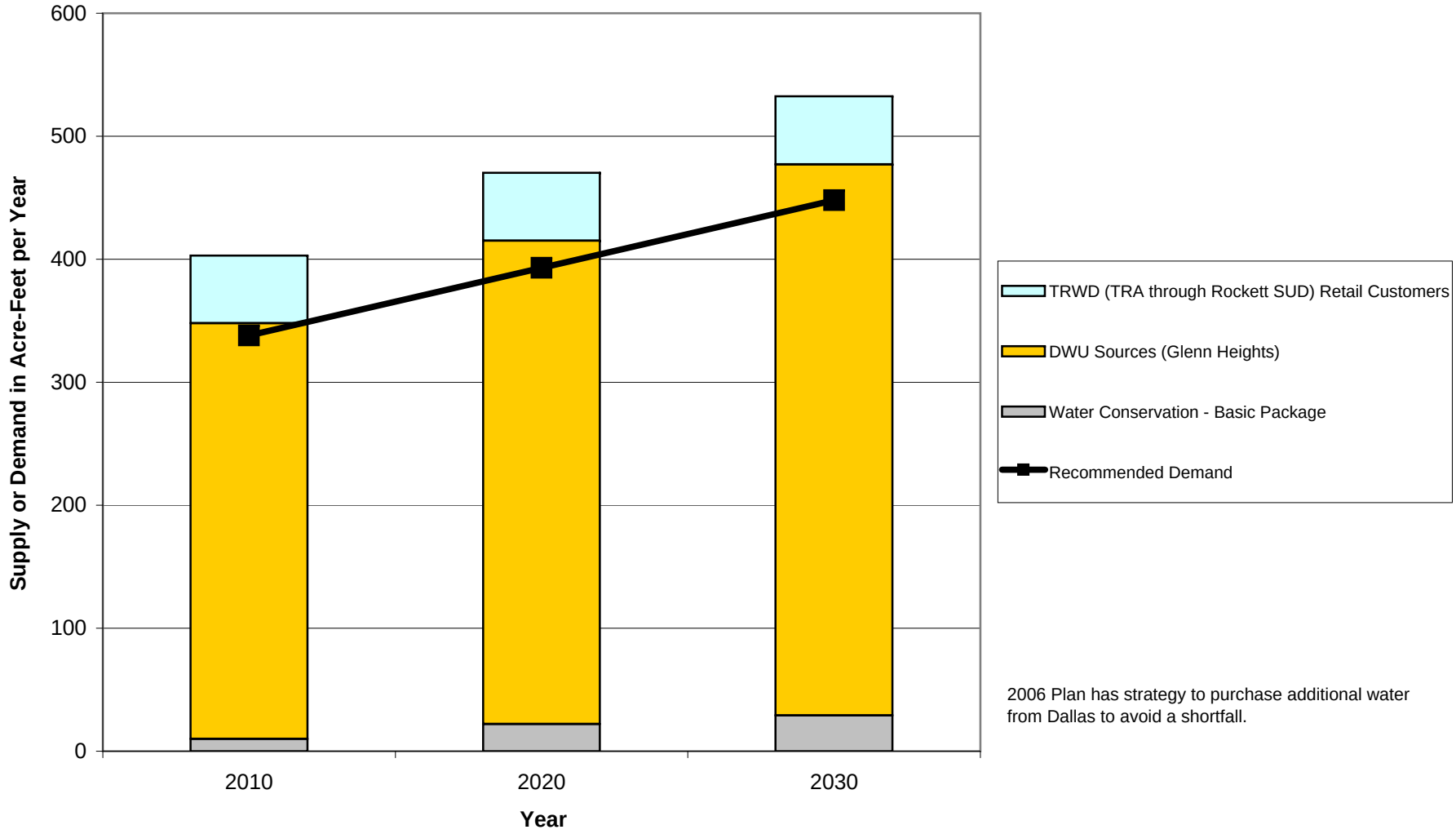


Table F-33
City of Ovilla
(Includes Ellis and Dallas Counties)

Population	**2010**	**2020**	**2030**	**Notes**
Ellis Co.	4,983	6,681	8,354	2006 Plan
Dallas Co.	368	540	792	2006 Plan
Total Population	**5,351**	**7,221**	**9,146**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Ellis Co.	1,016	1,347	1,666	2006 Plan
Dallas Co.	75	109	158	2006 Plan
Total Demand	**1,091**	**1,456**	**1,824**	

Currently Available Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Dallas Sources	*874*	*1,143*	*1,401*	*supply based on Dallas Long Range Water Supply Plan*
Sardis-Lone Elm WSC	*122*	*123*	*124*	*200 retail customers within city limits of Ovilla*
Woodbine aquifer	56	56	56	2006 Plan
Water Conservation - Basic Package	35	86	124	2006 Plan
Water Conservation - Expanded Package	1	6	7	2006 Plan
Total Supply	**1,088**	**1,414**	**1,712**	

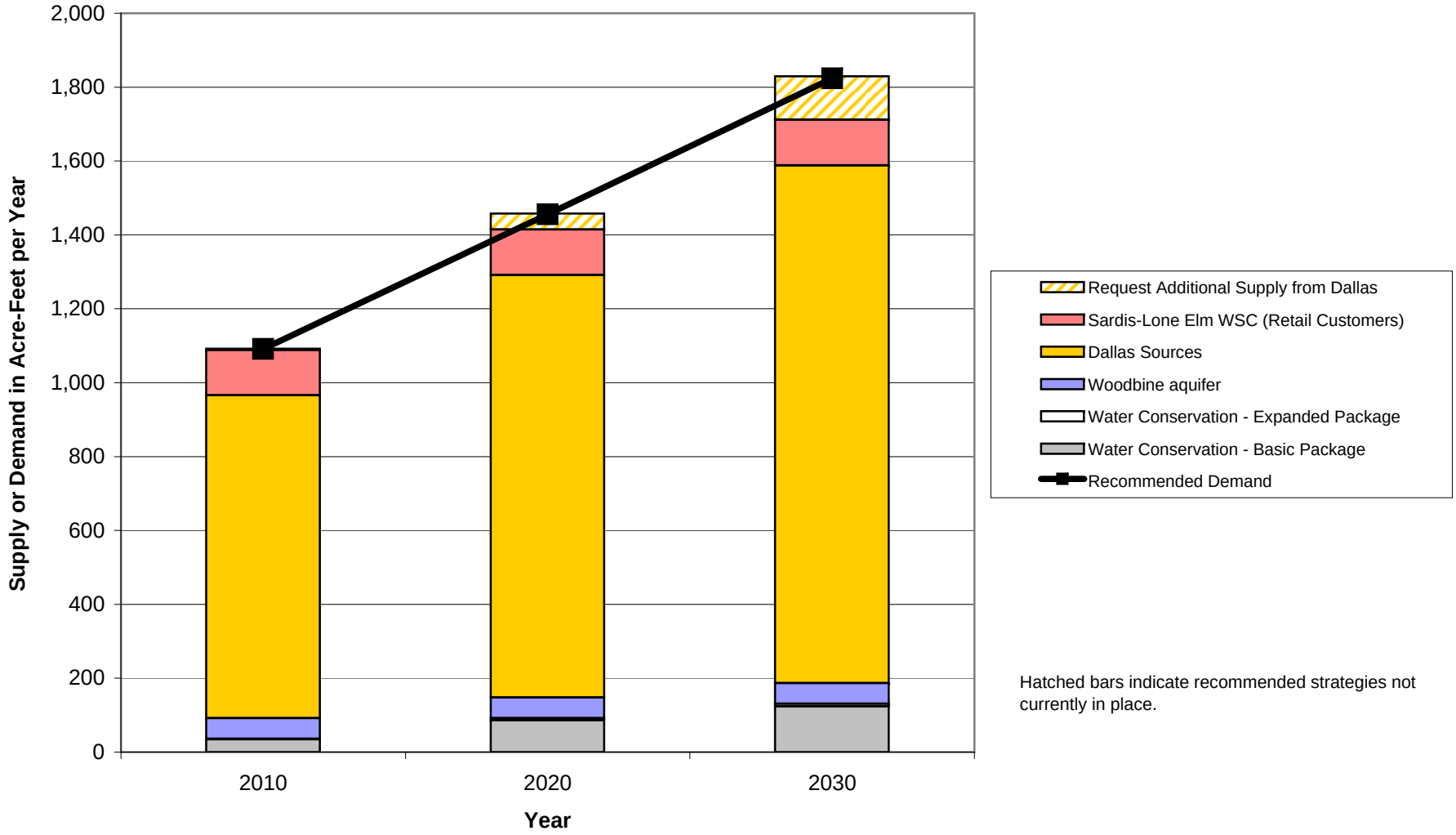
Surplus/Shortage (AF/Y)	**-3**	**-42**	**-112**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Purchase additional water from DWU	*4*	*44*	*117*	*Request additional supply from Dallas*
Total Strategies	**4**	**44**	**117**	

Total Surplus/Shortage with Strategies (AF/Y)	**1**	**2**	**6**

Notes: Changes from the 2006 Region C Water Plan are shown in italics.
Units: Acre-Feet per Year (AF/Y)

Figure F-33
City of Ovilla Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



Hatched bars indicate recommended strategies not currently in place.

Table F-34
Palmer

Population	**2010**	**2020**	**2030**	**Notes**
In-City	1,924	2,063	2,200	recommended

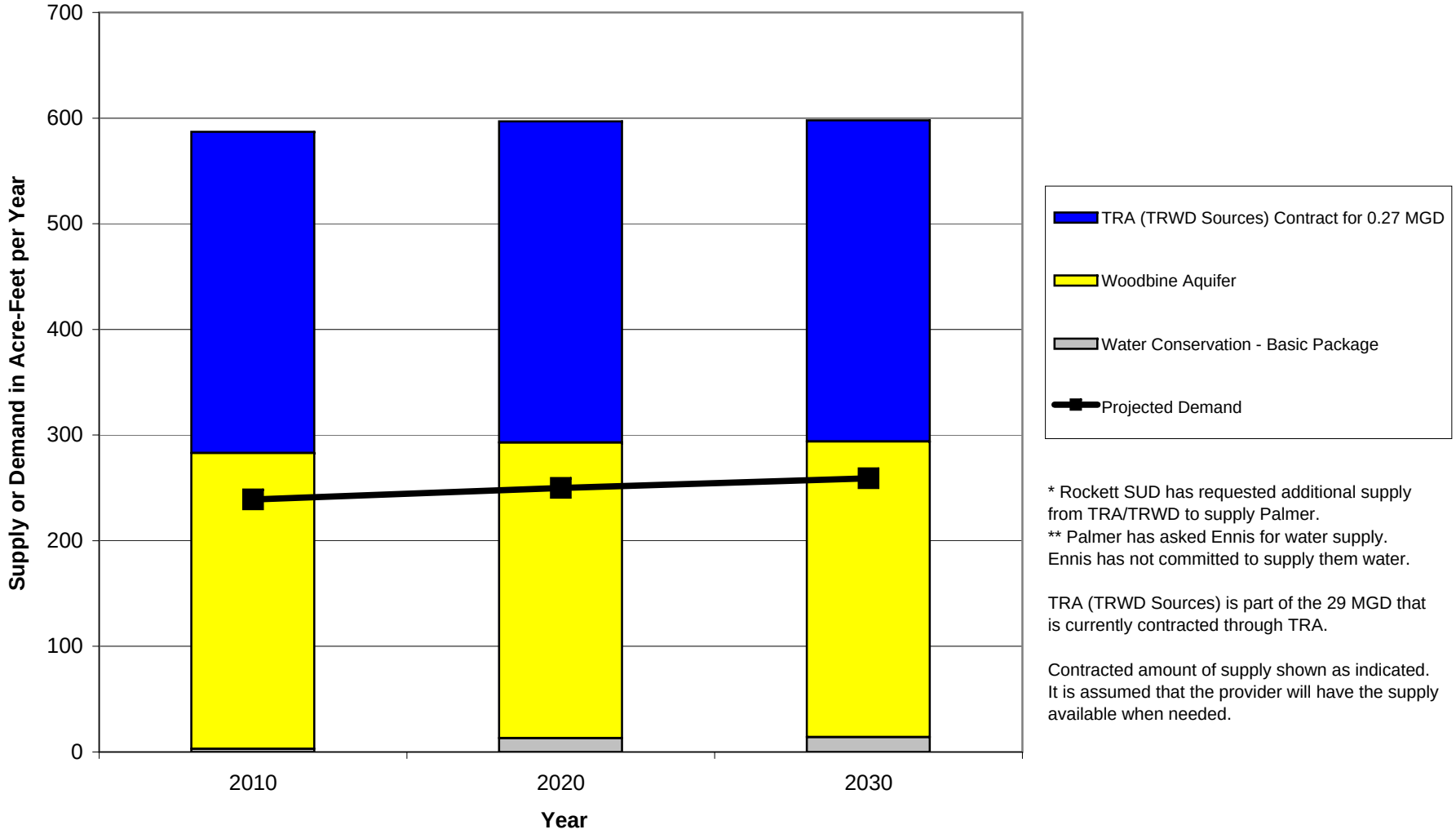
Proposed Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	239	250	259	recommended

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Woodbine Aquifer	280	280	280	2006 Plan
TRWD (from TRA through Rockett SUD)	*304*	*304*	*304*	*contract with TRA for 0.27 MGD (avg day), revised current supply based on this study*
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Water Conservation - Basic Package	3	13	14	2006 Plan
Total Supply	**587**	**597**	**598**	

Surplus/Shortage (AF/Y)	**348**	**347**	**339**

Notes: a. Rockett SUD has requested an additional contract from TRA (TRWD) to supply Palmer.
b. Significant changes to the 2006 Region C Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-34
Palmer Comparison of Currently Contracted Supplies to Recommended Demand



* Rockett SUD has requested additional supply from TRA/TRWD to supply Palmer.
** Palmer has asked Ennis for water supply. Ennis has not committed to supply them water.

TRA (TRWD Sources) is part of the 29 MGD that is currently contracted through TRA.

Contracted amount of supply shown as indicated. It is assumed that the provider will have the supply available when needed.

Table F-35
Parker WSC
(Includes Johnson and Hill Counties)

Population	**2010**	**2020**	**2030**	**Notes**
Johnson Co., Brazos Basin	*2,080*	*2,156*	*2,233*	*recommended*
Johnson Co., Trinity Basin	*231*	*240*	*248*	*recommended*
Hill Co., Brazos Basin	*359*	*372*	*385*	*recommended*
Hill Co., Trinity Basin	*49*	*51*	*53*	*recommended*
Total Population	**2,719**	**2,819**	**2,919**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Johnson Co., Brazos Basin	*273*	*275*	*277*	*recommended*
Johnson Co., Trinity Basin	*30*	*31*	*31*	*recommended*
Hill Co., Brazos Basin	*47*	*47*	*48*	*recommended*
Hill Co., Trinity Basin	*6*	*7*	*7*	*recommended*
Total Demand	**357**	**359**	**363**	

Current Supply (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	57	57	57	2006 Plan showed 57 AF/Y; currently producing 100 AF/Y
Files Valley WSC (Aquilla WSD)	*336*	*336*	*336*	*contract for 300,000 gal/d (avg)*
Total Supply	**393**	**393**	**393**	

Surplus/Shortage	**36**	**34**	**30**

Recommended Strategies	**2010**	**2020**	**2030**	**Notes**
BRA SWATS through Johnson Co SUD (Johnson County)	181	181	181	based on survey results
Supplemental wells in Trinity aquifer	*0*	*0*	*0*	*keep strategy*
Total	**181**	**181**	**181**	

Final Surplus/Shortage	**217**	**215**	**211**

Notes: a. A portion of Parker WSC is served by Files Valley WSC.
b. Parker WSC plans to add another well in the Trinity aquifer.
c. Significant changes to the 2006 Brazos G Water Plan are shown in italics.
d. Units: Acre-Feet per Year (AF/Y)

Figure F-35
Parker WSC Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand

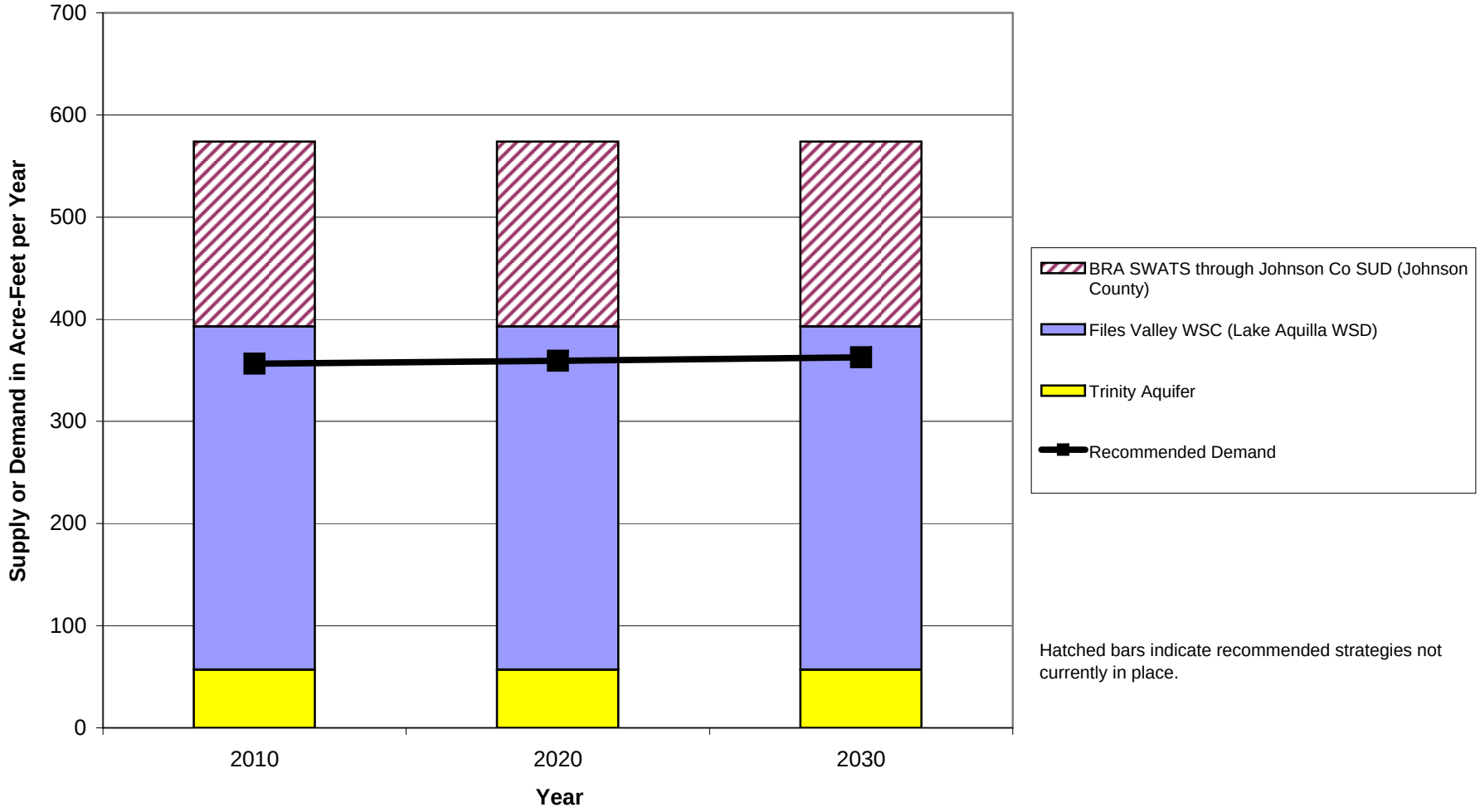


Table F-36
Pecan Hill

Population	**2010**	**2020**	**2030**	**Notes**
In-City	813	943	1,072	recommended

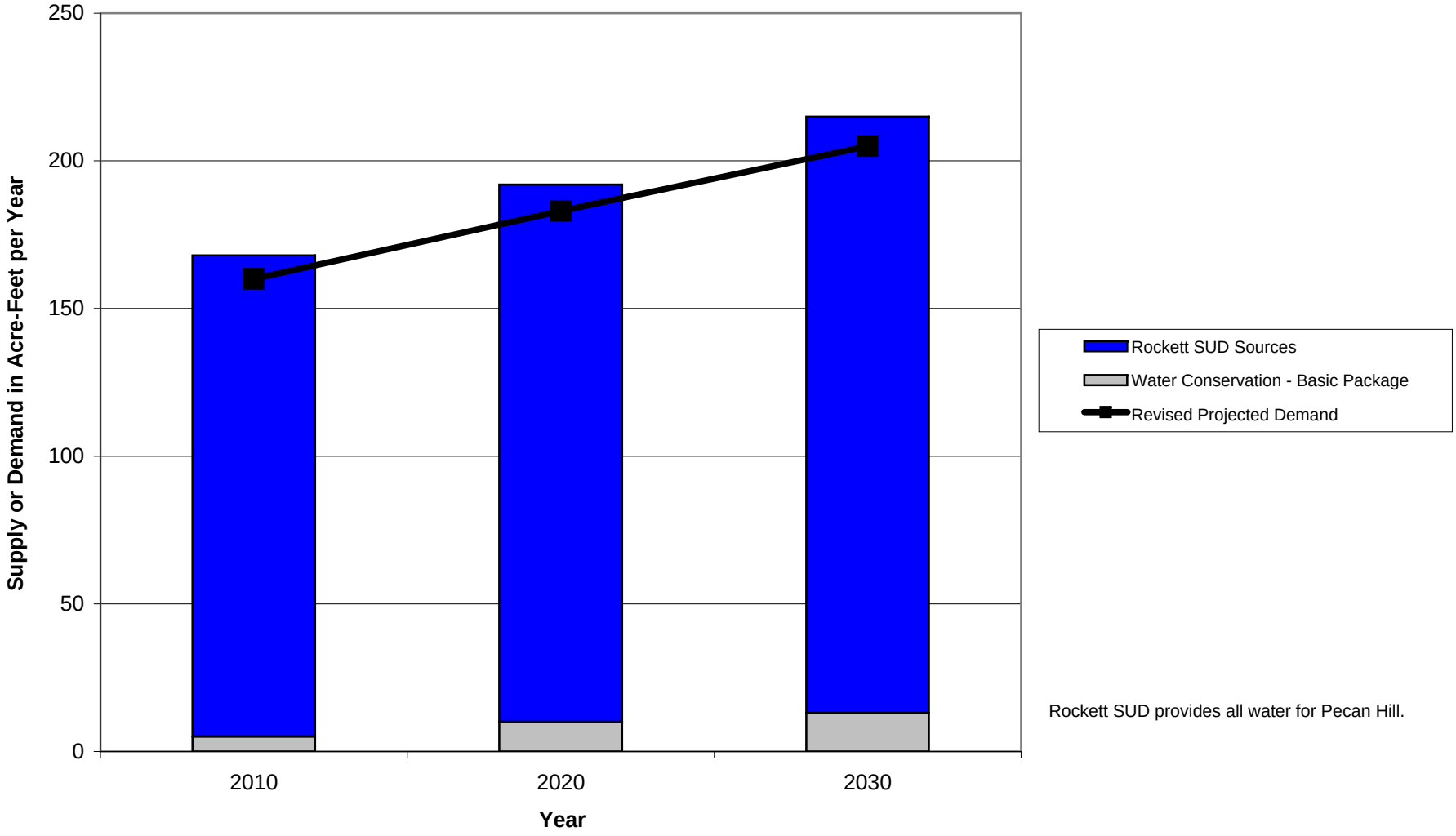
Proposed Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	160	183	205	recommended

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Rockett SUD Sources	*163*	*182*	*202*	*Rockett SUD currently meets all demand, revised current supply based on this study*
Water Conservation - Basic Package	5	10	13	2006 Plan
Total Supply	**168**	**192**	**215**	

Surplus/Shortage (AF/Y)	**8**	**9**	**10**

Notes: a. Rockett SUD serves all of Pecan Hill.
b. Pecan Hill no longer obtains water from Waxahachie (Lake Waxahachie) or other aquifer.
c. Changes from the 2006 Region C Water Plan are shown in italics.
d. Units: Acre-Feet per Year (AF/Y)

Figure F-36
Pecan Hill Comparison of Currently Contracted Supplies to Recommended Demand



Rockett SUD provides all water for Pecan Hill.

Table F-37
City of Red Oak

Population	**2010**	**2020**	**2030**	**Notes**
City	*12,500*	*21,000*	*26,000*	*recommended*

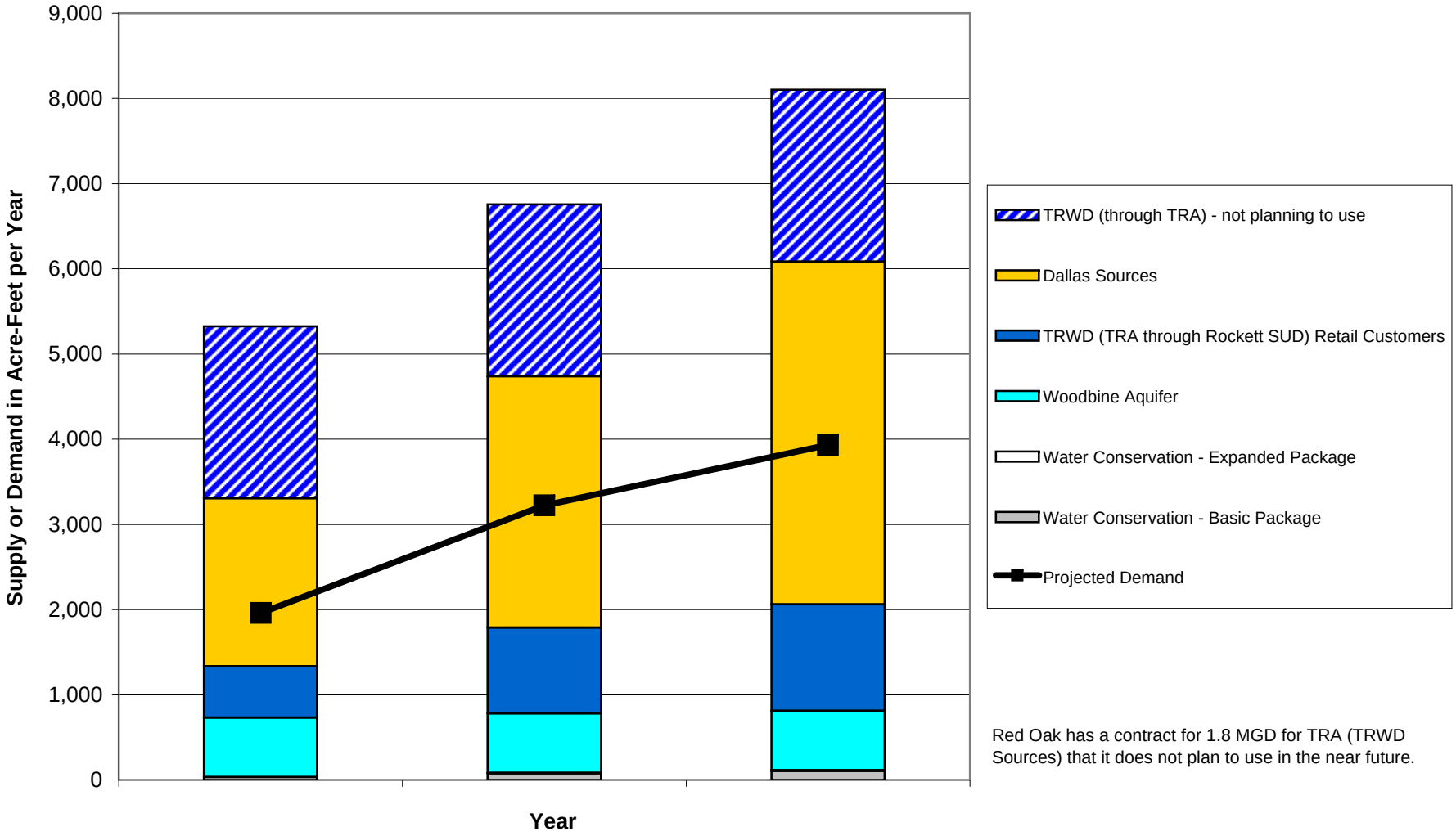
Proposed Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand (AF/Y)	*1,960*	*3,223*	*3,932*	*recommended*

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
TRWD (through TRA) - not planning to use	2,018	2,018	2,018	1.8 MGD (avg day) contract with TRA (TRWD sources); no immediate plans to use water
Woodbine Aquifer	698	698	698	2006 Plan
DWU Sources	*1,973*	*2,948*	*4,024*	*25 MGD (peak) contract with DWU; Figures in Dallas' Long Range Water Plan shown here, revised current supply based on this study*
TRWD (from TRA through Rockett SUD)	*601*	*1,010*	*1,250*	*1,094 connections*
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Water Conservation - Basic Package	33	76	104	2006 Plan
Water Conservation - Expanded Package	1	6	9	2006 Plan
Total Supply	**5,324**	**6,756**	**8,103**	

Surplus/Shortage (AF/Y)	**3,363**	**3,533**	**4,171**

Notes: a. 2006 plan shows small amount from Midlothian in 2010 as current supply. That is incorrect.
b. 2006 Plan also showed the TRA (TRWD sources) Ellis County project. This should be removed.
c. Rockett SUD serves a portion of Red Oak.
d. Significant changes from the 2006 Region C Water Plan are shown in italics.
e. Units: Acre-Feet per Year (AF/Y)

Figure F-37
City of Red Oak Comparison of Currently Contracted Supplies to Recommended Demand



Red Oak has a contract for 1.8 MGD for TRA (TRWD Sources) that it does not plan to use in the near future.

Table F-38
Rice WSC
(Includes Ellis and Navarro Counties)

Population	**2010**	**2020**	**2030**	**Notes**
Ellis County portion	1,027	1,377	1,722	2006 Plan
Navarro County portion	6,640	8,357	10,145	2006 Plan
Total Population	**7,667**	**9,734**	**11,867**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Ellis County portion	127	165	204	2006 Plan
Navarro County portion	818	1,002	1,205	2006 Plan
Total Demand	**945**	**1,167**	**1,409**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Lake Bardwell (Ennis)	*50*	*50*	*50*	*Contract is for 0.090 MGD (peak day)*
Navarro Mills Reservoir (Corsicana)	949	1,065	1,209	2006 Plan
Water Conservation - Basic Package	2	8	16	2006 Plan
Total Supply	**1,001**	**1,123**	**1,275**	

Surplus/Shortage (AF/Y)	**56**	**-44**	**-134**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
TRWD (from TRA through Ennis)	0	14	34	2006 Plan
Additional water from Corsicana	0	230	282	2006 Plan
Total	**0**	**244**	**316**	

Final Surplus/Shortage (AF/Y)	**56**	**200**	**182**

Note: a. Ennis has requested additional supply from TRA (TRWD Sources).
b. Changes from the 2006 Region C Water Plan are shown in italics.
c. Units: Acre-Feet per Year (AF/Y)

Figure F-38
Rice WSC Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand

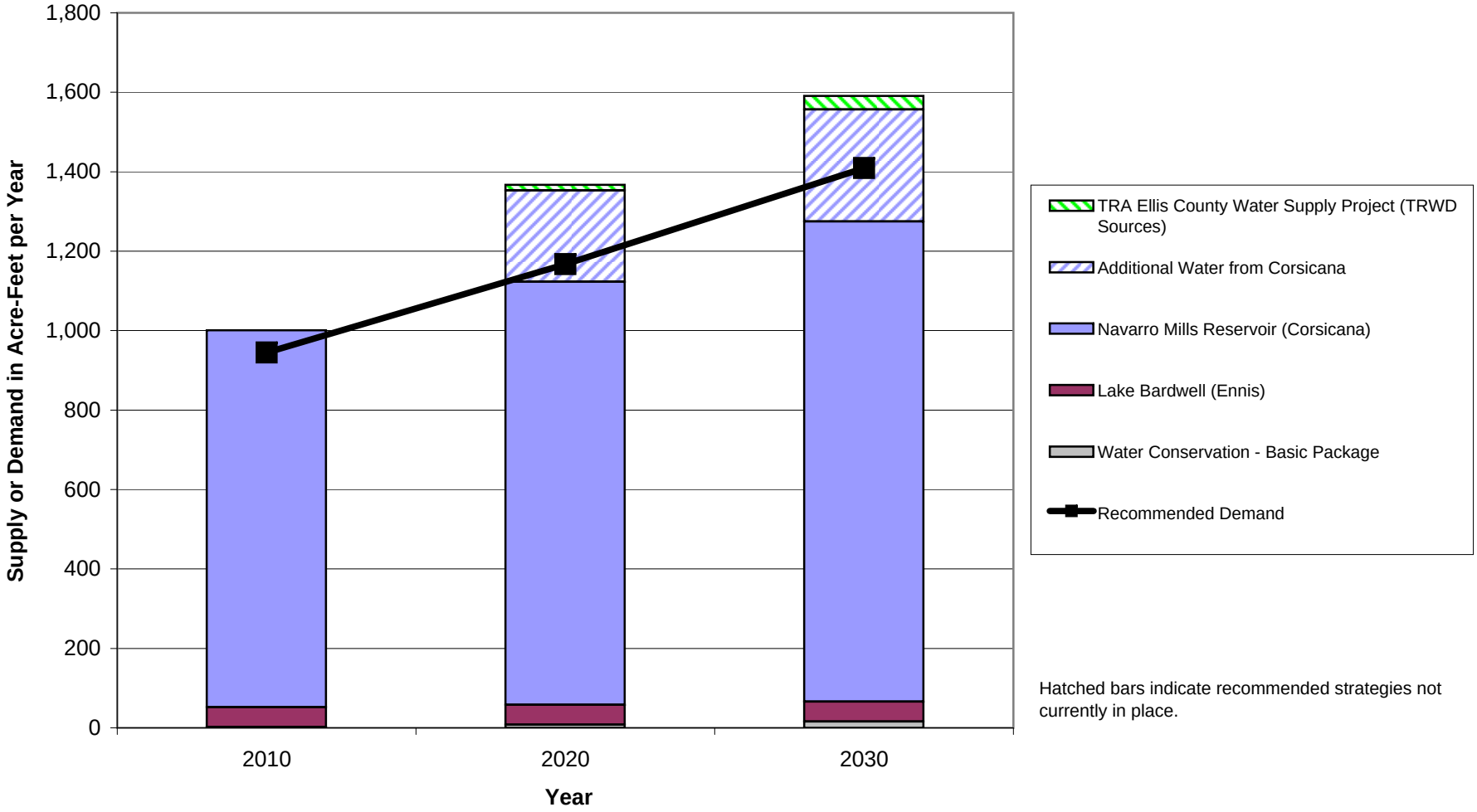


Table F-39
City of Rio Vista

Population	**2010**	**2020**	**2030**	**Notes**
In-City Demand	751	863	981	2006 Plan

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	71	77	85	2006 Plan

Current Supply (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	17	16	16	2006 Plan
Total Supply	**17**	**16**	**16**	

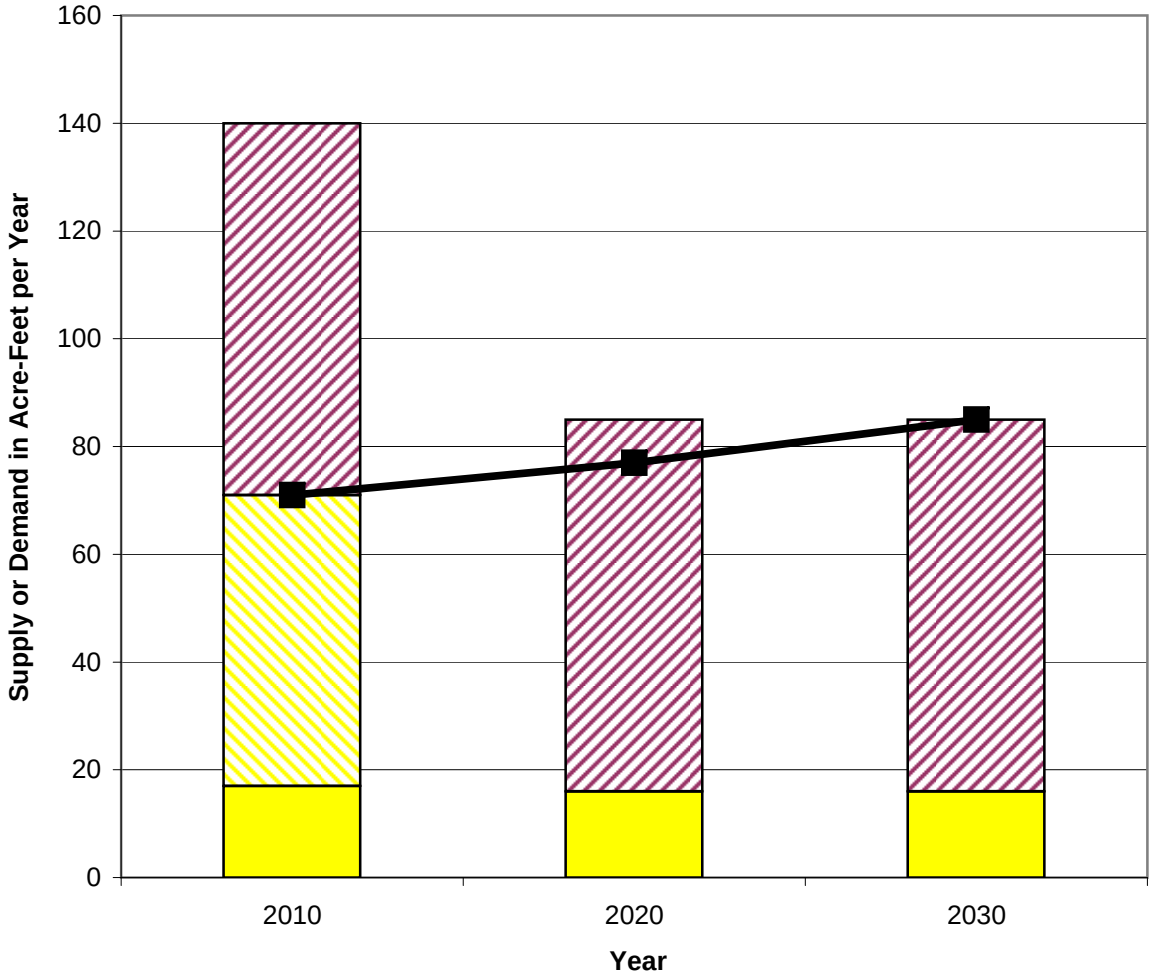
Surplus/Shortage	**-54**	**-61**	**-69**

Recommended Strategies	**2010**	**2020**	**2030**	**Notes**
Temporary overdraft of the Trinity aquifer in 2010	*54*	*0*	*0*	*new strategy*
BRA SWATS (possibly through Johnson County SUD)	69	69	69	Contracted supply assumed to be equal to maximum project demand.
Total	**123**	**69**	**69**	

Final Surplus/Shortage	**69**	**8**	**0**

Note: Rio Vista plans to drill a new well.
Alternative strategy for Rio Vista is to purchase water from Cleburne.
Units: Acre-Feet per Year (AF/Y)

Figure F-39
City of Rio Vista Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



All demands are met with zero additional supplies remaining in any decade per Brazos G RWPG assumptions.

Hatched bars indicate recommended strategies not currently in place.

Table F-40
Rockett SUD
(Includes Dallas and Ellis Counties)

Population of Current Customers	**2010**	**2020**	**2030**	**Notes**
Service Area not within City Boundaries (Dallas County)	2,713	3,611	4,706	recommended
Service Area not within City Boundaries (Ellis County)	20,249	26,822	36,076	recommended
Ennis	*80*	*82*	*84*	*23 connections (retail customer)*
Ferris	2,631	3,183	3,851	total population
Palmer	1,924	2,063	2,200	total population
Pecan Hill	813	943	1,072	total population
Red Oak	*3,832*	*6,579*	*8,267*	*1,094 connections (retail customer)*
Lancaster	*600*	*616*	*629*	*162 connections (retail customer)*
Oak Leaf	*244*	*249*	*253*	*68 connections (retail customer)*
Waxahachie	*2,443*	*2,455*	*2,468*	*698 connections (retail customer)*
Ellis County-Other	*372*	*374*	*379*	*current contracts with Boyce WSC and Brystol WSC*
Current Customer Population	**35,901**	**46,977**	**59,985**	

Demand of Current Customers (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Service Area not within City Boundaries (Dallas County)	380	505	659	recommended
Service Area not within City Boundaries (Ellis County)	2,396	3,299	4,609	recommended
Ennis	*17*	*17*	*17*	*23 connections (retail customer)*
Ferris	401	474	561	In-City demand (linked)
Palmer	239	250	259	In-City demand (linked)
Pecan Hill	*160*	*183*	*205*	*total demand (linked)*
Red Oak	*601*	*1,010*	*1,250*	*1,094 connections (retail customer)*
Lancaster	*90*	*90*	*91*	*162 connections (retail customer)*
Oak Leaf	*55*	*55*	*56*	*68 connections (retail customer)*
Waxahachie	*613*	*616*	*619*	*698 connections (retail customer)*
Ellis County-Other	*70*	*70*	*70*	*current contracts with Boyce WSC and Brystol WSC*
Current Customer Demand	**5,022**	**6,569**	**8,396**	

Table F-40, Continued

Potential New Customer Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Ellis County-Other (East Garrett WSC)	0	9	9	considering 8,000 gal/d
Sardis-Lone Elm WSC	6,502	6,502	6,502	amount assumed
Proposed New Customer Demand	**6,502**	**6,511**	**6,511**	

Total Current and Potential Customer Demand (AF/Y)	**11,524**	**13,080**	**14,907**

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Midlothian sources	*1,544*	*1,682*	*1,682*	*2006 Plan showed 2010 as last decade of contract with no plan to renew; renewing contract seeking 3 MGD (Peak)*
Trinity aquifer	*0*	*0*	*0*	*Plans to plug wells before 2010*
TRWD (through TRA)	*6,782*	*6,782*	*6,782*	*6.05 MGD (avg day) contract with TRA/TRWD (includes 0.32 MGD that used to belong to Boyce and 0.21 MGD that used to belong to Brystol)*
TRWD (through TRA) for Ferris	*807*	*807*	*807*	*Ferris has an existing 0.72 MGD contract with TRWD (through TRA)*
TRWD (through TRA) for Palmer	*304*	*304*	*304*	*Palmer has an existing 0.271 MGD contract with TRWD (through TRA)*
Lake Waxahachie (Waxahachie)	0	0	0	Currently supplied from Waxahachie. By 2010, will get TRWD water from new Sokoll plant.
Dallas Sources (contract)	1,592	841	34	supply based on Dallas Long Range Water Supply Plan
Water Conservation - Basic Package	63	239	280	2006 Plan
Total Supply	**11,092**	**10,655**	**9,889**	

Surplus/Shortage (AF/Y)	**6,070**	**4,086**	**1,493**
Surplus/Shortage (Current and Potential Customers) (AF/Y)	**-432**	**-2,425**	**-5,018**

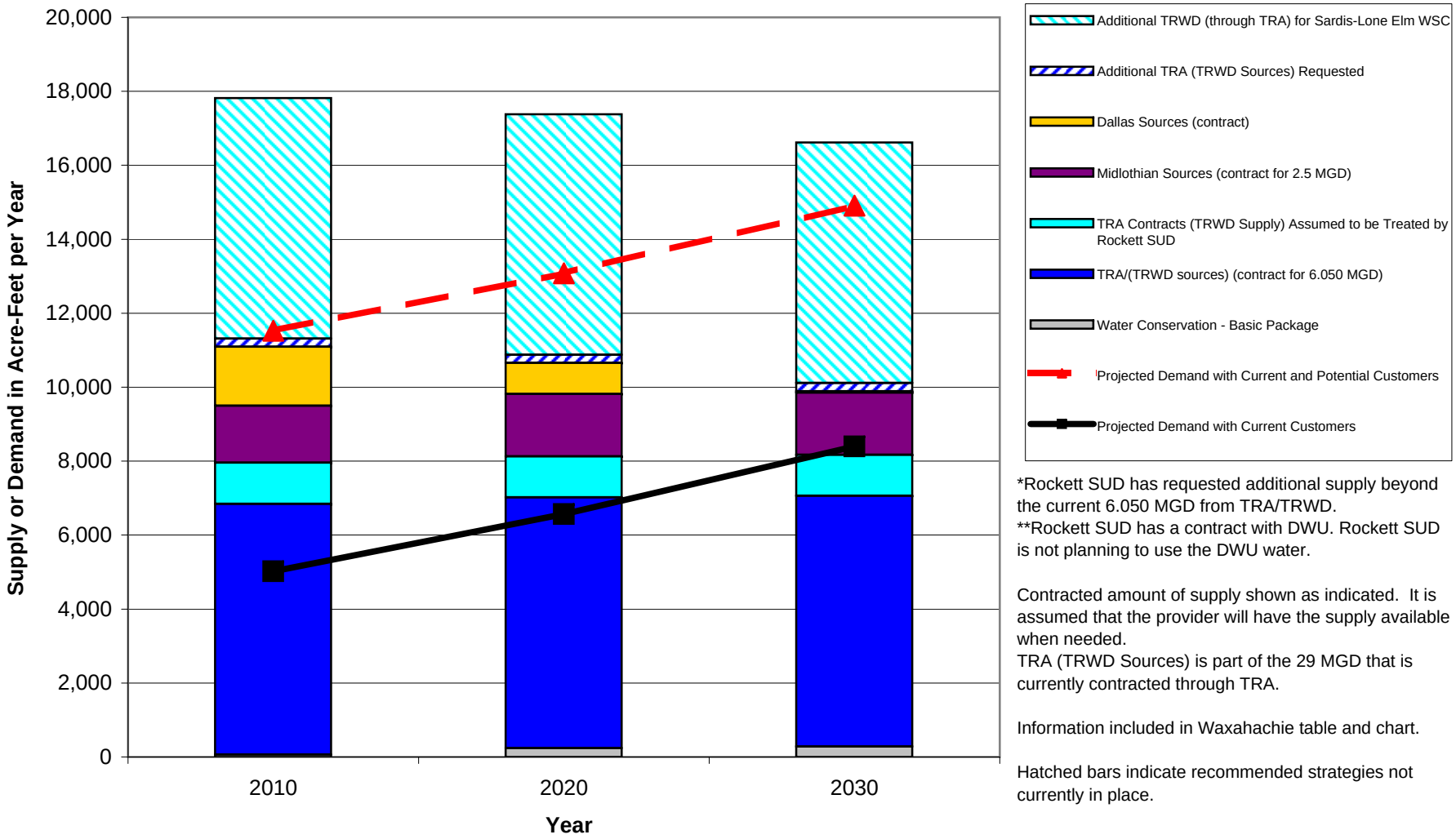
Table F-40, Continued

Recommended Strategies (AF/Y)	2010	2020	2030	Notes
Additional TRWD (through TRA)	*224*	*224*	*224*	*amount has been updated. Assumed contract for an additional 0.2 mad.*
Additional TRWD (through TRA) for Sardis-Lone Elm WSC	*6,502*	*6,502*	*6,502*	*new strategy*
Total	**6,726**	**6,726**	**6,726**	

Remaining Contract Balances Committed to Specific Entities (AF/Y)	**471**	**387**	**291**
Final Surplus/Shortage (Current Customers) (AF/Y)	**12,325**	**10,425**	**7,928**
Final Uncommitted Surplus/Shortage (Current and Pot. Customers) (AF/Y)	**5,823**	**3,914**	**1,417**

Notes: a. Rockett SUD has requested additional TRWD water (through TRA) above 6.05 MGD that is currently contracted.
b. Rockett SUD has a contract with Dallas to purchase treated water. Rockett SUD is not planning to use the Dallas water in the near future.
c. Joint water treatment plant with Waxahachie is under construction. It will provide 20 MGD (peak) initially and can be expanded to provide up to 80 MGD (peak).
d. The TRWD (through TRA) strategy replaces the previous strategy to obtain water from Lake Waxahachie.
e. Significant changes from the 2006 Region C Water Plan are shown in italics.
f. Remaining contract balances for existing TRA contracts for Ferris, Palmer, and County-Other cannot be allocated to other Rockett SUD customers.
g. Units: Acre-Feet per Year (AF/Y)

Figure F-40
Rockett SUD and Customers Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demands



*Rockett SUD has requested additional supply beyond the current 6.050 MGD from TRA/TRWD.
**Rockett SUD has a contract with DWU. Rockett SUD is not planning to use the DWU water.

Contracted amount of supply shown as indicated. It is assumed that the provider will have the supply available when needed.
TRA (TRWD Sources) is part of the 29 MGD that is currently contracted through TRA.

Information included in Waxahachie table and chart.

Hatched bars indicate recommended strategies not currently in place.

Table F-41
Sardis-Lone Elm WSC
(includes Dallas and Ellis County portions)

Service Area Population	**2010**	**2020**	**2030**	**Notes**
Ellis County	*14,601*	*23,367*	*30,317*	*recommended*
Dallas Co	*72*	*108*	*138*	*recommended*
Midlothian (retail customers)	*900*	*915*	*923*	*300 retail connections*
Ovilla (retail customers)	*598*	*610*	*622*	*200 retail connections*
Total Population	**16,171**	**25,000**	**32,000**	

Service Area Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Demand (Ellis County)	*3,356*	*5,129*	*6,496*	*recommended*
Demand (Dallas Co)	*15*	*22*	*28*	*recommended*
Midlothian (retail customers)	*242*	*243*	*244*	*300 retail connections*
Ovilla (retail customers)	*122*	*123*	*124*	*200 retail connections*
Total Demand	**3,735**	**5,517**	**6,892**	

Currently Contracted Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	1,150	1,150	1,150	2006 Plan; current use is 3,195 AF/Y
Woodbine Aquifer	*168*	*168*	*168*	*recent addition to supply; amount shown is assumed*
Water Conservation - Basic Package	51	96	111	2006 Plan
Water Conservation - Expanded Package	1	6	7	2006 Plan
Total Supply	**1,370**	**1,420**	**1,436**	

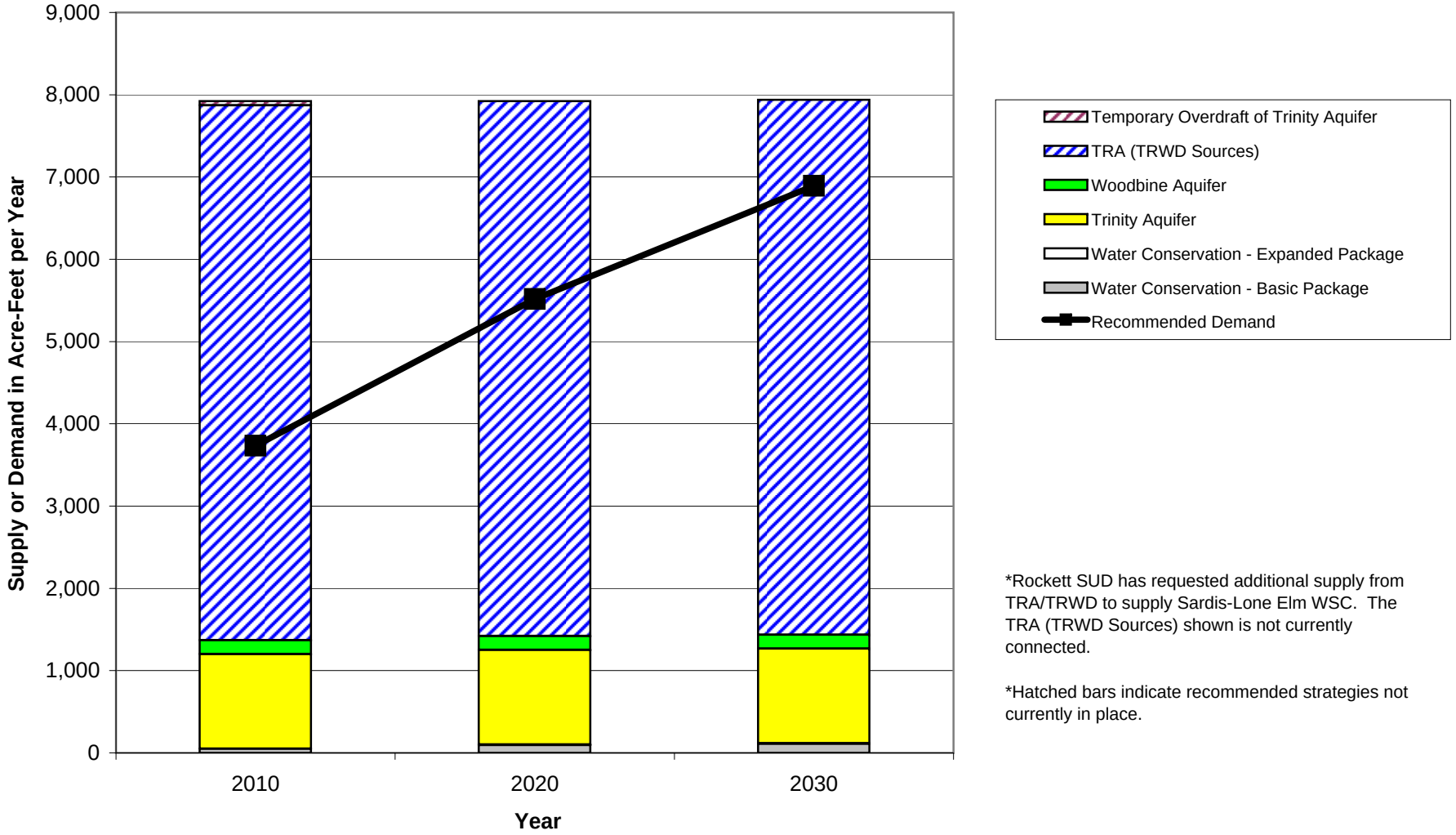
Surplus/Shortage (AF/Y)	**-2,365**	**-4,097**	**-5,456**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
TRWD (from TRA through Rockett SUD)	*6,502*	*6,502*	*6,502*	*potential contract with Rockett SUD for TRA (TRWD Sources) of 5.8 mad; by 2030 all demand assumed to fall on Rockett SUD*
Overdraft Trinity Aquifer (New Wells)	50	0	0	2006 Plan
Supplemental wells in Trinity aquifer	0	0	0	2006 Plan
Supplemental wells in Woodbine aquifer	0	0	0	2006 Plan
Total	**6,552**	**6,502**	**6,502**	

Final Surplus/Shortage (AF/Y)	**4,187**	**2,405**	**1,046**

Note: a. Rockett SUD has requested an additional contract from TRA (TRWD) to supply Sardis-Lone Elm WSC.
b. Sardis-Lone Elm WSC wants the reduction in groundwater use 2020 and beyond to be removed.
c. Changes from the 2006 Region C Water Plan are shown in italics.
d. Sardis-Lone Elm WSC plans to drill additional wells in the Woodbine aquifer.
e. Sardis-Lone Elm has an emergency connection with Midlothian that can supply water to either entity.
f. Units: Acre-Feet per Year (AF/Y)

Figure F-41
Sardis-Lone Elm WSC Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



*Rockett SUD has requested additional supply from TRA/TRWD to supply Sardis-Lone Elm WSC. The TRA (TRWD Sources) shown is not currently connected.

*Hatched bars indicate recommended strategies not currently in place.

Table F-42
City of Venus

Population	2010	2020	2030	Notes
City	*2,766*	*3,795*	*5,425*	*recommended*

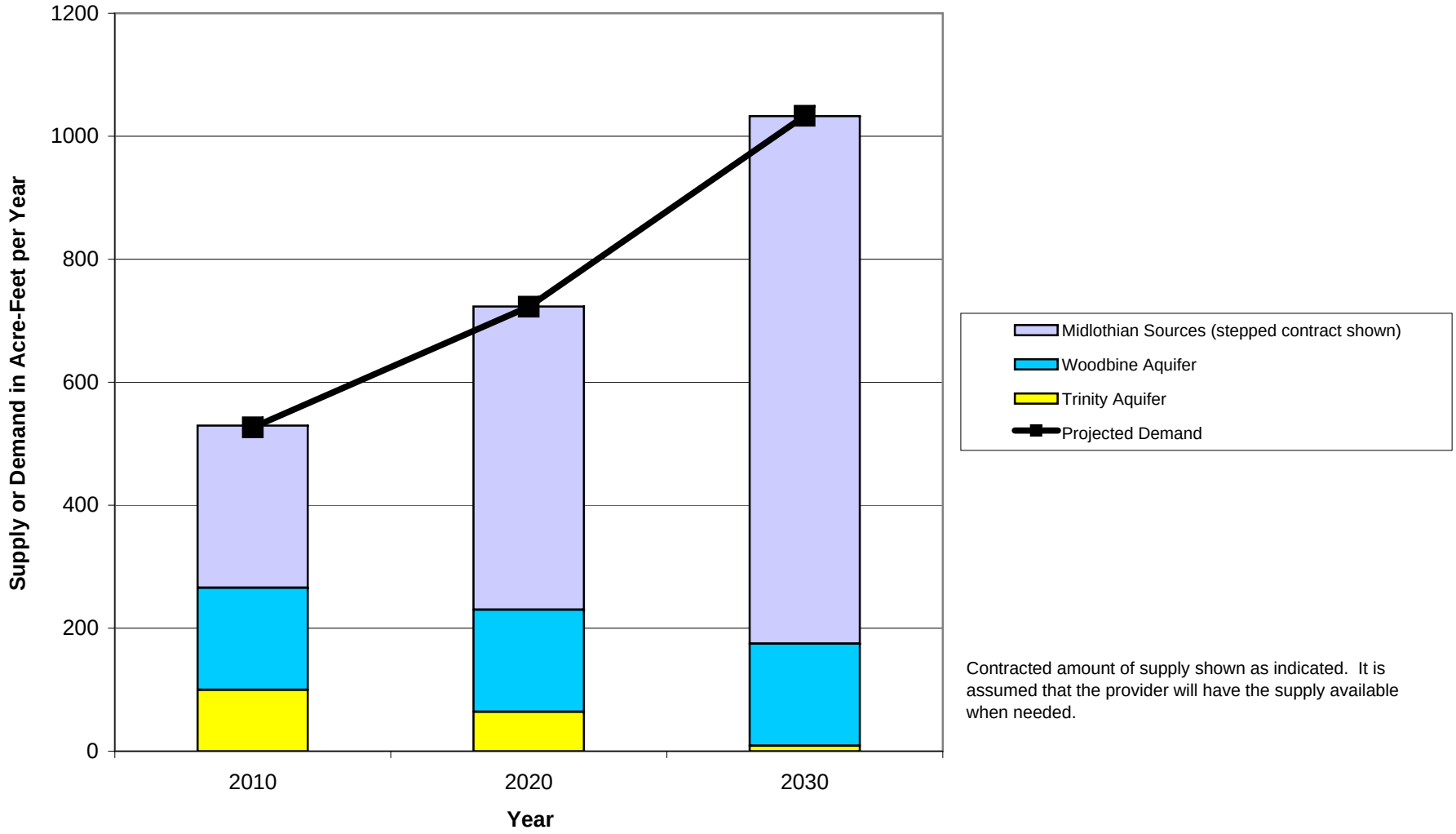
Demand (AF/Y)	2010	2020	2030	Notes
In-City Demand	*527*	*723*	*1,033*	*recommended*

Currently Contracted Supplies (AF/Y)	2010	2020	2030	Notes
Woodbine Aquifer	166	166	166	2006 Plan
Trinity Aquifer	*100*	*64*	*9*	*0 shown in 2006 plan, 100 AF/Y assumed and ramping down.*
Midlothian (TRWD Sources through TRA)	*263*	*493*	*858*	*based on ramp up schedule per current contract*
Total Supply	**529**	**723**	**1033**	

Surplus/Shortage (AF/Y)	2	0	0

No strategies were recommended in the 2006 Plan because Venus did not have any shortages.
No additional strategies are recommended at this time.
Significant changes from the 2006 Brazos G Water Plan are shown in italics.
Units: Acre-Feet per Year (AF/Y)

Figure F-42
Venus Comparison of Currently Contracted Supplies to Recommended Demand



Contracted amount of supply shown as indicated. It is assumed that the provider will have the supply available when needed.

Table F-43
City of Waxahachie

Population of Existing Customers	**2010**	**2020**	**2030**	**Notes**
City of Waxahachie	*32,900*	*48,440*	*63,800*	*recommended*
Rockett SUD and Customers	0	0	0	2010 demand will be replaced by new, joint water treatment plant
Ellis County-Other	1,285	1,285	1,285	Assume 12 percent of recommended, includes Nash-Forreston WSC
Current Customer Population	**34,185**	**49,725**	**65,085**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City Demand	*8,255*	*12,155*	*16,009*	*recommended*
Rockett SUD and Customers	0	0	0	2010 demand will be replaced by new, joint water treatment plant
Ellis County-Other	242	240	237	Assume 12 percent of recommended, includes Nash-Forreston WSC
Ellis County Manufacturing (28%)	970	1,028	1,075	Assume 28 percent of recommended
Current Customer Demand	**9,467**	**13,423**	**17,321**	

Potential New Customer Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Buena Vista-Bethel SUD	*0*	*934*	*1,567*	*not currently connected; demand less other supplies in 2020 and full demand in 2030*
City of Italy	0	140	362	not currently connected; demand less other supplies in 2020 and full demand in 2030
City of Maypearl	0	38	140	not currently connected; demand less other supplies in 2020 and full demand in 2030
Ellis County Steam Electric Power	*4,484*	*4,484*	*4,484*	*considering an average day demand of 4 MGD to be supplied from Lake Waxahachie*
Total Potential Customer Demand	**4,484**	**5,596**	**6,553**	

Total Current and Potential Customer Demand (AF/Y)	**13,951**	**19,019**	**23,874**

Table F-43, Continued

Currently Contracted Supplies (AF/Y)	2010	2020	2030	Notes
Lake Bardwell (TRA)	*3,855*	*3,668*	*3,483*	*TRA contract allows for 4,320 AF/Y; supply limited due to sedimentation as shown in 2006 Plan*
Lake Waxahachie	2,667	2,573	2,480	2006 Plan shown here; Current use is 4,320 AF/Y
TRWD (through TRA)	*5,213*	*5,213*	*5,213*	*4.65 MGD (avg day) contract with TRA (TRWD Sources)*
TRWD (through TRA) for Buena Vista-Bethel SUD	*953*	*953*	*953*	*Buena Vista-Bethel SUD has a contract with TRA for 0.85 MGD*
TRWD (through TRA) for Maypearl	*415*	*415*	*415*	*Maypearl has a contract with TRA for 0.37 MGD*
TRWD (through TRA) for Avalon WSC (County-Other)	*673*	*673*	*673*	*Avalon WSC has a contract with TRA for 0.6 MGD*
TRWD (through TRA) for Italy	*561*	*561*	*561*	*Italy has a contract with TRA for 0.5 MGD*
TRWD (through TRA) for Nash-Forreston WSC (County-Other)	*280*	*280*	*280*	*Nash-Forreston WSC has an existing 0.25 MGD contract with TRWD (through TRA)*
Reuse	*4,128*	*5,128*	*5,128*	*permit allows for up to 5,128 AF/Y, revised current supply based on this study*
Dallas Supplies	*0*	*13,452*	*13,452*	*supply based on Dallas Long Range Water Supply Plan*
Water Conservation - Basic Package	229	580	823	2006 Plan
Water Conservation - Expanded Package	3	25	135	2006 Plan
Total Supply	**18,977**	**33,521**	**33,596**	

Surplus/Shortage (Current Customers) (AF/Y)	**9,510**	**20,098**	**16,275**
Surplus/Shortage (Current and Potential Customers) (AF/Y)	**5,026**	**14,502**	**9,722**

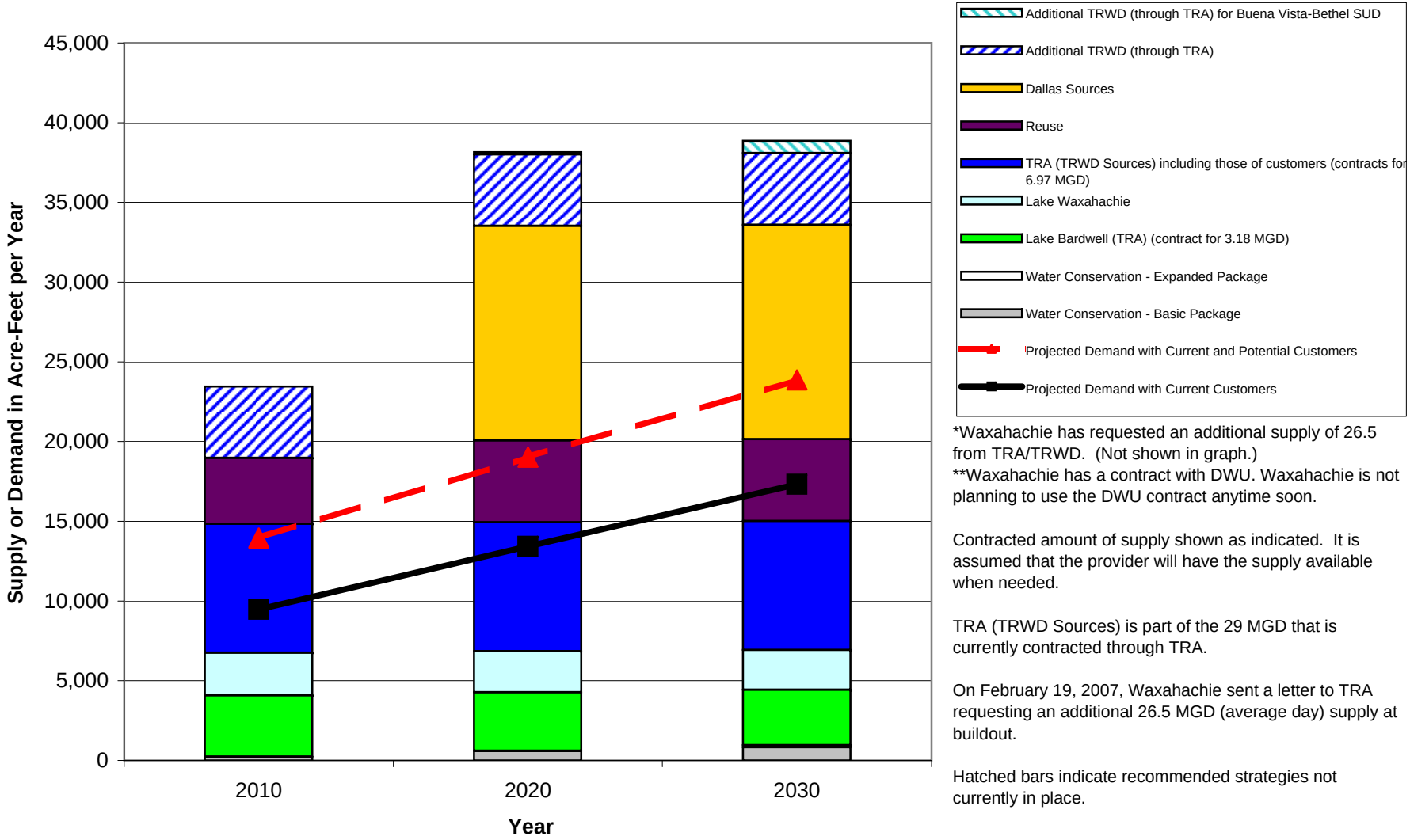
Recommended Strategies (AF/Y)	2010	2020	2030	Notes
Additional TRWD (through TRA)	*4,484*	*4,484*	*4,484*	*updated amount; assumed 4 MGD*
Additional TRWD (through TRA) for Buena Vista-Bethel SUD	*0*	*146*	*785*	*new strategy*
Total	**4,484**	**4,630**	**5,269**	

Table F-43, Continued

Remaining Contract Balances Committed to Specific Entities (AF/Y)	**2,640**	**1,530**	**1,190**
Final Surplus/Shortage (Current Customers) (AF/Y)	**11,354**	**23,198**	**20,354**
Final Surplus/Shortage (Current and Potential Customers) (AF/Y)	**6,870**	**17,602**	**13,801**

Notes: a. Waxahachie and Rockett SUD are developing a joint water treatment plant and have asked TRA (TRWD sources) for additional supply beyond current contract amounts.
b. Waxahachie has a contract to purchase treated water from Dallas. Waxahachie is not planning to use the Dallas water in the near future.
c. As an alternative strategy, Waxahachie could sell water to Files Valley WSC and Ellis County Other.
d. Significant changes from the 2006 Region C Water Plan are shown in italics.
e. Waxahachie will need treatment plant expansions.
f. Remaining contract balances for existing TRA contracts for Buena Vista-Bethel SUD, Maypearl, Avalon WSC, and Italy cannot be allocated to other Waxahachie customers.
g. Waxahachie's south water treatment plant will be expanded in 2010. Waxahachie and Rockett SUD are jointly developing the Sokoll Water Treatment Plant, which is expected to be in operation by 2010 and will need to be expanded in the future.
h. Alternative strategies for Waxahachie include pumping water from Joe Pool Lake and from Lake Benbrook.
i. Units: Acre-Feet per Year (AF/Y)

Figure F-43
City of Waxahachie Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demands



*Waxahachie has requested an additional supply of 26.5 from TRA/TRWD. (Not shown in graph.)
**Waxahachie has a contract with DWU. Waxahachie is not planning to use the DWU contract anytime soon.

Contracted amount of supply shown as indicated. It is assumed that the provider will have the supply available when needed.

TRA (TRWD Sources) is part of the 29 MGD that is currently contracted through TRA.

On February 19, 2007, Waxahachie sent a letter to TRA requesting an additional 26.5 MGD (average day) supply at buildout.

Hatched bars indicate recommended strategies not currently in place.

Table F-44
City of Wilmer

Population	**2010**	**2020**	**2030**	**Notes**
In-City	5,500	7,500	8,800	2006 Plan
Total Population	**5,500**	**7,500**	**8,800**	

Demand (AF/Y)	**2010**	**2020**	**2030**	**Notes**
In-City	641	899	1,035	2006 Plan
Total Demand	**641**	**899**	**1,035**	

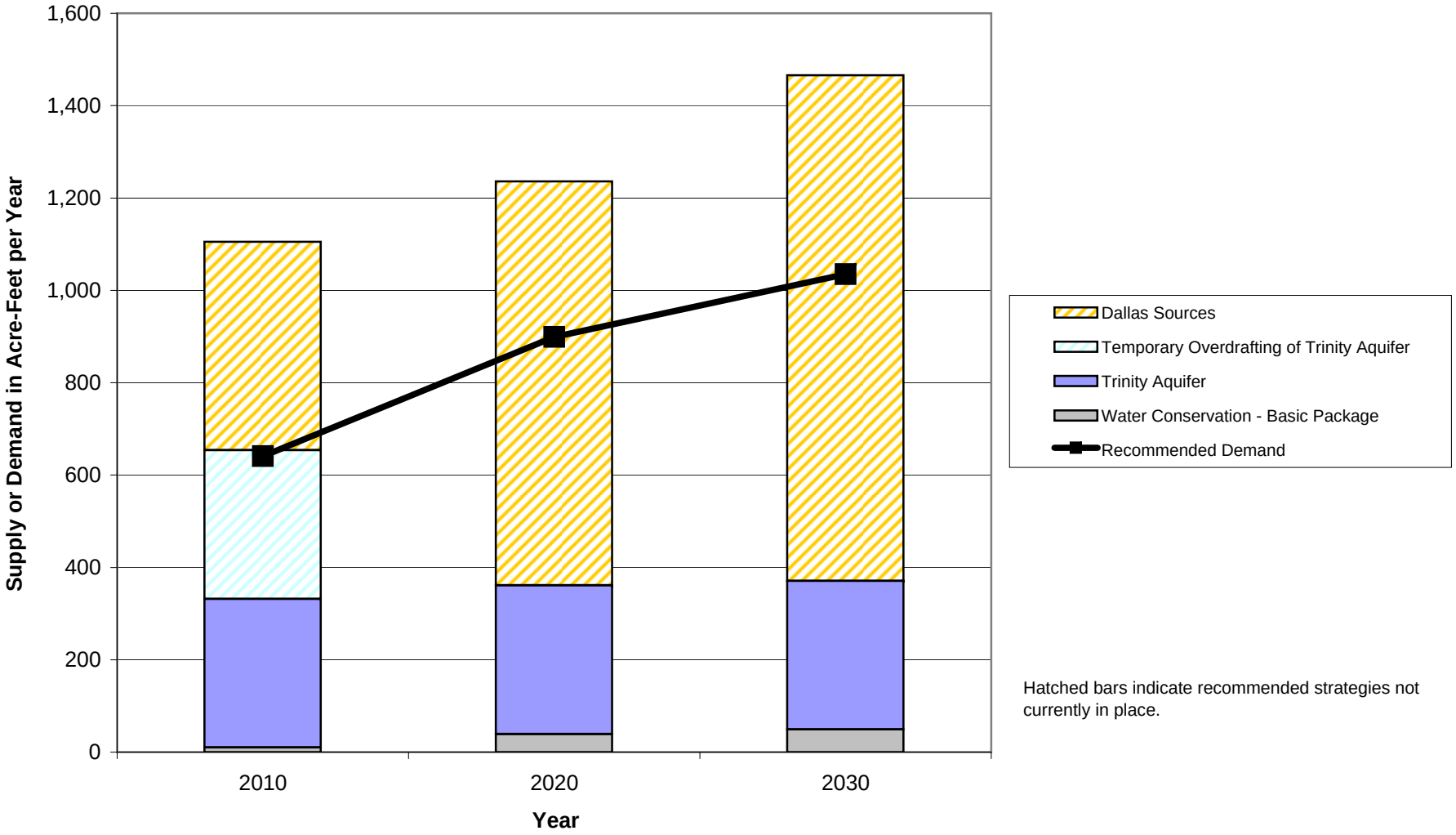
Currently Available Supplies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Trinity Aquifer	322	322	322	2006 Plan
Total Supply	**322**	**322**	**322**	

Surplus/Shortage (AF/Y)	**-319**	**-577**	**-713**

Recommended Strategies (AF/Y)	**2010**	**2020**	**2030**	**Notes**
Dallas Sources	451	875	1,095	2006 Plan
Temporary overdrafting of Trinity aquifer	322	0	0	2006 Plan
Supplemental wells in Trinity aquifer	0	0	0	2006 Plan
Water Conservation - Basic Package	10	39	49	2006 Plan
Total Supply	**783**	**914**	**1,144**	

Units: Acre-Feet per Year (AF/Y)
No changes made to the current supplies or recommended strategies in the 2006 Plan.

Figure F-44
City of Wilmer Comparison of Currently Contracted Supplies and Recommended Water Management Strategies to Recommended Demand



APPENDIX G

DETAILED COST ESTIMATES FOR RECOMMENDED WATER MANAGEMENT STRATEGIES

Appendix G
Detailed Cost Estimates for Recommended Water Management Strategies

This appendix includes a memorandum summarizing the cost estimating assumptions. Specific cost estimates for recommended water management strategies are included in this appendix.

Table of Contents

FREESE • NICHOLS

MEMORANDUM

TO: File, NTD07286

FROM: Simone Kiel, Rachel Ickert

SUBJECT: Cost Estimating for SB1 Projects

DATE: September 4, 2008

Introduction

1. The evaluation of water management strategies requires developing cost estimates. Guidance for cost estimates may be found in the TWDB's "General Guidelines for Regional Water Plan Development (2007-2012)", Section 4.1.2. Costs are to be reported in second quarter 2007 dollars.

2. All cost estimates should be checked by construction services and discipline leaders in the appropriate areas, including Environmental Science.

3. We have developed standard unit costs for installed pipe, pump stations and standard treatment facilities developed from experience with similar projects throughout the State of Texas. These estimates are to be used for all SB1 projects, unless more detailed costing is available. All unit costs include the contractors' mobilization, overhead and profit. The unit costs **do not** include engineering, contingency, financial and legal services, costs for land and rights-of-way, permits, environmental and archeological studies, or mitigation.

4. The information presented in this memorandum is intended to be 'rule-of-thumb' guidance. Specific situations may call for alteration of the procedures and costs. Note that the costs in this memorandum provide a planning level estimate for comparison purposes.

5. It is important that when comparing alternatives that the cost estimates be similar and include similar items. If an existing reliable cost estimate is available for a project it should be used where appropriate. All cost estimates must meet the requirements set forth in the TWDB's "General Guidelines for Regional Water Plan Development (2007-2012)".

6. The cost estimates have two components:

   - Initial capital costs, including engineering and construction costs, and
   - Average annual costs, including annual operation and maintenance costs and debt service.

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TWDB does not require the consultant to determine life cycle or present value analysis. In general, unless you are putting together a complex scenario with phased implementation or are planning on using State funding, annual costs are sufficient for comparison purposes and a life-cycle analysis is not required.

ASSUMPTIONS FOR CAPITAL COSTS:

Conveyance Systems

Standard pipeline costs used for these cost estimates are shown in Table 1. Pump station costs are based on required Horsepower capacity and are listed in Table 2. The power capacity is to be determined from the hydraulic analyses conducted from a planning level hydraulic grade line evaluation (or detailed analysis if available). Pipelines and pump stations are to be sized for peak pumping capacity.

- Pump efficiency is assumed to be 75 percent.
- Peaking factor of 2 times the average demand for strategies when the water is pumped directly to a water treatment plant. (or historical peaking factor, if available)
- Peaking factor of 1.2 to 1.5 is to be used if there are additional water sources and/or the water is transported to a terminal storage facility.
- Ground storage is to be provided at each booster pump station along the transmission line.
- Ground storage tanks should provide sufficient storage for 2.5 to 4 hours of pumping at peak capacity. Costs for ground storage are shown in Table 3. Covered storage tanks are used for all strategies transporting treated water.
- Costs for elevated storage tanks are shown in Table 3A.

Water Treatment Plants

Water treatment plants are to be sized for peak day capacity (assume peaking factor of 2 if no specific data is available). Costs estimated for new conventional surface water treatment facilities and expansions of existing facilities are listed in Table 4. Conventional treatment does not include advanced technologies, such as ozone or UV treatment. **All treatment plants are to be sized for finished water capacity**.

- For reverse osmosis plants for surface water, increase construction costs shown on Table 4 by the amount shown on Table 5 for the appropriate size plant that will be used for RO. If groundwater is the raw water source, use only the costs in Table 5. These costs were based on actual cost estimates of similar facilities.
- The amount of reject water generated by reverse osmosis treatment is dependent upon the incoming quality of the raw water. Final treatment goals should be between 600 and 800 mg/l of TDS. (This provides a safety margin in meeting

secondary treatment standards.) For reverse osmosis treatment of brackish water (1,000 – 3,000 mg/l of TDS), assume that 20 percent of the raw water treated with membranes is discharged as reject water, unless project-specific data is available. For brackish water with TDS concentrations between 3,000 and 10,000 mg/l, assume 30% reject water. Desalination of seawater or very high TDS water will have a higher percent of reject water (50 to 60%). Minimal losses are assumed for conventional treatment facilities.

- Costs for ion exchange facilities are shown on Table 6. For these facilities it is assumed that 2 to 3 percent of the raw water would be discharged as reject water.

New Groundwater Wells

The per-linear-foot costs for new water wells shown in Table 7 are based on a price per square foot of casing material. The costs for public water supply and industrial wells were developed using $130 to $150 per square foot of casing material. It is assumed that the cost of irrigation wells is approximately 60% of the cost for municipal and industrial wells. Well depth will be estimated by county and aquifer.

For expansion of existing well fields for municipal water providers, an additional $150,000 per well for connection to the existing distribution system is assumed. Connection costs and conveyance systems for new well fields will be determined on a case-by-case basis.

New Reservoirs

Site-specific cost estimates will be made for reservoir sites. The elements required for reservoir sites are included in Table 8. Lake intake structures for new reservoirs will be determined on a case-by-case basis. Generally, costs for construction of such facilities prior to filling of the reservoir will be less than shown on Table 2.

Other Costs

- Engineering, contingency, construction management, financial and legal costs are to be estimated at 30 percent of construction cost for pipelines and 35 percent of construction costs for pump stations, treatment facilities and reservoir projects. (Exhibit B)
- Permitting and mitigation for transmission and treatment projects are to be estimated at 1 percent of the total construction costs. For reservoirs, mitigation and permitting costs are assumed equal to twice the land purchase cost, unless site specific data is available.
- Right-of-way costs for transmission lines are estimated per acre of ROW using the unit costs in Table 9. If a small pipeline follows existing right-of-ways (such

as highways), no additional right-of-way cost is assumed. Large pipelines will require ROW costs regardless of routing.

- The costs for property acquisition for reservoirs are to be based on previous cost estimates, if available. A minimum of $3,500 per acre is assumed if no site specific data is available.

Interest during construction is the total of interest accrued at the end of the construction period using a 6 percent annual interest rate on total borrowed funds, less a 4 percent rate of return on investment of unspent funds. This is calculated assuming that the total estimated project cost (excluding interest during construction) would be drawn down at a constant rate per month during the construction period. Factors were determined for different lengths of time for project construction. These factors were used in cost estimating and are presented in Table 10.

ASSUMPTIONS FOR ANNUAL COSTS:

Annual costs are to be estimated using the following assumptions:

- Debt service for all transmission and treatment facilities is to be annualized over 30 years, but not longer than the life of the project. Debt service for reservoirs is to be annualized over 30 years. [Note: uniform amortization periods should be used when evaluating similar projects for an entity.]

- Annual interest rate for debt service is 6 percent.

- Water purchase costs are to be based on wholesale rates reported by the selling entity when possible. In lieu of known rates, a typical regional cost for treated water and raw water will be developed.

- Operation and Maintenance costs are to be calculated based on the construction cost of the capital improvement. Engineering, permitting, etc. should not be included as a basis for this calculation. However, a 20% allowance for construction contingencies should be included for all O&M calculations. Per the "General Guidelines for Regional Water Plan Development (2007-2012)", O&M should be calculated at:
    - 1 percent of the construction costs for pipelines
    - 1.5 percent for dams
    - 2.5 percent of the construction costs for pump stations, storage tanks, meters and SCADA systems
    - Assume O&M costs for treatment facilities are included in the treatment cost

- Surface water treatment costs are estimated at $0.65 per 1,000 gallons for conventional plants and $1.15 per 1,000 gallons of finished water for surface water plants with reverse osmosis. Assume cost for treatment of groundwater by reverse osmosis is $0.60 per 1,000 gallons. If only a portion of the water will be treated with RO, apply costs proportionately. Treatment for nitrates is estimated at $0.35 per 1,000 gallons. Treatment for groundwater (assuming chlorination only) is estimated at $0.25 per 1,000 gallons. These costs include chemicals, labor and electricity and should be applied to amount of finished water receiving the treatment.

- Reject water disposal for treatment of brackish water is to be estimated on a case-by-case basis depending on disposal method. If no method is defined, assume a cost of $0.30 per 1,000 gallons of reject water. [This value represents a moderate cost estimate. If the water were returned to a brackish surface water source, the costs would be negligible. If evaporation beds or deep well injection were used, the costs could be much higher.]

- Pumping costs are to be estimated using an electricity rate of $0.09 per Kilowatt Hour. If local data is available, this can be used.

Table 1

Pipeline Costs (does not include ROW)

Diameter	Base Installed Cost	Rural Cost with Appurtenances	Urban Cost with Appurtenances	Assumed ROW Width	Assumed Temporary Easement Width
(Inches)	($/Foot)	($/Foot)	($/Foot)	(Feet)	(Feet)
6	22	24	36	15	50
8	29	32	48	15	50
10	36	40	60	20	60
12	44	48	72	20	60
14	51	56	84	20	60
16	58	64	96	20	60
18	65	72	108	20	60
20	76	84	126	20	60
24	98	108	162	20	60
30	123	135	200	20	60
36	155	171	257	20	60
42	182	200	300	30	70
48	227	250	348	30	70
54	268	295	405	30	70
60	309	340	460	30	70
66	373	410	550	30	70
72	436	480	648	30	70
78	500	550	743	40	80
84	573	630	850	40	80
90	655	720	972	40	80
96	727	800	1,080	40	80
102	809	890	1,200	40	80
108	909	1,000	1,350	40	80
114	1,000	1,100	1,485	50	100
120	1,127	1,240	1,675	50	100
132	1,364	1,500	2,025	50	100
144	1,609	1,770	2,390	50	100

Notes: a Costs are based on PVC class 150 pipe for the smaller long, rural pipelines.
b Appurtenances assumed to be 10% of installed pipe costs.
c For urban pipelines, costs were increased by 35% for cost with appurtenances. For pipes 42"and smaller, additional costs were added.
d Adjust costs for obstacles (rock, forested areas) and easy conditions (soft soil in flat country).

Table 2
Pump Station Costs for Transmission Systems

	Booster PS	Lake PS with Intake
Horsepower	**Costs**	**Costs**
5	$480,000	
10	$500,000	
20	$525,000	
25	$550,000	
50	$600,000	
100	$690,000	
200	$1,040,000	$1,380,000
300	$1,340,000	$1,780,000
400	$1,670,000	$2,220,000
500	$1,890,000	$2,510,000
600	$2,000,000	$2,660,000
700	$2,110,000	$2,810,000
800	$2,340,000	$3,110,000
900	$2,450,000	$3,260,000
1,000	$2,670,000	$3,551,000
2,000	$3,890,000	$5,174,000
3,000	$4,670,000	$6,211,000
4,000	$5,670,000	$7,541,000
5,000	$6,500,000	$8,645,000
6,000	$7,500,000	$9,975,000
7,000	$8,300,000	$11,039,000
8,000	$9,200,000	$12,236,000
9,000	$10,200,000	$13,566,000
10,000	$11,400,000	$15,162,000
20,000	$19,000,000	$25,270,000
30,000	$25,000,000	$33,250,000
40,000	$31,000,000	$41,230,000
50,000	$36,000,000	$47,880,000
60,000	$41,000,000	$54,530,000
70,000	$46,000,000	$61,180,000

Note:
1. Lake PS with intake costs include intake and pump station.
2. Adjust pump station costs upward if the pump station is designed to move large quantities of water at a low head (i.e. low horsepower). See Rusty Gibson for appropriate factor.
3. Assumed multiple pump setup for all pump stations.

Table 3
Ground Storage Tanks

Size (MG)	With Roof	Without Roof
0.05	$116,000	$99,000
0.1	$170,000	$145,000
0.5	$407,000	$310,000
1.0	$590,000	$436,000
1.5	$740,000	$550,000
2.0	$890,000	$664,000
2.5	$1,010,000	$764,000
3.0	$1,130,000	$863,000
3.5	$1,260,000	$952,000
4.0	$1,400,000	$1,040,000
5.0	$1,600,000	$1,212,000
6.0	$1,930,000	$1,400,000
7.0	$2,275,000	$1,619,000
8.0	$2,625,000	$1,925,000
10.0	$3,485,000	$2,560,000
14.0	$5,205,000	$3,800,000

Note: Costs assume steel tanks smaller than 1 MG, concrete tanks 1 MG and larger.

Table 3A
Elevated Storage Tanks

Size (MG)	Cost
0.5	$1,240,000
0.75	$1,430,000
1.0	$1,620,000
1.5	$2,140,000
2.0	$2,670,000
2.5	$3,140,000

Table 4
Conventional Water Treatment Plant Costs

Plant Capacity (MGD)	New Conventional Plants	Conventional Plant Expansions
1	$5,400,000	$2,700,000
3	$9,900,000	$6,900,000
7	$16,300,000	$12,000,000
10	$20,800,000	$14,900,000
15	$27,100,000	$19,400,000
20	$32,900,000	$24,300,000
30	$44,300,000	$33,200,000
40	$55,800,000	$42,300,000
50	$67,500,000	$50,600,000
60	$79,000,000	$59,100,000
70	$89,900,000	$67,200,000
80	$100,400,000	$75,700,000
90	$110,200,000	$84,200,000
100	$121,100,000	$93,200,000

Note: Plant is sized for finished peak day capacity.

Table 5
Additional Cost for Reverse Osmosis Treatment

Plant Capacity (MGD)	Reverse Osmosis Facilities Cost
0.5	$1,200,000
1	$1,500,000
3	$3,000,000
7	$6,700,000
10	$9,100,000
15	$13,200,000
20	$17,000,000
30	$23,700,000
40	$29,200,000
50	$34,000,000
60	$37,900,000

Note: Plant is sized for finished water capacity.

Table 6
Groundwater Nitrate Treatment

Treatment Capacity (MGD)	Ion Exchange Plant Cost
0.25	$700,000
1.0	$1,600,000
3.0	$3,600,000

Note: Plant is sized for finished water capacity.

Table 7
Cost Elements for Water Wells

Well Diameter (inches)	Typical Production Range (gpm)	Estimated Cost per LF a=1 for PWS/Industrial or 0.6 for Irrigation
6	50-100	$210a
8	100-250	$280a
10	250-400	$370a
12	400-500	$470a
15	500-600	$560a

Table 8
Cost Elements for Reservoir Sites

Capital Costs	Studies and Permitting
Embankment	Environmental and archeological studies
Spillway	Permitting
Outlet works	Terrestrial mitigation tracts
Site work	Engineering and contingencies
Land	Construction management
Administrative facilities	
Supplemental pumping facilities	
Flood protection	

Table 9
Pipeline Easement Costs

Description of Land	Cost per Acre
Rural County	$ 10,000
Suburban County	$ 25,000
Urban County	$ 60,000
Highly Urbanized Area	Evaluate on a case-by-case basis

Note: Suburban County is defined as a county immediately bordering the Dallas/Fort Worth Metroplex.

Table 10
Factors for Interest During Construction

Construction Period	Factor
6 months	0.02167
12 months	0.04167
18 months	0.06167
24 months	0.08167
36 month construction	0.12167

Figure 1

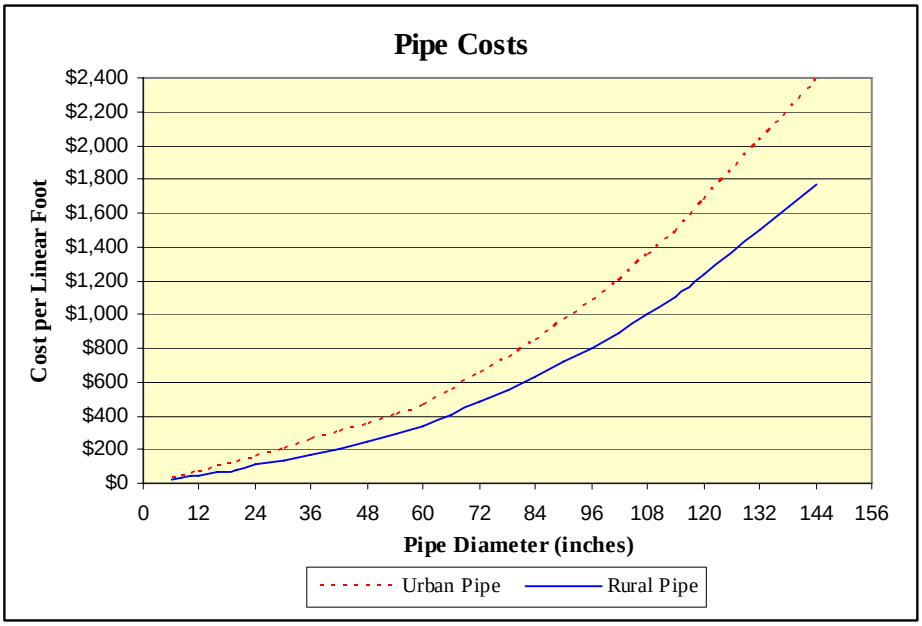

Table G-1
Alvarado Connection to Midlothian

Owner: Alvarado
Amount: 561 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION				
Transmission Pipeline (12 in)	84,480	LF	$48	$4,055,000
Right of way	39	ACRES	$25,000	$970,000
Engineering and Contingencies	30%			$1,217,000
Subtotal pipelines				**$6,242,000**
PUMP STATIONS				
Pump Station (75 HP)	1	LS	$645,000	$645,000
Ground Storage Tank (0.2 MG)	1	LS	$230,000	$230,000
Engineering and Contingencies	35%			$306,000
Subtotal Pump Stations				**$1,181,000**
Permitting and Mitigation	1%			**$59,000**
CONSTRUCTION TOTAL				**$7,482,000**
Interest During Construction		12 months		**$312,000**
TOTAL CAPITAL COST				**$7,794,000**
ANNUAL COSTS				
Debt Service				$566,200
Operation and Maintenance Costs				
Pipeline	1.0%		$4,866,000	$48,700
Pump Station	2.5%		$1,050,000	$26,300
Estimated Annual Power Cost	171,816	kW-H	$0.09	$15,500
TRWD Buy-In Cost	1	MG	$613,567.00	$614,100
Treated Water Cost	182,802	1000 gal	$4.20	$767,800
TOTAL ANNUAL COSTS				**$2,038,600**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$3,633.87
Per 1,000 Gallons				$11.15
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$2,624.60
Per 1,000 Gallons				$8.05

Table G-2
Alvarado Connection to JCSUD

Owner: Alvarado
Amount: 561 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION				
Transmission Pipeline (16 in)	5,280	LF	$64	$338,000
Right of way	2	ACRES	$25,000	$61,000
Engineering and Contingencies	30%			$101,000
Subtotal pipelines				**$500,000**
Permitting and Mitigation	1%			**$4,000**
CONSTRUCTION TOTAL				**$504,000**
Interest During Construction		12 months		**$21,000**
TOTAL CAPITAL COST				**$525,000**
ANNUAL COSTS				
Debt Service				$38,100
Operation and Maintenance Costs				
Pipeline	1.0%		$405,600	$4,100
Estimated Annual Power Cost	256,322	kW-H	$0.09	$23,100
Treated Water Cost	182,802	1000 gal	$2.00	$365,600
TOTAL ANNUAL COSTS				**$430,900**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$768.09
Per 1,000 Gallons				$2.36
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$700.18
Per 1,000 Gallons				$2.15

Table G-3
Alvarado - 2 New Wells Trinity Aquifer

Owner:	Alvarado	
Amount:	444	Acre-Feet per Year
Water Depth	1,000	ft
Well Depth	2,500	ft
Well Yield	300	gpm
Well Size	10	in
Yield per well	483	Acre-Feet per Year (peak)
Yield per well	242	Acre-Feet per Year (average)
Wells Needed	2	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	5,000	LF	$222	$1,110,000
Connection to distribution	2		$150,000	$300,000
Engineering and Contingencies	30%			$423,000
Subtotal of Well(s)				**$1,833,000**
Permitting and Mitigation	1%			**$17,000**
CONSTRUCTION TOTAL				**$1,850,000**
Interest During Construction		(6 months)		**$40,000**
TOTAL CAPITAL COST				**$1,890,000**
ANNUAL COSTS				
Debt Service - Total Capital				$137,300
Operation and Maintenance				
Transmission	1.0%			$3,600
Well(s)	2.5%			$33,300
Chlorination	144,678	1000 gal	$0.25	$36,200
Pumping Costs	640,000	kW-h	$0.09	$57,600
Total Annual Cost				**$268,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$603.60
Per 1000 Gallons				$1.85
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$294.37
Per 1000 Gallons				$0.90

Table G-4
Arlington WTP Expansion of 32 MGD

Owner: Arlington
Amount: 18,000 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
WATER TREATMENT FACILITIES				
Water Treatment Plant Expansion	32	MGD		$35,020,000
Engineering and Contingencies	35%			$12,257,000
Subtotal of Water Treatment Plant				**$47,277,000**
Permitting and Mitigation	1%			**$420,000**
CONSTRUCTION TOTAL				**$47,697,000**
Interest During Construction		(24 months)		**$3,895,000**
TOTAL CAPITAL COST				**$51,592,000**
ANNUAL COSTS				
Debt Service				$3,748,100
Operation and Maintenance Costs				
Pipeline				
Pump Station				
Estimated Annual Power Cost				
WTP Operation	5,865,318	1000 gal	$0.65	$3,812,500
Raw Water Cost	5,865,318	1000 gal	$0.62	$3,661,200
TOTAL ANNUAL COSTS				**$11,221,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$623.43
Per 1,000 Gallons				$1.91
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$415.00
Per 1,000 Gallons				$1.27

Table G-5
Bardwell Purchases Water from Ennis

Owner: Bardwell
Amount: 68 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Operation and Maintenance Costs				
Pipeline	1%			$0
Pump Station	2.50%			$0
Estimated Annual Power Cost	$0.09	kW-h		$0
Treated Water Cost	22,158	1000 gal	$ 3.41	$75,600
TOTAL ANNUAL COSTS				**$75,600**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,111.76
Per 1,000 Gallons				$3.41
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,112.00
Per 1,000 Gallons				$3.41

Table G-6
Bardwell Update Supplemental Wells Woodbine Aquifer

Owner:	Bardwell	
Amount:	69	Acre-Feet per Year
Well Depth	1,450	ft
Well Yield	85	gpm
Well Size	6	in
Yield per well	137	Acre-Feet per Year (peak)
Yield per well	68.5	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	1,450	LF	$210	$305,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	30%			$137,000
Subtotal Wells				**$455,000**
Permitting and Mitigation	1%			**$5,000**
CONSTRUCTION TOTAL				**$460,000**
Interest During Construction		(6 months)		**$10,000**
TOTAL CAPITAL COST				**$470,000**
ANNUAL COSTS				
Debt Service				$34,100
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$34,100**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$497.81
Per 1,000 Gallons				$1.53
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-7
Bardwell - New Wells Woodbine Aquifer

Owner:	Bardwell	
Amount:	170	Acre-Feet per Year
Water Depth	481	feet
Well Depth	1,450	feet
Well Yield	85	gpm
Well Size	6	in
Yield per well	137	Acre-Feet per Year (peak)
Yield per well	68.5	Acre-Feet per Year (average)
Wells Needed	3	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Water Wells	4,350	LF	$ 210	$914,000
Connection to Distribution	3		$ 150,000	$450,000
Engineering and Contingencies	30%			$409,000
Subtotal of Wells				**$1,773,000**
WATER TREATMENT FACILITIES				
Water Treatment Plant Expansion	0.30	MGD		$1,230,000
Engineering and Contingencies	35%			$431,000
Subtotal of Water Treatment Plant				**$1,661,000**
Permitting and Mitigation	1%			**$16,000**
CONSTRUCTION TOTAL				**$3,450,000**
Interest During Construction		(6 months)		**$75,000**
TOTAL CAPITAL COST				**$3,525,000**
ANNUAL COSTS				
Debt Service - Total Capital				$256,100
Operation and Maintenance				
Transmission	1%			$5,400
Well(s)	2.5%			$27,400
Add Chemicals, Etc.	55,395	1000 gal	$ 0.45	$24,900
Pumping Costs	124,000	kW-h	$ 0.09	$11,200
TOTAL ANNUAL COSTS				**$ 325,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,911.76
Per 1000 Gallons				$5.87
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$405.29
Per 1000 Gallons				$1.24

Table G-8
Bethany WSC Connection to Keene

Owner: Bethany WSC
Amount: 275 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipelines				
Pipeline 10 in.	21,120	LF	$40	$845,000
ROW Easements	10	Acres	$25,000	$250,000
Engineering and Contingencies (30%)	30%			$329,000
Subtotal of Pipelines				**$1,424,000**
Pumping Facilities				
4 HP Pump Station	1	LS	$480,000	$480,000
0.10 MG Elevated Storage Tank	1	LS	$1,200,000	$1,200,000
Engineering and Contingencies (35%)	35%			$588,000
Subtotal of Pump Stations				**$2,268,000**
Permitting and Mitigation	1%			**$30,000**
CONSTRUCTION TOTAL				**$3,722,000**
Interest During Construction	(18 months)			$230,000
TOTAL CAPITAL COST				**$3,952,000**
ANNUAL COSTS				
Debt Service - Total Capital				$287,100
Operation and Maintenance				
Purchase of water	89,609	1000 gal	$8.53	$764,400
Transmission	1.0%			$10,100
Storage tanks and Pumps	2.5%			$50,400
Pumping Costs	13,355	kW-h	$0.09	$1,200
TOTAL ANNUAL COSTS				**$1,113,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$4,048.00
Per 1000 Gallons				$12.42
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$3,004.00
Per 1000 Gallons				$9.22

Table G-9
Bethany WSC Connection to JCSUD

Owner: Bethany WSC
Amount: 336 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipelines				
Pipeline 10 in.	26,400	LF	$40	$1,056,000
ROW Easements	12	Acres	$25,000	$300,000
Engineering and Contingencies (30%)	30%			$407,000
Subtotal of Pipelines				**$1,763,000**
	`			
Pumping Facilities				
5 HP Pump Station	1	LS	$512,000	$512,000
0.10 MG Elevated Storage Tank	1	LS	$1,200,000	$1,200,000
Engineering and Contingencies (35%)	35%			$599,000
Subtotal of Pump Stations				**$2,311,000**
Permitting and Mitigation	1%			**$33,000**
CONSTRUCTION TOTAL				**$4,107,000**
Interest During Construction		(18 months)		**$253,000**
TOTAL CAPITAL COST				**$4,360,000**
ANNUAL COSTS				
Debt Service - Total Capital				$316,700
Operation and Maintenance				
Purchase of water	109,486	1000 gal	$8.53	$933,900
Transmission	1.0%			$12,700
Storage tanks and Pumps	2.5%			$51,400
Pumping Costs	18,413	kW-h	$0.09	$1,700
TOTAL ANNUAL COSTS				**$1,316,400**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$3,917.86
Per 1000 Gallons				$12.02
UNIT COSTS (After 30 Years)				
Per acre-foot				$2,975.30
Per 1000 gallons				$9.13

Table G-10
Bethesda WSC Connection to Arlington

Owner: Bethesda WSC
Amount: 2,803 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipelines				
Pipeline 20 in.	47,520	LF	$162	$7,698,000
ROW Easements	22	Acres	$60,000	$1,320,000
Engineering and Contingencies (30%)	30%			$2,705,000
Subtotal of Pipelines				**$11,723,000**
Pumping Facilities				
130 HP Pump Station	1	LS	$800,000	$800,000
0.5 MG Elevated Storage Tank	1	LS	$1,240,000	$1,240,000
Engineering and Contingencies (35%)	35%			$714,000
Subtotal of Pump Stations				**$2,754,000**
Permitting and Mitigation	1%			**$117,000**
CONSTRUCTION TOTAL				**$14,594,000**
Interest During Construction		(18 months)		**$900,000**
TOTAL CAPITAL COST				**$15,494,000**
ANNUAL COSTS				
Debt Service - Total Capital				$1,125,600
Operation and Maintenance				
Purchase of treated water	913,360	1000 gal	$2.00	$1,826,700
Transmission	1.00%			$92,400
Storage tanks and Pumps	2.50%			$61,200
Pumping Costs	427,608	kW-h	$0.09	$38,500
TOTAL ANNUAL COSTS				**$3,144,400**
UNIT COSTS (First 30 Years)				
Per acre-foot				$1,121.80
Per 1000 gallons				$3.44
UNIT COSTS (After 30 Years)				
Per acre-foot				$68.53
Per 1000 gallons				$0.21

Table G-11
SWATS Plant Expansion (Total Plant Capacity of 15.5 MGD)

Owner: Brazos River Authority
Amount: 1,401 Ac-Ft/Yr

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
TREATMENT PLANT				
Expand plant by 2.5 mgd	1	LS	$ 5,850,000	$5,850,000
Expand desalination	1	LS	$ 2,625,000	$2,625,000
Engineering and Contingencies	30%			$2,543,000
Subtotal Pump Stations				**$11,018,000**
Permitting and Mitigation	1%			**$102,000**
CONSTRUCTION TOTAL				**$11,120,000**
Interest During Construction		(18 months)		$686,000
TOTAL CAPITAL COST				**$11,806,000**
ANNUAL COSTS				
Debt Service				$857,700
Treatment	456,599	1000 gal	$ 1.15	$525,100
TOTAL ANNUAL COSTS				**$1,382,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$987
Per 1,000 Gallons				$3.03
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$375
Per 1,000 Gallons				$1.15

Table G-12
SWATS Plant Expansion (Total Plant Capacity of 20 MGD)

Owner: Brazos River Authority
Amount: 2,522 Ac-Ft/Yr

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
TREATMENT PLANT				
Expand plant by 4.5 mgd	1	LS	$ 8,813,000	$8,813,000
Expand desalination	1	LS	$ 4,388,000	$4,388,000
Engineering and Contingencies	30%			$3,960,000
Subtotal Pump Stations				**$17,161,000**
Permitting and Mitigation	1%			**$158,000**
CONSTRUCTION TOTAL				**$17,319,000**
Interest During Construction		(18 months)		**$1,068,000**
TOTAL CAPITAL COST				**$18,387,000**
ANNUAL COSTS				
Debt Service				$1,335,800
Treatment	821,878	1000 gal	$ 1.15	$945,200
TOTAL ANNUAL COSTS				**$2,281,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$904
Per 1,000 Gallons				$2.78
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$375
Per 1,000 Gallons				$1.15

Table G-13
Buena Vista- Bethel Conveyance - Phase 1

Amount 280.25 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
Tap Fee	1	EA	$60,000	$60,000
20 PVC Pipe	12,175	FT	$126	$1,534,000
ROW	8.4	AC	$10,000	$84,000
Engineering and Contingencies	30%			$460,000
Subtotal of Pipeline(s)				**$2,138,000**
Pump Station(s)				
Station				
Pump, building, & appurtances	40	HP		$580,000
Land				$38,000
Engineering and Contingencies	35%			$203,000
Subtotal of Pump Station(s)				**$821,000**
Permitting and Mitigation	1%			**$25,000**
CONSTRUCTION TOTAL				**$2,984,000**
Interest During Construction		(24 months)		**$233,000**
TOTAL CAPITAL COST				**$3,217,000**
ANNUAL COSTS				
Debt Service				$233,700
Operation and Maintenance Costs				
Pipeline	1.0%			$18,400
Pump Station	2.5%			$17,400
Estimated Annual Power Cost	40	HP	$0.09	$11,800
Treated Water (First 30 Years)		1000 gal	$2.05	$187,100
Treated Water (After 30 Years)		1000 gal	$1.11	$101,300
TOTAL ANNUAL COSTS (First 30 Years)				**$468,400**
TOTAL ANNUAL COSTS (After 30 Years)				**$148,900**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,671.36
Per 1,000 Gallons				$5.13
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$531.31
Per 1,000 Gallons				$1.63

Table G-14
Buena Vista- Bethel Conveyance - Phase 2

Amount 1,401.25 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
Tap Fee	0	EA	$60,000	$0
20 PVC Pipe	20,900	FT	$126	$2,633,000
ROW	14.4	AC	$10,000	$144,000
Engineering and Contingencies	30%			$790,000
Subtotal of Pipeline(s)				**$3,567,000**
Pump Station(s)				
Station				
Pump, building, & appurtances	100	HP		$690,000
Land				$25,000
Engineering and Contingencies	35%			$242,000
Subtotal of Pump Station(s)				**$957,000**
Permitting and Mitigation	1%			**$40,000**
CONSTRUCTION TOTAL				**$4,564,000**
Interest During Construction		(24 months)		**$357,000**
TOTAL CAPITAL COST				**$4,921,000**
ANNUAL COSTS				
Debt Service				$357,500
Operation and Maintenance Costs				
Pipeline	1.0%			$31,600
Pump Station	2.5%			$20,700
Estimated Annual Power Cost	100	HP	$0.09	$29,400
Treated Water (First 30 Years)		1000 gal	$2.05	$935,300
Treated Water (After 30 Years)		1000 gal	$1.11	$506,400
TOTAL ANNUAL COSTS (First 30 Years)				**$1,374,500**
TOTAL ANNUAL COSTS (After 30 Years)				**$588,100**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$980.91
Per 1,000 Gallons				$3.01
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$419.70
Per 1,000 Gallons				$1.29

Table G-15
Buena Vista-Bethel SUD Additional Trinity Aquifer (Existing Wells)

Owner:	Buena Vista-Bethel SUD	
Amount:	56	Acre-Feet per Year
Water Depth	839	ft
Well Depth	2,579	ft
Well Yield	217	gpm
Well Size	8	in
Yield per well	349	Acre-Feet per Year (peak)
Yield per well	175	Acre-Feet per Year (average)
Wells Needed	0	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	0	LF	$280	$0
Connection to distribution				$0
Engineering and Contingencies	30%			$0
Subtotal Wells				**$0**
Permitting and Mitigation	1%			**$0**
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Add Chemicals	18,248	1000 gal	$0.25	$4,600
Pumping Cost	71,788	kW-h	$0.09	$6,500
TOTAL ANNUAL COST				**$11,100**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$198.21
Per 1,000 Gallons				$0.61
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$198.21
Per 1,000 Gallons				$0.61

Table G-16
Buena Vista-Bethel SUD Update Supplemental Wells Trinity Aquifer

Owner:	Buena Vista-Bethel SUD	
Amount:	460	Acre-Feet per Year
Well Depth	2,585	ft
Well Yield	289	gpm
Well Size	10	in
Yield per well	465	Acre-Feet per Year (peak)
Yield per well	233	Acre-Feet per Year (average)
Wells Needed	2	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	5,170	LF	$370	$1,913,000
Connection to distribution	2	LS	$150,000	$300,000
Engineering and Contingencies	30%			$664,000
Subtotal Wells				**$2,877,000**
Permitting and Mitigation	1%			**$27,000**
CONSTRUCTION TOTAL				**$2,904,000**
Interest During Construction		(6 months)		**$63,000**
TOTAL CAPITAL COST				**$2,967,000**
ANNUAL COSTS				
Debt Service				$215,500
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$215,500**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$468.48
Per 1,000 Gallons				$1.44
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-17
Burleson to Fort Worth (Burleson's Share of Cost to Connect to Fort Worth)

Owner: Burleson

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipelines*				
Pipeline (24 in.)	27,000	LF	$162	$4,374,000
Pipeline (30 in.)	37,800	LF	$200	$7,560,000
ROW Easements	30	Acres	$60,000	$1,800,000
Yard Piping	1	LS	$100,000	$100,000
42" Boring and casing	400	LF	$470	$188,000
48" Boring and casing	200	LF	$540	$108,000
Engineering and Contingencies (30%)	30%			$4,239,000
Subtotal of Pipelines				**$18,369,000**
Pumping Facilities				
3 MGD Pump Station	1	LS	$1,130,000	$1,130,000
1.5 MG Elevated Storage Tank	1	LS	$2,250,000	$2,250,000
Engineering and Contingencies (35%)	35%			$1,183,000
Subtotal of Pump Stations				**$4,563,000**
Permitting and Mitigation	1%			**$184,000**
CONSTRUCTION TOTAL				**$22,932,000**
Interest During Construction		(18 months)		**$1,414,000**
TOTAL CAPITAL COST				**$24,530,000**
Fort Worth's Share (85%)				**$20,851,000**
Burleson's Share (15%)				**$3,679,000**
ANNUAL COSTS FOR BURLESON				
Debt Service (6% for 30 years)				$267,300
Operation & Maintenance				$31,700
TOTAL ANNUAL COSTS				**$299,000**

Notes:
* Pipeline and storage tank information and costs based on information provided in Fort Worth Master Plan.

Table G-18
Cedar Hill Update Supplemental Wells Trinity Aquifer

Owner:	Cedar Hill	
Amount:	315	Acre-Feet per Year
Well Depth	2,499	ft
Well Yield	393	gpm
Well Size	10	in
Yield per well	633	Acre-Feet per Year (peak)
Yield per well	317	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	2,499	LF	$370	$925,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	0			$323,000
Subtotal Wells				**$1,398,000**
Permitting and Mitigation	1%			**$13,000**
CONSTRUCTION TOTAL				**$1,411,000**
Interest During Construction		(6 months)		**$31,000**
TOTAL CAPITAL COST				**$1,442,000**
ANNUAL COSTS				
Debt Service				$104,800
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$104,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$332.70
Per 1,000 Gallons				$1.02
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-19
City of Cleburne's Lake Whitney Diversion of 1.9 MGD (2015)
(Source: 2008 Brazos G Water Plan Amendment)

Owner: City of Cleburne
Amount: 2,129 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
1. Deep Water Intake	Platform Design			$11,750,000
2. Raw Water Pump Station	4.2	MGD	4,700 ac.ft./yr.	Included in Item #1
3. Electrical Service	1,000	Hp	LS	$1,750,000
4. Feed Tank	0.5	MG		$300,000
5. Pre-Treatment – MF/UF	1.75	MGD		$1,750,000
6. Transfer Tank	0.5	MG		$300,000
7. Desalination Treatment – RO	1.75	MGD		$2,500,000
8. Transfer Tank	0.5	MG		$300,000
9. Chemical Facilities and Administration	1.9	MGD		$225,000
10. Transfer Pumps	1.9	MGD		$475,000
11. Concentrate Disposal	0.5	MGD		
Brine Concentrator			LS	$1,750,000
Disposal Well			LS	$1,750,000
12. Transmission Pipeline (18 in)	8	Mi	$95/ft	$4,013,000
13. Meters and Connections		LS		$50,000
14. Land Acquisition	10	Acres	$25,000	$250,000
15. Easements	30 ft. wide		$0.21660/SF	$274,000
16. Permitting				$955,000
Sub-Total				*$28,392,000*
17. Engineering, Legal and Contingencies	30%			$8,518,000
TOTAL CAPITAL COST				**$36,910,000**
ANNUAL COST				
Debt Service (5.50 percent, 20 years)				$3,088,600
Raw Water Purchase (20 year present worth)				$271,400
Operation and Maintenance				
Pump Station & Transmission				$415,300
Water Treatment				$1,416,700
Brine Disposal				$198,300
Pumping				$45,500
TOTAL ANNUAL COSTS				**$5,435,800**
UNIT COST				
Per Acre-Foot. Phase I				$2,553.22
Per 1000 Gallons Phase I				$7.84
UNIT COST (After Bonds Are Paid)				
Per Acre-Foot. Phase I				$1,102.49
Per 1000 Gallons Phase I				$3.38

Table G-20
City of Cleburne's 5 MGD Water Treatment Water Plant Expansion
(Source: 2008 Brazos G Water Plan Amendment)

Owner: City of Cleburne
Amount: 2,803 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
1. Water Treatment Plant Expansion	5	MGD	LS	$8,000,000
2. Improvements to Sludge Handling	5	MGD	LS	$750,000
3. Miscellaneous Improvements & Pumping			LS	$500,000
Sub-Total				*$9,250,000*
Engineering, Legal & Contingencies			30%	$2,775,000
TOTAL CAPITAL COST				**$12,025,000**
ANNUAL COST				
Debt Service				$1,006,200
Water Treatment	912,500	1,000 gal	$0.65	$593,100
TOTAL ANNUAL COSTS				**$1,599,300**
UNIT COST				
Per Acre-Ft. Expansion				$570.67
Per 1000 Gallons Expansion				$1.75
UNIT COST (After Bonds Are Paid)				
Per Acre-Ft. Expansion				$211.63
Per 1000 Gallons Expansion				$0.65

Table G-21
City of Cleburne's New West Loop Reuse Pipeline
(Source: 2008 Brazos G Water Plan Amendment)

Owner: City of Cleburne
Amount: 3,027 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	2007 Cost
CAPITAL COST				
New 16" reuse pipeline	56,505		$95	$5,368,000
Pump Station – Installed	1		$450,000	$450,000
Meter	1		$50,000	$50,000
Storage Tank – standpipe	1		$400,000	$400,000
Easements	30' Wide		$7	$339,030
Sub-Total				*$6,607,000*
Engineering & Contingencies	30%			$1,982,000
TOTAL CAPITAL COST				**$8,589,000**
ANNUAL COSTS				
Debt Service				$718,700
Operation and Maintenance				
Pipelines				$64,400
Storage Tanks and Pump Stations				$13,500
Energy Cost	1,307,000		$0.09	$117,600
TOTAL ANNUAL COSTS				**$914,200**
UNIT COST				
Per Acre-Foot				$302.05
Per 1000 Gallons				$0.93
UNIT COST (After Bonds Are Paid)				
Per Acre-Foot				$64.59
Per 1000 Gallons				$0.20

Table G-22
City of Cleburne's 1.9 MGD Water Treatment Plant Expansion and Pipeline (2020)

Owner: City of Cleburne
Amount: 2,129 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	2007 Cost
CAPITAL COST				
Water Treatment Plant Expansion				
1. Pre-Treatment – MF/UF	1.75	MGD		$1,750,000
2. Desalination Treatment – RO	1.75	MGD		$2,500,000
3. Chemical Facilities and Administration	1.9	MGD		$225,000
4. Transfer Pumps	1.9	MGD		$475,000
5. Concentrate Disposal	0.5	MGD		$2,500,000
6. Transmission Pipeline (18 in)	20	Mi	$95/ft	$10,032,000
7. Easements	30 ft. wide		$0.21660/SF	$686,000
Sub-Total				*$18,168,000*
8. Engineering, Legal and Contingencies	30%			$5,450,000
TOTAL CAPITAL COST				**$23,618,000**
ANNUAL COST				
Debt Service (5.5 percent, 20 years)				$1,976,300
Raw Water Purchase (20 year present worth)				$271,000
Operation and Maintenance				
Pump Station & Transmission				$415,300
Water Treatment				$1,416,700
Brine Disposal				$198,300
Pumping				$45,500
TOTAL ANNUAL COSTS				**$4,323,100**
UNIT COST				
Per Acre-Foot. Phase II				$2,030.58
Per 1000 Gallons Phase II				$6.23
UNIT COST (After Bonds Are Paid)				
Per Acre-Foot. Phase II				$1,102.30
Per 1000 Gallons Phase II				$3.38

Table G-23
Community Water Co. Additional Water from Ennis

Owner: Community Water Co.
Amount: 67 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Operation and Maintenance Costs				
Pipeline	1%			$0
Pump Station	2.50%			$0
Estimated Annual Power Cost	$0.09	kW-h		$0
Treated Water Cost	21,832	1000 gal	$ 3.41	$74,000
TOTAL ANNUAL COSTS				**$74,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,104.48
Per 1,000 Gallons				$3.39
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,104.00
Per 1,000 Gallons				$3.39

Table G-24
Ennis WWTP Indirect Reuse

Owner: Ennis
Indirect Reuse Amount: 3,696 Ac-Ft/Yr current contract

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
20" Reclaimed Water Line				
Pipe	32,855	FT	$84	$2,760,000
ROW	15	AC	$25,000	$377,000
20" Raw Water Line				
Pipe	4,752	FT	$84	$399,000
ROW	2	AC	$25,000	$55,000
Engineering and Contingencies	30%			$948,000
Subtotal of Pipeline(s)				**$4,539,000**
Pump Station(s)				
Station 1	65	HP		$627,000
Station 2	200	HP		$1,380,000
Engineering and Contingencies	35%			$702,000
Subtotal of Pump Station(s)				**$2,709,000**
WATER TREATMENT FACILITIES				
Water Treatment Plant Expansion				
Water Treatment Plant Expansion	6.00	MGD		$12,100,000
Advanced Wastewater Treatment	4.00	MGD		$3,925,000
Engineering and Contingencies	35%			$5,609,000
Subtotal of Wastewater Treatment Plant				**$21,634,000**
Permitting and Mitigation	1%			**$207,000**
CONSTRUCTION TOTAL				**$29,089,000**
Interest During Construction		(18 months)		**$1,794,000**
TOTAL CAPITAL COST				**$30,883,000**
ANNUAL COSTS				
Debt Service				$2,243,600
Operation and Maintenance Costs				
Pipeline	1.00%			$37,900
Pump Station	2.50%			$60,200
RO Operation	1,204,345	1000 gal	$1.15	$1,385,000
WTP Operation	1,204,345	1000 gal	$0.65	$782,800
Estimated Annual Power Cost	615,000	kW-H	$0.09	$55,400
Raw Water Cost	1,204,345	1000 gal	$0.66	$795,100
TOTAL ANNUAL COSTS				**$ 5,360,000**
Table G-24, Continued				
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,450.22
Per 1,000 Gallons				$4.45
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$843.00
Per 1,000 Gallons				$2.59

Assume no raw water cost.

Table G-25
Ennis Water Treatment Plant Expansion in 2020

Owner: Ennis
Amount: 1,682 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WATER TREATMENT FACILITIES				
Water Treatment Plant	3	MGD		$6,900,000
Engineering and Contingencies	35%			$2,415,000
Subtotal of Water Treatment Plant				**$9,315,000**
Permitting and Mitigation	1%			**$14,000**
CONSTRUCTION TOTAL				**$9,329,000**
Interest During Construction		(24 months)		**$762,000**
TOTAL CAPITAL COST				**$ 10,091,000**
ANNUAL COSTS				
Debt Service				$733,100
Operation and Maintenance Costs				
Raw Water Cost		1000 gal	$ 0.66	$361,400
WTP Operation		1000 gal	$ 0.65	$355,900
TOTAL ANNUAL COSTS				**$1,450,400**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$862.56
Per 1,000 Gallons				$2.65
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$426.58
Per 1,000 Gallons				$1.31

Table G-26
Ennis Water Treatment Plant Expansion in 2030

Owner: Ennis
Amount: 1,682 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WATER TREATMENT FACILITIES				
Water Treatment Plant	3	MGD		$6,900,000
Engineering and Contingencies	35%			$2,415,000
Subtotal of Water Treatment Plant				**$9,315,000**
Permitting and Mitigation	1%			**$14,000**
CONSTRUCTION TOTAL				**$9,329,000**
Interest During Construction		(24 months)		**$762,000**
TOTAL CAPITAL COST				**$ 10,091,000**
ANNUAL COSTS				
Debt Service				$733,100
Operation and Maintenance Costs				
Raw Water Cost		1000 gal	$ 0.66	$361,400
WTP Operation		1000 gal	$ 0.65	$355,900
TOTAL ANNUAL COSTS				**$1,450,400**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$862.56
Per 1,000 Gallons				$2.65
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$426.58
Per 1,000 Gallons				$1.31

Table G-27
Ferris Update Supplemental Wells Woodbine Aquifer

Owner:	Ferris	
Amount:	173	Acre-Feet per Year
Well Depth	1,442	ft
Well Yield	215	gpm
Well Size	8	in
Yield per well	346	Acre-Feet per Year (peak)
Yield per well	173	Acre-Feet per Year (average)
Wells Needed	1	

Item No. & Description	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	1,442	LF	$280	$404,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	30%			$166,000
Subtotal Wells				**$720,000**
Permitting and Mitigation	1%			**$7,000**
CONSTRUCTION TOTAL				**$727,000**
Interest During Construction		(6 months)		**$16,000**
TOTAL CAPITAL COST				**$743,000**
ANNUAL COSTS				
Debt Service				$54,000
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$54,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$312.14
Per 1,000 Gallons				$0.96
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-28
South Ellis County Supply Line - Phase 1
Buildout Transmission with Pump Station for Files Valley WSC, Italy, Maypearl, and Ellis County Other

Owner: Files Valley WSC, Italy, Maypearl, and Ellis County Other
Amount 1,682 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION FACILITIES				
Pipelines				
Tap Fee	1	EA	$60,000	$60,000
12 PVC Water Line				
Pipe	51,000	EA	$72	$3,672,000
14 PVC Water Line				
Pipe	18,000	FT	$84	$1,512,000
16 PVC Water Line				
Pipe	4,000	FT	$96	$384,000
18 PVC Water Line				
Pipe	0	FT	$108	$0
ROW	51	AC	$10,000	$510,000
Engineering and Contingencies	30%			$1,670,000
Subtotal of Pipeline(s)				**$7,808,000**
Pump Station(s)				
Pump, building, & appurtances	5	MGD		$ 1,250,000
Engineering and Contingencies	35%			$438,000
Subtotal of Pump Station(s)				**$1,688,000**
Permitting and Mitigation	1%			**$82,000**
CONSTRUCTION TOTAL				**$9,578,000**
Interest During Construction		(24 months)		**$749,000**
TOTAL CAPITAL COST				**$10,327,000**
ANNUAL COSTS				
Debt Service				$750,200
Operation and Maintenance Costs				
Pipeline	1.0%			$66,800
Pump Station	2.5%			$37,500
Annual Power Cost	300	HP	$ 0.09	$ 88,200
Treated Water (First 30 Years)		1000 gal	$2.05	$1,122,700
Treated Water (After 30 Years)		1000 gal	$1.11	$607,900
TOTAL ANNUAL COSTS (First 30 Years)				**$2,065,400**
TOTAL ANNUAL COSTS (After 30 Years)				**$800,400**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,227.94
Per 1,000 Gallons				$3.77
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$475.86
Per 1,000 Gallons				$1.46

Table G-29
South Ellis County Supply Line - Phase 2 (after 2030)
Buildout Transmission with Pump Station for Files Valley WSC, Italy, Maypearl, and Ellis County Other

Owner: Files Valley WSC, Italy, Maypearl, and Ellis County Other
Amount 1,289 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION FACILITIES				
Pipelines				
Tap Fee	0	EA	$60,000	$0
12 PVC Water Line				
Pipe	0	EA	$72	$0
14 PVC Water Line				
Pipe	51,000	FT	$84	$4,284,000
16 PVC Water Line				
Pipe	18,000	FT	$96	$1,728,000
18 PVC Water Line				
Pipe	4,000	FT	$108	$432,000
ROW	0	AC	$10,000	$0
Engineering and Contingencies	30%			$1,933,000
Subtotal of Pipeline(s)				**$8,377,000**
Pump Station(s)				
Pump, building, & appurtances	7	MGD		$ 1,750,000
Engineering and Contingencies	35%			$613,000
Subtotal of Pump Station(s)				**$2,363,000**
Permitting and Mitigation	1%			**$98,000**
CONSTRUCTION TOTAL				**$10,838,000**
Interest During Construction		(24 months)		**$847,000**
TOTAL CAPITAL COST				**$11,685,000**
ANNUAL COSTS				
Debt Service				$848,900
Operation and Maintenance Costs				
Pipeline	1.0%			$77,300
Pump Station	2.5%			$52,500
Annual Power Cost	400	HP	$ 0.09	$ 117,600
Treated Water (First 30 Years)		1000 gal	$2.05	$860,400
Treated Water (After 30 Years)		1000 gal	$1.11	$465,900
TOTAL ANNUAL COSTS (First 30 Years)				**$1,956,700**
TOTAL ANNUAL COSTS (After 30 Years)				**$713,300**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,518.00
Per 1,000 Gallons				$4.66
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$553.37
Per 1,000 Gallons				$1.70

Table G-30
Glenn Heights Update Supplemental Wells Trinity Aquifer

Owner:	Glenn Heights	
Amount:	260	Acre-Feet per Year
Well Depth	1,066	ft
Well Yield	65	gpm
Well Size	6	in
Yield per well	105	Acre-Feet per Year (peak)
Yield per well	53	Acre-Feet per Year (average)
Wells Needed	5	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	5,330	LF	$210	$1,119,000
Connection to distribution	5	LS	$150,000	$750,000
Engineering and Contingencies	30%			$561,000
Subtotal Wells				**$2,430,000**
Permitting and Mitigation	1%			**$22,000**
CONSTRUCTION TOTAL				**$2,452,000**
Interest During Construction		(6 months)		**$53,000**
TOTAL CAPITAL COST				**$2,505,000**
ANNUAL COSTS				
Debt Service				$182,000
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$182,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$700.00
Per 1,000 Gallons				$2.15
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-31
Glenn Heights Additional Water from Dallas

Owner: Glenn Heights
Amount: 1,161 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Operation and Maintenance Costs				
Pipeline	1.0%			$0
Pump Station	2.5%			$0
Estimated Annual Power Cost				$0
Treated Water Flat Rate	378,218	1000 gal	$1.36	$514,500
TOTAL ANNUAL COSTS				**$514,500**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$443.26
Per 1,000 Gallons				$1.36
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$443.00
Per 1,000 Gallons				$1.36

Table G-32
Godley Purchase Water Treatment Capacity from Johnson County SUD

Owner: Godley
Amount: 224 Ac-Ft/Yr

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
8" Water Line				
Pipe	55,440	FT	$ 32	$1,774,000
ROW	25	AC	$ 10,000	$255,000
Engineering and Contingencies	30%			$532,000
Subtotal of Pipeline(s)				**$2,561,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	14	hp		$510,000
Storage Tank	0.04	MG		$110,000
Engineering and Contingencies	35%			$217,000
Subtotal of Pump Station(s)				**$837,000**
Permitting and Mitigation	1%			**$29,000**
CONSTRUCTION TOTAL				**$3,427,000**
Interest During Construction		(18 months)		**$211,000**
TOTAL CAPITAL COST				**$3,638,000**
ANNUAL COSTS				
Debt Service				$264,300
Operation and Maintenance Costs				
Pipeline	1%			$21,000
Pump Station	2.50%			$19,000
Estimated Annual Power Cost	51,896	kW-H	$ 0.09	$4,700
Treated Water Cost	72,991	1000 gal	$ 7.00	$510,900
TOTAL ANNUAL COSTS				**$819,900**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$3,660
Per 1,000 Gallons				$11.23
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$2,480
Per 1,000 Gallons				$7.61

Table G-33
Grand Prairie Connection to Johnson County SUD

Owner:	Grand Prairie	
Amount (JCSUD to Grand Prairie, 2010):	3,363	Acre-Feet per Year
Amount (Grand Prairie to JCSUD, 2020, 2030)	6,726	Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION				
Transmission Pipeline (30 in)	73,920	LF	$200	$14,784,000
Right of way	34	ACRES	$60,000	$2,036,000
Engineering and Contingencies	30%			$4,435,000
Subtotal pipelines				**$21,255,000**
PUMP STATION (JCSUD to Grand Prairie)				
Pump Station (6.0 mgd, 70 HP)	1	LS	$636,000	$636,000
Ground Storage Tank (1 MG)	1	LS	$590,000	$590,000
Engineering and Contingencies	35%			$429,000
Subtotal Pump Stations				**$1,655,000**
PUMP STATION (Grand Prairie to JCSUD)				
Pump Station - (12 mgd, 1,000 HP)	1	LS	$2,670,000	$2,670,000
Elevated Storage Tank (0.75 MG)	2	LS	$1,430,000	$2,860,000
Ground Storage Tank (1 MG)	1	LS	$590,000	$590,000
Metering Station	1	LS	$40,000	$40,000
Engineering and Contingencies	35%			$2,156,000
Subtotal Pump Stations				**$8,316,000**
Permitting and Mitigation	1.0%			**$181,000**
CONSTRUCTION TOTAL				**$31,407,000**
Interest During Construction		(12 months)		**$1,309,000**
TOTAL CAPITAL COST				**$32,716,000**
ANNUAL COSTS				
Debt Service				$2,376,800
Operation and Maintenance Costs				
Pipeline	1.0%		$14,784,000	$147,800
Pump Station	2.5%		$7,386,000	$184,700
Estimated Annual Power Cost	2,426,255	kW-H	$0.09	$218,400
Treated Water Cost	2,191,674	1000 gal	$2.00	$4,383,300
TOTAL ANNUAL COSTS				**$7,311,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$2,173.95
Per 1,000 Gallons				$6.67
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,467.20
Per 1,000 Gallons				$4.50

Table G-34
Grand Prairie Connection to Midlothian

Owner: Grand Prairie
Amount: 5,044 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST (Phase 1)				
TRANSMISSION (Phase 1, 2010)				
Transmission Pipeline (24 in)	21,120	LF	$162	$3,421,000
Right of way	10	ACRES	$60,000	$582,000
Engineering and Contingencies	0			$1,026,000
Subtotal pipelines				**$5,029,000**
PUMP STATION (Phase 1, 2010)				
Pump Station (4.5 mgd, 21 HP)	1	LS	$530,000	$530,000
Ground Storage Tank (2 MG)	1	LS	$890,000	$890,000
Engineering and Contingencies	0			$497,000
Subtotal Pump Stations				**$1,917,000**
Permitting and Mitigation	1%			**$58,000**
CONSTRUCTION TOTAL (Phase 1)				**$7,004,000**
Interest During Construction		(12 months)		**$292,000**
TOTAL CAPITAL COST (Phase 1)				**$7,296,000**
ANNUAL COSTS (Phase 1)				
Debt Service				$530,000
Operation and Maintenance Costs				
Pipeline	0		$4,105,200	$41,100
Pump Station	0		$1,704,000	$42,600
Estimated Annual Power Cost	189,260	kW-H	$0.09	$17,000
Treated Water Cost	1,643,592	1000 gal	$4.20	$6,903,100
TOTAL ANNUAL COSTS				**$7,533,800**
PHASE 1 UNIT COSTS (First 30 Years)				
Per Acre-Foot				$2,987
Per 1,000 Gallons				$9.17
PHASE 1 UNIT COSTS (After 30 Years)				
Per Acre-Foot				$2,777
Per 1,000 Gallons				$8.52

Table G-34, Continued

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST (Phase 2)				
PUMP STATION (Phase 2, 2020)				
Pump Station (4.5 mgd, 21 HP)	1	LS	$530,000	$530,000
Ground Storage Tank (2 MG)	1	LS	$890,000	$890,000
Engineering and Contingencies	35%			$497,000
Subtotal Pump Stations				**$1,917,000**
CONSTRUCTION TOTAL (Phase 2)				**$1,917,000**
Interest During Construction		12 months		$80,000
TOTAL CAPITAL COST (Phase 2)				**$1,997,000**
ANNUAL COSTS (Phase 2)				
Debt Service				$145,000
Operation and Maintenance Costs				
Pump Station	$0		$1,704,000	$43,000
Estimated Annual Power Cost	378,520	kW-H	$0.09	$34,000
Raw Water Cost	821,796	1000 gal	$4.20	$3,452,000
TOTAL ANNUAL COSTS				**$3,674,000**
PHASE 2 UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,456.78
Per 1,000 Gallons				$4.47
PHASE 2 UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,399.29
Per 1,000 Gallons				$4.29

Table G-35
Grand Prairie Connection to Mansfield (TRWD Sources)

Owner: Grand Prairie
Amount: 6,726 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION				
Transmission Pipeline (36 in)	47,520	LF	$257	$12,213,000
Right of way	22	ACRES	$60,000	$1,309,000
Engineering and Contingencies	0			$3,664,000
Subtotal pipelines				**$17,186,000**
Permitting and mitigation	1%			**$122,000**
CONSTRUCTION TOTAL				**$17,308,000**
Interest During Construction		(12 months)		**$721,000**
TOTAL CAPITAL COST				**$18,029,000**
ANNUAL COSTS				
Debt Service				$1,309,800
Operation and Maintenance Costs				
Pipeline	0		$12,213,000	$122,100
Treated Water Cost	2,191,674	1000 gal	$2	$4,383,300
TOTAL ANNUAL COSTS				**$5,815,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$864.59
Per 1,000 Gallons				$2.65
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$669.85
Per 1,000 Gallons				$2.06

Table G-36
Grand Prairie Connection to Additional Mansfield (6 mgd peak)

Owner: Grand Prairie
Amount: 3,363 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION				
Transmission Pipeline (30 in)	10,560	LF	$200	$2,112,000
Right of way	5	ACRES	$60,000	$291,000
Engineering and Contingencies	30%			$634,000
Subtotal pipelines				**$3,037,000**
PUMP STATIONS				
Pump Station (6 mgd, 35 HP)	2	LS	$570,000	$1,140,000
Ground Storage Tank (3 MG)	2	LS	$1,130,000	$2,260,000
Engineering and Contingencies	35%			$1,190,000
Subtotal Pump Stations				**$4,590,000**
Permitting and Mitigation	1%			**$66,000**
CONSTRUCTION TOTAL				**$7,693,000**
Interest During Construction		(12 months)		**$321,000**
TOTAL CAPITAL COST				**$8,014,000**
ANNUAL COSTS				
Debt Service				$582,200
Operation and Maintenance Costs				
Pipeline	1.0%		$2,534,400	$25,300
Pump Station	2.5%		$4,080,000	$102,000
Estimated Annual Power Cost	97,980	kW-H	$0.09	$8,800
Treated Water Cost	1,095,837	1000 gal	$2.00	$2,191,700
TOTAL ANNUAL COSTS				**$2,910,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$865.30
Per 1,000 Gallons				$2.66
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$692.18
Per 1,000 Gallons				$2.12

Table G-37
Grand Prairie Connection to Arlington

Owner: Grand Prairie
Amount: 2,242 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION				
Transmission Pipeline (24 in)	2,500	LF	$162	$405,000
Right of way	1	ACRES	$60,000	$69,000
Engineering and Contingencies	30%			$122,000
Subtotal pipelines				**$596,000**
PUMP STATIONS				
Pump Station (4.0 mgd, 11 HP)	1	LS	$503,000	$503,000
Ground Storage Tank (2 MG)	1	LS	$890,000	$890,000
Whole sale flow meter	1	LS	$50,000	$50,000
Engineering and Contingencies	35%			$505,000
Subtotal Pump Stations				**$1,948,000**
Permitting and Mitigation	1%			**$22,000**
CONSTRUCTION TOTAL				**$2,566,000**
Interest During Construction		12 months		**$107,000**
TOTAL CAPITAL COST				**$2,673,000**
ANNUAL COSTS				
Debt Service				$194,200
Operation and Maintenance Costs				
Pipeline	1.0%		$486,000	$4,900
Pump Station	2.5%		$1,731,600	$43,300
Estimated Annual Power Cost	63,897	kW-H	$0.09	$5,800
Treated Water Cost	730,558	1000 gal	$2.00	$1,461,100
TOTAL ANNUAL COSTS				**$1,709,300**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$762.40
Per 1,000 Gallons				$2.34
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$675.78
Per 1,000 Gallons				$2.07

Table G-38
Grand Prairie Connection to Cedar Hill

Owner: Grand Prairie
Amount: 3,363 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION				
Transmission Pipeline (24 in)	5,280	LF	$162	$855,000
Right of way	2	ACRES	$60,000	$145,000
Engineering and Contingencies	30%			$257,000
Subtotal pipelines				**$1,257,000**
PUMP STATIONS				
Pump Station (2.0 mgd, 5 HP)	1	LS	$480,000	$480,000
Pump Station Expansion (to 6 mgd)	1	LS	$480,000	$480,000
Ground Storage Tank (3 MG)	1	LS	$1,130,000	$1,130,000
Engineering and Contingencies	35%			$732,000
Subtotal Pump Stations				**$2,822,000**
Permitting and Mitigation	1%			**$35,000**
CONSTRUCTION TOTAL				**$4,114,000**
Interest During Construction		(12 months)		**$171,000**
TOTAL CAPITAL COST				**$4,285,000**
ANNUAL COSTS				
Debt Service				$311,300
Operation and Maintenance Costs				
Pipeline	1.0%		$1,026,000	$10,300
Pump Station	2.5%		$2,508,000	$62,700
Estimated Annual Power Cost	23,660	kW-H	$0.09	$2,100
Treated Water Cost	1,095,837	1000 gal	$2.00	$2,191,700
TOTAL ANNUAL COSTS				**$2,578,100**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$766.61
Per 1,000 Gallons				$2.35
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$674.04
Per 1,000 Gallons				$2.07

Table G-39
Grand Prairie Update Supplemental Wells Trinity Aquifer

Owner:	Grand Prairie	
Amount:	3,381	Acre-Feet per Year
Well Depth	2,100	ft
Well Yield	700	gpm
Well Size	16	in
Yield per well	1,127	Acre-Feet per Year (peak)
Yield per well	564	Acre-Feet per Year (average)
Wells Needed	6	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
WELLS				
Groundwater wells	12,600	LF	$560	$7,056,000
Connection to distribution	6	LS	$150,000	$900,000
Engineering and Contingencies	30%			$2,387,000
Subtotal Wells				**$10,343,000**
Permitting and Mitigation	1%			**$95,000**
CONSTRUCTION TOTAL				**$10,438,000**
Interest During Construction		(6 months)		**$226,000**
TOTAL CAPITAL COST				**$10,664,000**
ANNUAL COSTS				
Debt Service				$774,700
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$774,700**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$229.13
Per 1,000 Gallons				$0.70
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-40
Grandview Purchase BRA Supply Through Johnson County SUD

Owner: Grandview
Amount: 212 Ac-Ft/Yr

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
8" Water Line				
Pipe	55,440	FT	$32	$1,774,000
ROW	19	AC	$10,000	$191,000
Engineering and Contingencies	30%			$532,000
Subtotal of Pipeline(s)				**$2,497,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	19	hp		$525,000
Storage Tank	0.05	MG		$116,000
Engineering and Contingencies	35%			$224,000
Subtotal of Pump Station(s)				**$865,000**
Permitting and Mitigation	1%			**$29,000**
CONSTRUCTION TOTAL				**$3,391,000**
Interest During Construction		(18 months)		**$209,000**
TOTAL CAPITAL COST				**$3,600,000**
ANNUAL COSTS				
Debt Service				$261,500
Operation and Maintenance Costs				
Pipeline	1%			$21,000
Pump Station	2.50%			$19,000
Estimated Annual Power Cost	74,275	kW-H	$0.09	$6,700
Treated Water Cost	69,080	1000 gal	$7.00	$483,600
TOTAL ANNUAL COSTS				**$791,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$3,735
Per 1,000 Gallons				$11.46
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$2,501
Per 1,000 Gallons				$7.68

Table G-41
Pipeline from BRA SWATS to JCSUD
For Grandview, Rio Vista, and Parker WSC

Owner:	Grandview, Rio Vista, Parker WSC
Total Amount:	**462 Ac-Ft/Yr**
Grandview	212 Ac-Ft/Yr
Rio Vista	69 Ac-Ft/Yr
Parker WSC	181 Ac-Ft/Yr

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
12" Water Line				
Pipe	101,000	FT	$48	$4,848,000
ROW	46	AC	$10,000	$464,000
Engineering and Contingencies	30%			$1,454,000
Subtotal of Pipeline(s)				**$6,766,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtenances	36	hp		$600,000
Storage Tank	0.10	MG		$145,000
Engineering and Contingencies	35%			$261,000
Subtotal of Pump Station(s)				**$1,006,000**
Permitting and Mitigation	1%			**$67,000**
CONSTRUCTION TOTAL				**$7,839,000**
Interest During Construction		(18 months)		**$483,000**
TOTAL CAPITAL COST				**$8,322,000**
ANNUAL COSTS				
Debt Service				$604,600
Operation and Maintenance Costs				
Pipeline	1%			$58,000
Pump Station	2.50%			$22,000
Estimated Annual Power Cost	137,874	kW-H	$0.09	$12,400
TOTAL ANNUAL COSTS				**$697,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,509
Per 1,000 Gallons				$4.63
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$200
Per 1,000 Gallons				$0.61

Table G-41, Continued

Item	Quantity	Units	Unit Cost	Total Cost
COSTS BY ENTITY				
GRANDVIEW				
Total Capital Cost				**$3,819,000**
Total Annual Costs				**$320,000**
RIO VISTA				
Total Capital Cost				**$1,243,000**
Total Annual Costs				**$104,000**
PARKER WSC				
Total Capital Cost				**$3,260,000**
Total Annual Costs				**$273,000**

Table G-42
Italy New Wells Woodbine Aquifer

Owner:	Italy	
Amount:	249	Acre-Feet per Year
Water Depth	317	ft
Well Depth	908	ft
Well Yield	201	gpm
Well Size	8	in
Yield per well	324	Acre-Feet per Year (peak)
Yield per well	162	Acre-Feet per Year (average)
Wells Needed	2	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Water Wells	1,816	LF	$280	$508,000
Connection to Distribution	2		$150,000	$300,000
Engineering and Contingencies	30%			$242,000
Subtotal of Well(s)				**$1,050,000**
Permitting and mitigation	1%			$10,000
CONSTRUCTION TOTAL				**$1,060,000**
Interest During Construction		(6 months)		**$23,000**
TOTAL CAPITAL COST				**$1,083,000**
ANNUAL COSTS				
Debt Service - Total Capital				$78,700
Operation and Maintenance				
Transmission	1.0%			$3,600
Well(s)	2.5%			$15,200
Chlorination	81,137	1000 gal	$0.25	$20,300
Pumping Costs	131,000	kW-h	$0.09	$11,800
TOTAL ANNUAL COSTS				**$129,600**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$520.48
Per 1000 Gallons				$1.60
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$204.42
Per 1000 Gallons				$0.63

Table G-43
Italy Update Supplemental Wells Woodbine Aquifer

Owner:	Italy	
Amount:	100	Acre-Feet per Year
Well Depth	910	ft
Well Yield	135	gpm
Well Size	8	in
Yield per well	217	Acre-Feet per Year (peak)
Yield per well	109	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	910	LF	$280	$255,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	0			$122,000
Subtotal Wells				**$405,000**
Permitting and Mitigation	1%			**$5,000**
CONSTRUCTION TOTAL				**$410,000**
Interest During Construction		(6 months)		**$9,000**
TOTAL CAPITAL COST				**$419,000**
ANNUAL COSTS				
Debt Service				$30,400
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$30,400**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$304.00
Per 1,000 Gallons				$0.93
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-44
Italy Update Supplemental Wells Trinity Aquifer

Owner:	Italy	
Amount:	150	Acre-Feet per Year
Well Depth	2,807	ft
Well Yield	188	gpm
Well Size	8	in
Yield per well	303	Acre-Feet per Year (peak)
Yield per well	152	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	2,807	LF	$280	$786,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	30%			$281,000
Subtotal Wells				**$936,000**
Permitting and Mitigation	1%			**$11,000**
CONSTRUCTION TOTAL				**$947,000**
Interest During Construction		(6 months)		**$21,000**
TOTAL CAPITAL COST				**$968,000**
ANNUAL COSTS				
Debt Service				$70,300
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$70,300**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$468.67
Per 1,000 Gallons				$1.44
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-45

Johnson County SUD Connection to Mansfield

Owner: Johnson County SUD

Amount: 6,726 Ac-Ft/Yr

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION				
Transmission Pipeline (24 in)	68,640	LF	$162	$11,120,000
Right of way	31.52	ACRES	$60,000	$1,891,000
Engineering and Contingencies	30%			$3,336,000
Subtotal pipelines				**$16,347,000**
PUMP STATIONS				
Pump Station (6.0 mgd)	1	LS	$2,500,000	$2,500,000
Pump Station Expansion (to 12 mgd)	1	LS	$1,000,000	$1,000,000
Ground Storage Tank (3 MG)	1	LS	$1,130,000	$1,130,000
Ground Storage Tank (2 MG)	1	LS	$890,000	$890,000
Engineering and Contingencies	35%			$1,932,000
Subtotal Pump Stations				**$7,452,000**
Permitting and Mitigation	1%			**$200,000**
CONSTRUCTION TOTAL				**$23,999,000**
Interest During Construction		(12 months)		**$1,000,000**
TOTAL CAPITAL COST				**$ 24,999,000**
ANNUAL COSTS				
Debt Service				$1,816,200
Operation and Maintenance Costs				
Pipeline	1%		$ 13,344,000	$133,400
Pump Station	2.50%		$ 6,624,000	$165,600
Estimated Annual Power Cost	1,247,018	kW-H	$ 0.09	$112,200
Treated Water Cost	2,191,674	1000 gal	$ 2.00	$4,383,300
TOTAL ANNUAL COSTS				**$6,610,700**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$982.86
Per 1,000 Gallons				$3.02
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$712.83
Per 1,000 Gallons				$2.19

Note: JCSUD plans to operate for baseload rather than peaking. Needs revision with new transmission pipeline distance. Anticipate costs to double.

Table G-46
Kennedale Update Supplemental Wells Trinity Aquifer

Owner:	Kennedale	
Amount:	1,160	Acre-Feet per Year
Well Depth	1,500	ft
Well Yield	360	gpm
Well Size	10	in
Yield per well	580	Acre-Feet per Year (peak)
Yield per well	290	Acre-Feet per Year (average)
Wells Needed	4	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
WELLS				
Groundwater wells	6,000	LF	$370	$2,220,000
Connection to distribution	4	LS	$150,000	$600,000
Engineering and Contingencies	30%			$846,000
Subtotal Wells				**$3,666,000**
Permitting and Mitigation	1%			**$34,000**
CONSTRUCTION TOTAL				**$3,700,000**
Interest During Construction		(6 months)		**$80,000**
TOTAL CAPITAL COST				**$3,780,000**
ANNUAL COSTS				
Debt Service				$274,600
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$274,600**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$236.72
Per 1,000 Gallons				$0.73
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-47
Mansfield WTP Expansion of 15 MGD

Owner: Mansfield
Amount: 8,400 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
WATER TREATMENT FACILITIES				
Water Treatment Plant Expansion	15	MGD		$19,400,000
Engineering and Contingencies	35%			$6,790,000
Subtotal of Water Treatment Plant				**$26,190,000**
Permitting and Mitigation	1%			**$233,000**
CONSTRUCTION TOTAL				**$26,423,000**
Interest During Construction		(18months)		**$1,630,000**
TOTAL CAPITAL COST				**$28,053,000**
ANNUAL COSTS				
Debt Service				$2,038,000
WTP Operation	2,737,148	1000 gal	$0.65	$1,779,100
Raw Water Cost	2,737,148	1000 gal	$0.62	$1,708,600
TOTAL ANNUAL COSTS				**$5,525,700**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$657.82
Per 1,000 Gallons				$2.02
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$415.00
Per 1,000 Gallons				$1.27

Table G-48
Maypearl Additional Woodbine Aquifer (Existing Wells)

Owner:	Maypearl	
Amount:	44	Acre-Feet per Year
Water Depth	105	ft
Well Depth	460	ft
Well Yield	45	gpm
Well Size	6	in
Yield per well	72	Acre-Feet per Year (peak)
Yield per well	36	Acre-Feet per Year (average)
Wells Needed	0	

Item No. & Description	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	0	LF	$210	$0
Connection to distribution				$0
Engineering and Contingencies	30%			$0
Subtotal Wells				**$0**
Permitting and Mitigation	1%			**$0**
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Add Chemicals	14,337	1000 gal	$0.25	$3,600
Pumping Cost	13,052	kW-h	$0.09	$1,200
TOTAL ANNUAL COSTS				**$4,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$109.09
Per 1,000 Gallons				$0.33
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$109.09
Per 1,000 Gallons				$0.33

Table G-49
Maypearl Additional Woodbine Aquifer (New Wells)

Owner:	Maypearl	
Amount:	11	Acre-Feet per Year
Water Depth	105	ft
Well Depth	460	ft
Well Yield	45	gpm
Well Size	6	in
Yield per well	72	Acre-Feet per Year (peak)
Yield per well	36	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Water Wells	460	LF	$210	$97,000
Connection to Distribution	1		$150,000	$150,000
Engineering and Contingencies	30%			$74,000
Subtotal of Well(s)				**$321,000**
Permitting and Mitigation	1%			**$3,000**
CONSTRUCTION TOTAL				**$324,000**
Interest During Construction		(6 months)		**$7,000**
TOTAL CAPITAL COST				**$331,000**
ANNUAL COSTS				
Debt Service - Total Capital				$24,000
Operation and Maintenance				
Transmission	0			$1,800
Well(s)	0			$2,900
Chlorination	3,584	1000 gal	$0.25	$900
Pumping Costs	7,000	kW-h	$0.09	$600
TOTAL ANNUAL COSTS				**$30,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$2,745.45
Per 1000 Gallons				$8.43
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$563.64
Per 1000 Gallons				$1.73

Table G-50
Maypearl Update Supplemental Wells Trinity Aquifer

Owner:	Maypearl	
Amount:	185	Acre-Feet per Year
Well Depth	2,064	ft
Well Yield	230	gpm
Well Size	8	in
Yield per well	370	Acre-Feet per Year (peak)
Yield per well	185	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	2,064	LF	$280	$578,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	30%			$218,000
Subtotal Wells				**$728,000**
Permitting and Mitigation	1%			$9,000
CONSTRUCTION TOTAL				**$737,000**
Interest During Construction		(6 months)		**$16,000**
TOTAL CAPITAL COST				**$753,000**
ANNUAL COSTS				
Debt Service				$54,700
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$54,700**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$295.68
Per 1,000 Gallons				$0.91
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-51
Maypearl Update Supplemental Wells Woodbine Aquifer

Owner:	Maypearl	
Amount:	46	Acre-Feet per Year
Well Depth	436	ft
Well Yield	58	gpm
Well Size	6	in
Yield per well	93	Acre-Feet per Year (peak)
Yield per well	47	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	436	LF	$210	$92,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	30%			$73,000
Subtotal Wells				**$242,000**
Permitting and Mitigation	1%			$3,000
CONSTRUCTION TOTAL				**$245,000**
Interest During Construction		(6 months)		**$5,000**
TOTAL CAPITAL COST				**$250,000**
ANNUAL COSTS				
Debt Service				$18,200
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$18,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$395.65
Per 1,000 Gallons				$1.21
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-52
Midlothian Additional Joe Pool Lake

Owner: Midlothian
Amount: 362 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pump Station(s)				
Station 1				
Pump, building, & appurtances	42	Hp		$584,000
Storage Tank	0	gal		$0
Engineering and Contingencies	35%			$204,000
Subtotal of Pump Station(s)				**$788,000**
Permitting and Mitigation	1%			**$7,000**
CONSTRUCTION TOTAL				**$795,000**
Interest During Construction		(6 months)		**$17,000**
TOTAL CAPITAL COST				**$812,000**
ANNUAL COSTS				
Debt Service				$59,000
Operation and Maintenance Costs				
Pump Station	2.5%			$17,500
Power Cost	137,000	kW-h	$0.09	$12,300
WTP Operation	117,964	1000 gal	$0.65	$76,700
Raw Water Cost	117,964	1000 gal	$0.68	$80,200
TOTAL ANNUAL COSTS				**$245,700**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$678.70
Per 1,000 Gallons				$2.08
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$516.00
Per 1,000 Gallons				$1.58

Note: Raw water is assumed to cost $0.68 per acre-foot (from survey response in the preparation of the 2006 R

Table G-53
Ellis County Water Supply Project (Midlothian, Phase I)

Owner: Midlothian
Amount: 6,725 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
Tap Fee	1	EA	$60,000	$60,000
30" Water Line				
Pipe	17,700	FT	$135	$2,390,000
ROW	8	AC	$10,000	$81,000
Engineering and Contingencies	30%			$717,000
Subtotal of Pipeline(s)				**$3,248,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	350	Hp		$1,505,000
Storage Tank		gal		$0
Engineering and Contingencies	35%			$527,000
Subtotal of Pump Station(s)				**$2,032,000**
WATER TREATMENT FACILITIES				
Water Treatment Plant	9	MGD		$13,933,000
Engineering and Contingencies	35%			$4,877,000
Subtotal of Water Treatment Plant				**$18,810,000**
Permitting and Mitigation	1%			**$47,000**
CONSTRUCTION TOTAL				**$24,137,000**
Interest During Construction		(18 months)		**$1,489,000**
TOTAL CAPITAL COST				**$25,626,000**
ANNUAL COSTS				
Debt Service				$1,861,700
Operation and Maintenance Costs				
Pipeline	1.0%			$28,700
Pump Station	2.5%			$45,200
Estimated Annual Power Cost	1,033,836	kW-h	$0.09	$93,000
WTP Operation	2,191,451	1000 gal	$0.65	$1,424,400
Raw Water Cost	2,191,451	1000 gal	$0.68	$1,490,200
Total Annual Costs				**$4,943,200**

Table G-53, Continued

UNIT COSTS (First 30 Years)				
Per Acre-Foot				$735.01
Per 1,000 Gallons				$2.26
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$458.00
Per 1,000 Gallons				$1.41

Midlothian Section Phase 2

Owner: Midlothian
Amount: 5,488 e-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
Tap Fee	1	EA	$60,000	$60,000
30" Water Line				
Pipe	17,700	FT	$135	$2,390,000
ROW	8	AC	$10,000	$81,000
Engineering and Contingencies	30%			$717,000
Subtotal of Pipeline(s)				**$3,248,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	650	Hp		$2,055,000
Storage Tank		gal		$0
Engineering and Contingencies	35%			$719,000
Subtotal of Pump Station(s)				**$2,774,000**
WATER TREATMENT FACILITIES				
Water Treatment Plant Expansion	6	MGD		$18,975,000
Engineering and Contingencies	35%			$6,641,000
Subtotal of Water Treatment Plant				**$25,616,000**
Permitting and Mitigation	1%			**$53,000**
CONSTRUCTION TOTAL				**$31,691,000**
Interest During Construction		(18 months)		**$1,825,000**
TOTAL CAPITAL COST				**$33,516,000**

Table G-53, Continued

ANNUAL COSTS				
Debt Service				$2,435,000
Operation and Maintenance Costs				
Pipeline	1.0%			$29,000
Pump Station	2.5%			$62,000
Estimated Annual Power Cost	1,142,000		$0.09	$103,000
WTP Operation	1,788,162	1000 gal	$0.45	$805,000
Raw Water Cost	1,788,162	1000 gal	$0.68	$1,216,000
TOTAL ANNUAL COSTS				**$4,650,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$847.35
Per 1,000 Gallons				$2.60
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$404.00
Per 1,000 Gallons				$1.24
TOTAL UNIT COST FOR PHASE 1 AND 2				
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$785.49
Per 1,000 Gallons				$2.41
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$433.68
Per 1,000 Gallons				$1.33

Notes:
Raw water is assumed to cost $0.68 per 1,000 gallons.
Based on pump station costs provided by Jones & Carter, Inc.

Table G-54
Midlothian Water Treatment Plant Expansion of 3 MGD

Owner: Midlothian
Amount: 1,682 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WATER TREATMENT FACILITIES				
Water Treatment Plant	3	MGD		$6,900,000
Engineering and Contingencies	35%			$2,415,000
Subtotal of Water Treatment Plant				**$9,315,000**
Permitting and Mitigation	1%			**$83,000**
CONSTRUCTION TOTAL				**$9,398,000**
Interest During Construction		(24 months)		**$768,000**
TOTAL CAPITAL COST				**$ 10,166,000**
ANNUAL COSTS				
Debt Service				$738,500
Operation and Maintenance Costs				
Raw Water Cost		1000 gal	$ 0.66	$361,400
WTP Operation		1000 gal	$ 0.65	$355,900
TOTAL ANNUAL COSTS				**$1,455,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$865.77
Per 1,000 Gallons				$2.66
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$426.58
Per 1,000 Gallons				$1.31

Table G-55
Midlothian Water Treatment Plant Expansion of 6 MGD

Owner: Midlothian
Amount: 3,363 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WATER TREATMENT FACILITIES				
Water Treatment Plant	6	MGD		$10,725,000
Engineering and Contingencies	35%			$3,754,000
Subtotal of Water Treatment Plant				**$14,479,000**
Permitting and Mitigation	1%			**$129,000**
CONSTRUCTION TOTAL				**$14,608,000**
Interest During Construction		(24 months)		**$1,193,000**
TOTAL CAPITAL COST				**$ 15,801,000**
ANNUAL COSTS				
Debt Service				$1,147,900
Operation and Maintenance Costs				
Raw Water Cost		1000 gal	$ 0.66	$722,700
WTP Operation		1000 gal	$ 0.65	$711,800
TOTAL ANNUAL COSTS				**$2,582,400**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$767.89
Per 1,000 Gallons				$2.36
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$426.55
Per 1,000 Gallons				$1.31

Table G-56
Milford Update Supplemental Wells Woodbine Aquifer

Owner:	Milford	
Amount:	107	Acre-Feet per Year
Well Depth	865	ft
Well Yield	133	gpm
Well Size	8	in
Yield per well	214	Acre-Feet per Year (peak)
Yield per well	107	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	865	LF	$280	$242,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	0			$118,000
Subtotal Wells				**$510,000**
Permitting and Mitigation	1%			**$5,000**
CONSTRUCTION TOTAL				**$515,000**
Interest During Construction		(6 months)		**$11,000**
TOTAL CAPITAL COST				**$526,000**
ANNUAL COSTS				
Debt Service				$38,200
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$38,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$357.01
Per 1,000 Gallons				$1.10
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-57
Mountain Peak SUD New Wells Woodbine Aquifer

Owner:	Mountain Peak SUD	
Amount:	50	Acre-Feet per Year
Water Depth	317	ft
Well Depth	908	ft
Well Yield	15	gpm
Well Size	6	in
Yield per well	24	Acre-Feet per Year (peak)
Yield per well	12	Acre-Feet per Year (average)
Wells Needed	5	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Water Wells	4,540	LF	$210	$953,000
Connection to Distribution	5	LS	$150,000	$750,000
Engineering and Contingencies	30%			$511,000
Subtotal of Well(s)				**$2,214,000**
Permitting and Mitigation	1%			**$20,000**
CONSTRUCTION TOTAL				**$2,234,000**
Interest During Construction		(6 months)		**$48,000**
TOTAL CAPITAL COST				**$2,282,000**
ANNUAL COSTS				
Debt Service - Total Capital				$165,800
Operation and Maintenance				
Transmission	1.0%			$9,000
Well(s)	2.5%			$28,600
Chlorination	16,293	1000 gal	$0.25	$4,100
Pumping Costs	26,000	kW-h	$0.09	$2,300
TOTAL ANNUAL COSTS				**$209,800**
UNIT COSTS (First 30 Years)				
Cost per acre-foot				$4,196.00
Cost per 1000 gallons				$12.88
UNIT COSTS (After 30 Years)				
Cost per acre-foot				$880.00
Cost per 1000 gallons				$2.70

Table G-58
Mountain Peak SUD New Wells Trinity Aquifer

Owner:	Mountain Peak SUD	
Amount:	300	Acre-Feet per Year
Water Depth	900	ft
Well Depth	2,800	ft
Well Yield	75	gpm
Well Size	6	in
Yield per well	121	Acre-Feet per Year (peak)
Yield per well	61	Acre-Feet per Year (average)
Wells Needed	5	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Water Wells	14,000	LF	$210	$2,940,000
Connection to Distribution	5	LS	$150,000	$750,000
Engineering and Contingencies	30%			$1,107,000
Subtotal of Well(s)				**$4,797,000**
Permitting and Mitigation	1%			**$44,000**
CONSTRUCTION TOTAL				**$4,841,000**
Interest During Construction		(6 months)		**$105,000**
TOTAL CAPITAL COST				**$4,946,000**
ANNUAL COSTS				
Debt Service - Total Capital				$359,300
Operation and Maintenance				
Transmission	1.0%			$9,000
Well(s)	2.5%			$88,200
Chlorination	97,755	1000 gal	$0.25	$24,400
Pumping Costs	392,000	kW-h	$0.09	$35,300
TOTAL ANNUAL COSTS				**$516,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,720.67
Cost per 1000 Gallons				$5.28
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$523.00
Per 1000 gallons				$1.61

Table G-59
Mountain Peak SUD Supplemental Wells Trinity Aquifer

Owner:	Mountain Peak SUD	
Amount:	400	Acre-Feet per Year
Well Depth	2,391	ft
Well Yield	250	gpm
Well Size	10	in
Yield per well	403	Acre-Feet per Year (peak)
Yield per well	202	Acre-Feet per Year (average)
Wells Needed	2	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	4,782	LF	$370	$1,769,000
Connection to distribution	2	LS	$150,000	$300,000
Engineering and Contingencies	0			$621,000
Subtotal Wells				**$2,690,000**
Permitting and Mitigation	1%			**$25,000**
CONSTRUCTION TOTAL				**$2,715,000**
Interest During Construction		(6 months)		**$59,000**
TOTAL CAPITAL COST				**$2,774,000**
ANNUAL COSTS				
Debt Service				$201,500
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$201,500**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$503.75
Per 1,000 Gallons				$1.55
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-60
Mountain Peak SUD Supplemental Wells Woodbine Aquifer

Owner:	Mountain Peak SUD	
Amount:	46	Acre-Feet per Year
Well Depth	1,400	ft
Well Yield	100	gpm
Well Size	8	in
Yield per well	161	Acre-Feet per Year (peak)
Yield per well	81	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	1,400	LF	$280	$392,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	30%			$163,000
Subtotal Wells				**$705,000**
Permitting and Mitigation	1%			**$7,000**
CONSTRUCTION TOTAL				**$712,000**
Interest During Construction		(6 months)		**$15,000**
TOTAL CAPITAL COST				**$727,000**
ANNUAL COSTS				
Debt Service				$52,800
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$52,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,147.83
Per 1,000 Gallons				$3.52
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-61
Oak Leaf Additional Water from Glenn Heights

Owner: Oak Leaf
Amount: 640 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Operation and Maintenance Costs				
Pipeline	1.00%			$0
Pump Station	2.50%			$0
Estimated Annual Power Cost				$0
Treated Water Cost	208,545	1000 gal	$4.15	$865,000
TOTAL ANNUAL COSTS				**$865,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,351.56
Per 1,000 Gallons				$4.15
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,352.00
Per 1,000 Gallons				$4.15

Table G-62
Ovilla Additional Water from Dallas

Owner: Ovilla
Amount: 1,055 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
16" Water Line				
Pipe	45,778	FT	$64	$2,930,000
ROW	21	AC	$10,000	$210,000
Engineering and Contingencies	30%			$879,000
Subtotal of Pipeline(s)				**$4,019,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	14	Hp		$510,000
Storage Tank	310,000	gal		$232,000
Engineering and Contingencies	35%			$260,000
Subtotal of Pump Station(s)				**$1,002,000**
Permitting and Mitigation	1%			**$44,000**
CONSTRUCTION TOTAL				**$5,065,000**
Interest During Construction		(12 months)		**$211,000**
TOTAL CAPITAL COST				**$5,276,000**
ANNUAL COSTS				
Debt Service				$383,000
Operation and Maintenance Costs				
Pipeline	1.0%			$35,000
Pump Station	2.5%			$22,000
Estimated Annual Power Cost	44,422	kW-h	$0.09	$4,000
Treated Water Flat Rate	343,773	1000 gal	$1.36	$468,000
TOTAL ANNUAL COSTS				**$912,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$864.45
Per 1,000 Gallons				$2.65
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$501.00
Per 1,000 Gallons				$1.54

Table G-63
Palmer Update Supplemental Wells Woodbine Aquifer

Owner:	Palmer	
Amount:	92	Acre-Feet per Year
Well Depth	1,404	ft
Well Yield	114	gpm
Well Size	8	in
Yield per well	184	Acre-Feet per Year (peak)
Yield per well	92	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	1,404	LF	$280	$393,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	30%			$163,000
Subtotal Wells				**$706,000**
Permitting and Mitigation	1%			**$7,000**
CONSTRUCTION TOTAL				**$713,000**
Interest During Construction		(6 months)		**$15,000**
TOTAL CAPITAL COST				**$728,000**
ANNUAL COSTS				
Debt Service				$52,900
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$52,900**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$575.00
Per 1,000 Gallons				$1.76
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-64
Parker WSC Connection to BRA SWATS

Owner: Parker WSC
Amount: 181 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipelines				
Pipeline 8 in.	21,120	LF	$32	$676,000
ROW Easements	7	Acres	$25,000	$175,000
Engineering and Contingencies (30%)	30%			$255,000
Subtotal of Pipelines				**$1,106,000**
Pumping Facilities				
5 HP Pump Station	1	LS	$480,000	$480,000
0.05 MG Elevated Storage Tank	1	LS	$1,100,000	$1,100,000
Engineering and Contingencies (35%)	35%			$553,000
Subtotal of Pump Stations				**$2,133,000**
Permitting and Mitigation	1%			**$27,000**
CONSTRUCTION TOTAL				**$3,266,000**
Interest During Construction		(18 months)		**$201,000**
TOTAL CAPITAL COST				**$3,467,000**
ANNUAL COSTS				
Debt Service - Total Capital				$252,000
Operation and Maintenance				
Purchase of water	58,979	1000 gal	$8.53	$503,000
Transmission	1.00%			$8,000
Storage tanks and Pumps	2.50%			$47,000
Pumping Costs	9,866	kW-h	$0.09	$1,000
TOTAL ANNUAL COSTS				**$811,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$4,480.66
Per 1000 Gallons				$13.75
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$3,088.40
Per 1000 Gallons				$9.48

Table G-65
Parker WSC Supplemental Wells

Owner:	Parker WSC	
Amount:	41	Acre-Feet per Year
Well Depth	200	ft
Well Yield	50	gpm
Well Size	6	in
Yield per well	81	Acre-Feet per Year (peak)
Yield per well	41	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
WELLS				
Groundwater wells	200	LF	$210	$42,000
Connection to distribution	1	LS	$150,000	$150,000
Engineering and Contingencies	30%			$58,000
Subtotal Wells				**$250,000**
Permitting and Mitigation	1%			**$2,000**
CONSTRUCTION TOTAL				**$252,000**
Interest During Construction		(6 months)		**$5,000**
TOTAL CAPITAL COST				**$257,000**
ANNUAL COSTS				
Debt Service				$18,700
Operation and Maintenance Costs	No additional O&M costs.			$0
TOTAL ANNUAL COSTS				**$18,700**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$461.73
Per 1,000 Gallons				$1.42
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-66
Red Oak Update Supplemental Wells Woodbine Aquifer

Owner:	Red Oak	
Amount:	398	Acre-Feet per Year
Well Depth	1,151	ft
Well Yield	247	gpm
Well Size	8	in
Yield per well	398	Acre-Feet per Year (peak)
Yield per well	199	Acre-Feet per Year (average)
Wells Needed	2	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	2,302	LF	$280	$645,000
Connection to distribution	2	LS	$150,000	$300,000
Engineering and Contingencies	30%			$284,000
Subtotal Wells				**$945,000**
Permitting and Mitigation	1%			**$11,000**
CONSTRUCTION TOTAL				**$956,000**
Interest During Construction		(6 months)		**$21,000**
TOTAL CAPITAL COST				**$977,000**
ANNUAL COSTS				
Debt Service				$71,000
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$71,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$178.39
Per 1,000 Gallons				$0.55
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-67
Additional Water from Corsicana

Owner: Rice WSC
Amount: 282 Ac-Ft/Yr

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
Assume no transmission improvements are needed.				
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Operation and Maintenance Costs				
Treated Water Cost	91,890	1000 gal	$ 2.00	$184,000
TOTAL ANNUAL COSTS				**$184,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$652
Per 1,000 Gallons				$2.00
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$652
Per 1,000 Gallons				$2.00

Table G-68
Rice WSC Additional Water from Ennis

Owner: Rice WSC
Amount: 34 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Operation and Maintenance Costs				
Pipeline	1%			$0
Pump Station	2.50%			$0
Estimated Annual Power Cost	$0.09	kW-h		$0
Treated Water Cost	11,079	1000 gal	$ 3.41	$38,000
TOTAL ANNUAL COSTS				**$38,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,117.65
Per 1,000 Gallons				$3.43
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,118.00
Per 1,000 Gallons				$3.43

Table G-69
Rio Vista Connection to BRA SWATS

Owner: Rio Vista
Amount: 69 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipelines				
Pipeline 6 in.	21,120	LF	$24	$507,000
ROW Easements	7	Acres	$10,000	$70,000
Engineering and Contingencies (30%)	30%			$173,000
Subtotal of Pipelines				**$750,000**
Pumping Facilities				
5 HP Pump Station	1	LS	$480,000	$480,000
0.05 MG Elevated Storage Tank	1	LS	$1,100,000	$1,100,000
Engineering and Contingencies (35%)	35%			$553,000
Subtotal of Pump Stations				**$2,133,000**
Permitting and Mitigation	1%			**$25,000**
CONSTRUCTION TOTAL				**$2,908,000**
Interest During Construction		(18 months)		**$179,000**
TOTAL CAPITAL COST				**$3,087,000**
ANNUAL COSTS				
Debt Service - Total Capital				$224,000
Operation and Maintenance				
Purchase of water	22,484	1000 gal	$8.53	$192,000
Transmission	1.0%			$6,000
Storage tanks and Pumps	2.5%			$47,000
Pumping Costs	1,433	kW-h	$0.09	$100
TOTAL ANNUAL COSTS				**$469,100**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$6,798.55
Per 1000 Gallons				$20.86
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$3,552.17
Per 1000 Gallons				$10.90

Table G-70
Temporary Overdraft of Trinity Aquifer

Owner:	Rio Vista	
Amount:	54	Acre-Feet per Year
Water Depth	1,000	ft
Well Depth	2,500	ft
Well Yield	70	gpm
Well Size	6	in
Yield per well	113	Acre-Feet per Year (peak)
Yield per well	57	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	2,500	LF	$210	$525,000
Connection to distribution	1		$150,000	$150,000
Engineering and Contingencies	30%			$203,000
Subtotal of Well(s)				**$878,000**
Permitting and Mitigation	1%			**$8,000**
CONSTRUCTION TOTAL				**$886,000**
Interest During Construction		(6 months)		**$19,000**
TOTAL CAPITAL COST				**$905,000**
ANNUAL COSTS				
Debt Service - Total Capital				$66,000
Operation and Maintenance				
Transmission	1.0%			$2,000
Well(s)	2.5%			$16,000
Chlorination	17,596	1000 gal	$0.25	$4,000
Pumping Costs	78,000	kW-h	$0.09	$7,000
TOTAL ANNUAL COSTS				**$95,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,759.26
Per 1000 Gallons				$5.40
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$537.04
Per 1000 Gallons				$1.65

Table G-71
Sardis-Lone Elm Transmission with Pump Station - Phase 1

Owner SARDIS-LONE ELM WSC
Amount 1,682 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
Tap Fee	1	EA	$60,000	$60,000
20 PVC Line				
Pipe	0	FT	$126	$0
30 PVC Line				
Pipe	25,000	FT	$200	$5,000,000
ROW	11	AC	$10,000	$110,000
Engineering and Contingencies	30%			$1,500,000
Subtotal of Pipeline(s)				**$6,670,000**
Pump Station(s)				
Station				
Pump, building, & appurtances	105	HP		$708,000
Engineering and Contingencies	35%			$248,000
Subtotal of Pump Station(s)				**$956,000**
Permitting and Mitigation	1%			**$68,000**
CONSTRUCTION TOTAL				**$7,694,000**
Interest During Construction		(24 months)		**$602,000**
TOTAL CAPITAL COST				**$8,296,000**
ANNUAL COSTS				
Debt Service				$602,700
Operation and Maintenance Costs				
Pipeline	1%			$60,000
Pump Station	2.5%			$21,200
Estimated Annual Power Cost	105	HP	$0.09	$30,900
Treated Water (First 30 Years)		1000 gal	$2.08	$1,139,700
Treated Water (After 30 Years)		1000 gal	$1.44	$786,000
TOTAL ANNUAL COSTS(First 30 Years)				**$1,251,800**
TOTAL ANNUAL COSTS (After 30 Years)				**$898,100**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$744.45
Per 1,000 Gallons				$2.28
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$534.11
Per 1,000 Gallons				$1.64

Table G-72
Sardis-Lone Elm Transmission with Pump Station - Phase 2

Owner SARDIS-LONE ELM WSC
Amount 1,682 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
Tap Fee	0	EA	$60,000	$0
20 PVC Line				
Pipe	40,000	FT	$126	$5,040,000
30 PVC Line				
Pipe	0	FT	$200	$0
ROW	18	AC	$10,000	$180,000
Engineering and Contingencies	30%			$1,512,000
Subtotal of Pipeline(s)				**$6,732,000**
Pump Station(s)				
Station				
Pump, building, & appurtances	203	HP		$1,049,000
Engineering and Contingencies	35%			$367,000
Subtotal of Pump Station(s)				**$1,416,000**
Permitting and Mitigation	1%			**$73,000**
CONSTRUCTION TOTAL				**$8,221,000**
Interest During Construction		(24 months)		**$643,000**
TOTAL CAPITAL COST				**$8,864,000**
ANNUAL COSTS				
Debt Service				$644,000
Operation and Maintenance Costs				
Pipeline	1%			$60,500
Pump Station	2.5%			$31,500
Estimated Annual Power Cost	203	HP	$0.09	$59,700
Treated Water (First 30 Years)		1000 gal	$1.97	$1,081,000
Treated Water (After 30 Years)		1000 gal	$1.22	$667,400
TOTAL ANNUAL COSTS(First 30 Years)				**$1,232,700**
TOTAL ANNUAL COSTS (After 30 Years)				**$819,100**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$733.10
Per 1,000 Gallons				$2.25
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$487.12
Per 1,000 Gallons				$1.49

Table G-73
Sardis-Lone Elm Transmission with Pump Station - Phase 3

Owner SARDIS-LONE ELM WSC
Amount 1,682 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
Tap Fee	0	EA	$60,000	$0
20 PVC Line				
Pipe	0	FT	$126	$0
30 PVC Line				
Pipe	0	FT	$200	$0
ROW	0	AC	$10,000	$0
Engineering and Contingencies	30%			$0
Subtotal of Pipeline(s)				**$0**
Pump Station(s)				
Station				
Pump, building, & appurtances	255	HP		$1,205,000
Engineering and Contingencies	35%			$422,000
Subtotal of Pump Station(s)				**$1,627,000**
Permitting and Mitigation	1%			**$14,000**
CONSTRUCTION TOTAL				**$1,641,000**
Interest During Construction		(24 months)		**$128,000**
TOTAL CAPITAL COST				**$1,769,000**
ANNUAL COSTS				
Debt Service				$128,500
Operation and Maintenance Costs				
Pipeline	1%			$0
Pump Station	2.5%			$36,200
Estimated Annual Power Cost	255	HP	$0.09	$75,000
Treated Water (First 30 Years)		1000 gal	$1.76	$963,700
Treated Water (After 30 Years)		1000 gal	$1.11	$607,700
TOTAL ANNUAL COSTS(First 30 Years)				**$1,074,900**
TOTAL ANNUAL COSTS (After 30 Years)				**$718,900**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$639.25
Per 1,000 Gallons				$1.96
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$427.53
Per 1,000 Gallons				$1.31

Table G-74
Sardis Lone Elm - Overdraft of Trinity Aquifer Using New Wells

Owner:	Sardis Lone Elm	
Amount:	531	Acre-Feet per Year
Water Depth	736	ft
Well Depth	2,100	ft
Well Yield	250	gpm
Well Size	10	in
Yield per well	403	Acre-Feet per Year (peak)
Yield per well	202	Acre-Feet per Year (average)
Wells Needed	3	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	6,300	LF	$370	$2,331,000
Connection to distribution				$0
Engineering and Contingencies	30%			$699,000
Subtotal of Well(s)				**$3,030,000**
Permitting and Mitigation	1%			**$28,000**
CONSTRUCTION TOTAL				**$3,058,000**
Interest During Construction		(6 months)		**$66,000**
TOTAL CAPITAL COST				**$3,124,000**
ANNUAL COSTS				
Debt Service - Total Capital				$227,000
Operation and Maintenance				
Transmission	1.0%			$0
Well(s)	2.5%			$70,000
Chlorination	173,027	1000 gal	$0.25	$43,000
Pumping Costs	574,000	kW-h	$0.09	$52,000
TOTAL ANNUAL COSTS				**$392,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$738.23
Per 1000 Gallons				$2.27
UNIT COSTS (After 30 Years)				
Per acre-foot				$310.73
Per 1000 gallons				$0.95

Table G-75
Sardis-Lone Elm WSC Update Supplemental Wells Trinity Aquifer

Owner:	Sardis-Lone Elm WSC	
Amount:	870	Acre-Feet per Year
Well Depth	2,508	ft
Well Yield	360	gpm
Well Size	10	in
Yield per well	580	Acre-Feet per Year (peak)
Yield per well	290	Acre-Feet per Year (average)
Wells Needed	3	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	7,524	LF	$370	$2,784,000
Connection to distribution	3	LS	$150,000	$450,000
Engineering and Contingencies	30%			$970,000
Subtotal Wells				**$4,204,000**
Permitting and Mitigation	1%			**$39,000**
CONSTRUCTION TOTAL				**$4,243,000**
Interest During Construction		(6 months)		**$92,000**
TOTAL CAPITAL COST				**$4,335,000**
ANNUAL COSTS				
Debt Service				$314,900
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$314,900**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$361.95
Per 1,000 Gallons				$1.11
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-76
Sardis-Lone Elm WSC Update Supplemental Wells Woodbine Aquifer

Owner:	Sardis-Lone Elm WSC	
Amount:	160	Acre-Feet per Year
Well Depth	1,500	ft
Well Yield	100	gpm
Well Size	8	in
Yield per well	161	Acre-Feet per Year (peak)
Yield per well	81	Acre-Feet per Year (average)
Wells Needed	2	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	3,000	LF	$280	$840,000
Connection to distribution	2	LS	$150,000	$300,000
Engineering and Contingencies	30%			$342,000
Subtotal Wells				**$1,482,000**
Permitting and Mitigation	1%			**$14,000**
CONSTRUCTION TOTAL				**$1,496,000**
Interest During Construction		(6 months)		**$32,000**
TOTAL CAPITAL COST				**$1,528,000**
ANNUAL COSTS				
Debt Service				$111,000
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$111,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$693.75
Per 1,000 Gallons				$2.13
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-77
Sokoll WTP (Rockett SUD and Waxahachie) 20 MGD Construction Phase 1
2010

Amount: 11,210 Ac-Ft/Yr

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WATER TREATMENT FACILITIES				
Water Treatment Plant	20	MGD	LS	$42,270,000
Land	0	acres	$10,000	$0
Engineering and Contingencies	0%			$0
Subtotal of Water Treatment Plant				**$42,270,000**
TRWD Connection				**$2,529,000**
Permitting and Mitigation	1%			**$507,000**
CONSTRUCTION TOTAL				**$45,306,000**
Interest During Construction		(24 months)		**$3,700,000**
TOTAL CAPITAL COST				**$49,006,000**
ANNUAL COSTS				
Debt Service				$3,560,200
Operation and Maintenance Costs				
Raw Water		1000 gal	$0.66	$2,410,800
WTP Operation		1000 gal	$0.45	$1,643,800
TOTAL ANNUAL COSTS				**$7,614,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$679.29
Per 1,000 Gallons				$2.08
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$361.69
Per 1,000 Gallons				$1.11

Note: Cost based on actual bid to construct the plant.

Table G-78
Sokoll WTP (Rockett SUD and Waxahachie) 20 MGD Expansion (2020)

Owner Waxahachie
Amount: 11,210 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WATER TREATMENT FACILITIES				
Water Treatment Plant	20	MGD	LS	$38,900,000
Engineering and Contingencies	10%			$3,890,000
Subtotal of Water Treatment Plant				**$42,790,000**
TRWD Connection (500 HP Pump Station)				**$1,890,000**
Permitting and Mitigation	1%			**$467,000**
CONSTRUCTION TOTAL				**$45,147,000**
Interest During Construction		(24 months)		**$3,530,000**
TOTAL CAPITAL COST				**$48,677,000**
ANNUAL COSTS				
Debt Service				$3,536,300
Operation and Maintenance Costs				
Raw Water		1000 gal	$0.66	$2,410,800
WTP Operation		1000 gal	$0.45	$1,643,800
TOTAL ANNUAL COSTS				**$7,590,900**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$677.15
Per 1,000 Gallons				$2.08
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$361.69
Per 1,000 Gallons				$1.11

Note: Engineering and contingencies assumed less than 35% based on the bid to construct the plant.

Table G-79
Sokoll WTP (Rockett SUD and Waxahachie) 20 MGD Expansion (2030)

Owner Waxahachie
Amount: 11,210 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WATER TREATMENT FACILITIES				
Water Treatment Plant	20	MGD	LS	$38,900,000
Engineering and Contingencies	10%			$3,890,000
Subtotal of Water Treatment Plant				**$42,790,000**
TRWD Connection (10,000 48" Line)				**$2,500,000**
Permitting and Mitigation	1%			**$467,000**
CONSTRUCTION TOTAL				**$45,757,000**
Interest During Construction		(24 months)		**$3,578,000**
TOTAL CAPITAL COST				**$49,335,000**
ANNUAL COSTS				
Debt Service				$3,584,100
Operation and Maintenance Costs				
Raw Water		1000 gal	$0.66	$2,410,800
WTP Operation		1000 gal	$0.45	$1,643,800
TOTAL ANNUAL COSTS				**$7,638,700**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$681.42
Per 1,000 Gallons				$2.09
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$361.69
Per 1,000 Gallons				$1.11

Note: Engineering and contingencies assumed less than 35% based on the bid to construct the plant.

Table G-80
Waxahachie Alternative Strategy to Purchase Water from Lake Benbrook

Owner: Waxahachie
Amount: 22,420 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
PUMP STATION				
Pump Station	1	LS	$3,000,000	$3,000,000
42" Yard Piping	1,000	LF	$420	$420,000
Four Piping Connections	4	EA	$50,000	$200,000
Engineering and Contingencies	35%			$1,267,000
Permitting and Mitigation	1%			**$43,000**
Construction Total				**$4,930,000**
Interest During Construction		(12 months)		**$205,000**
TOTAL CAPITAL COST				**$5,135,000**
ANNUAL COSTS				
Debt Service				$373,000
Operation and Maintenance Costs				
Energy Cost	2,443,329	kW-H	$0.09	$219,900
Pump Station Maintenance				$108,600
TOTAL ANNUAL COSTS				**$701,500**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$31.29
Per 1,000 Gallons				$0.10
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$14.65
Per 1,000 Gallons				$0.04

Table G-81
Waxahachie Alternative Strategy to Purchase Water from Joe Pool Lake

Owner: Waxahachie
Amount: 22,420 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
PUMP STATION				
Lake Pump Station	1	LS	$7,000,000	$7,000,000
42" Yard Piping	1,000	LF	$420	$420,000
Four Piping Connections	4	EA	$50,000	$200,000
Engineering and Contingencies	35%			$2,667,000
Permitting and Mitigation	1%			**$91,000**
Construction Total				**$10,378,000**
Interest During Construction		(12 months)		**$432,000**
TOTAL CAPITAL COST				**$10,810,000**
ANNUAL COSTS				
Debt Service				$785,000
Operation and Maintenance Costs				
Energy Cost	19,852,052	kW-H	$0.09	$1,787,000
Pump Station Maintenance				$229,000
TOTAL ANNUAL COSTS				**$2,801,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$124.93
Per 1,000 Gallons				$0.38
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$89.92
Per 1,000 Gallons				$0.28

Table G-82
Waxahachie Additional TRA/Waxahachie Indirect Reuse

Owner: TRA
Amount: 3,112 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION FACILITIES				
Pipeline(s)				
20" Water Line				
Pipe	15,420	Ft	$84	$1,295,000
ROW	7	Acres	$25,000	$177,000
Engineering and Contingencies	30%			$389,000
Subtotal Piping				**$1,861,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtenances	107	Hp		$690,000
Storage Tank	0.5	MG		$310,000
Engineering and Contingencies	35%			$350,000
Subtotal of Pump Station(s)				**$1,350,000**
WATER TREATMENT FACILITIES				
Water Treatment Plant Expansion	12	MGD		$16,700,000
Engineering and Contingencies	35%			$5,845,000
Subtotal of Water Treatment Plant				**$22,545,000**
Permitting and mitigation	1%			**$28,000**
CONSTRUCTION TOTAL				**$25,784,000**
Interest During Construction		(18 months)		**$1,590,000**
TOTAL CAPITAL COST				**$27,374,000**
ANNUAL COSTS				
Debt Service				$1,989,000
Operation and Maintenance Costs				
Pipeline	1%			$16,000
Pump Station	2.5%			$30,000
Estimated Annual Power Cost	610,000	kW-h	$0.09	$54,900
WTP Operation	1,013,940	1000 gal	$0.65	$659,000
Raw Water Cost	1,013,940	1000 gal	$0.32	$324,000
TOTAL ANNUAL COSTS				**$3,072,900**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$987.54
Per 1,000 Gallons				$3.03
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$334.00
Per 1,000 Gallons				$1.03

Note: Assumes no raw water cost.

Table G-83
Southern Waxahachie WTP 3 MGD Expansion (2010)

Owner: Waxahachie
Amount: 1,682 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WATER TREATMENT FACILITIES				
Upgrading Study	3	MGD		$7,000
Engineering and Contingencies	0%			$0
Subtotal of Water Treatment Plant				**$7,000**
Permitting and Mitigation	1%			**$0**
CONSTRUCTION TOTAL				**$7,000**
Interest During Construction		(6 months)		**$200**
TOTAL CAPITAL COST				**$ 7,200**
ANNUAL COSTS				
Debt Service				$500
Operation and Maintenance Costs				
Raw Water Cost		1000 gal	$ 0.66	$361,600
WTP Operation		1000 gal	$ 0.45	$246,600
TOTAL ANNUAL COSTS				**$608,700**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$362.00
Per 1,000 Gallons				$1.11
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$361.70
Per 1,000 Gallons				$1.11

Table G-84
Southern Waxahachie WTP 6 MGD Expansion (2030)

Owner: Waxahachie
Amount: 3,363 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WATER TREATMENT FACILITIES				
Water Treatment Plant Expansion	6	MGD		$10,725,000
Engineering and Contingencies	35%			$3,754,000
Subtotal of Water Treatment Plant				**$14,479,000**
Permitting and Mitigation	1%			**$21,000**
CONSTRUCTION TOTAL				**$14,500,000**
Interest During Construction		(6 months)		**$314,000**
TOTAL CAPITAL COST				**$ 14,814,000**
ANNUAL COSTS				
Debt Service				$1,076,200
Operation and Maintenance Costs				
Raw Water Cost		1000 gal	$ 0.66	$723,300
WTP Operation		1000 gal	$ 0.45	$493,100
TOTAL ANNUAL COSTS				**$2,292,600**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$681.71
Per 1,000 Gallons				$2.09
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$361.70
Per 1,000 Gallons				$1.11

Table G-85
Wilmer - Cost of Overdrafting with Existing Wells until 2010

Owner:	Wilmer	
Amount:	319	Acre-Feet per Year
Water Depth	900	ft
Well Depth	3,500	ft
Well Yield	400	gpm
Well Size	10	in
Yield per well	644	Acre-Feet per Year (peak)
Yield per well	322	Acre-Feet per Year (average)
Wells Needed	1	

Item	Quantity	Unit	Unit Cost	Total Cost
ANNUAL COSTS				
Chlorination	103,946	1000 gal	$0.25	$26,000
Pumping Costs	418,000	kW-h	$0.09	$37,620
TOTAL ANNUAL COSTS				**$63,620**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$199.44
Per 1000 Gallons				$0.61
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$199.44
Per 1000 Gallons				$0.61

Table G-86
Wilmer Update Supplemental Wells Trinity Aquifer

Owner:	Wilmer	
Amount:	644	Acre-Feet per Year
Well Depth	3,661	ft
Well Yield	400	gpm
Well Size	12	in
Yield per well	644	Acre-Feet per Year (peak)
Yield per well	322	Acre-Feet per Year (average)
Wells Needed	2	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	7,322	LF	$470	$3,441,000
Connection to distribution	2	LS	$150,000	$300,000
Engineering and Contingencies	30%			$1,122,000
Subtotal Wells				**$4,863,000**
Permitting and Mitigation	1%			**$45,000**
CONSTRUCTION TOTAL				**$4,908,000**
Interest During Construction		(6 months)		**$106,000**
TOTAL CAPITAL COST				**$5,014,000**
ANNUAL COSTS				
Debt Service				$364,300
Operation and Maintenance Costs	No additional Operation and Maintenan			$0
TOTAL ANNUAL COSTS				**$364,300**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$565.68
Per 1,000 Gallons				$1.74
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1,000 Gallons				$0.00

Table G-87
Wilmer Connection to DWU

Owner: Wilmer
Amount: 1,095 Acre-Feet per Year

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
14" Water Line				
Pipe	31,700	FT	$ 70	$2,219,000
ROW	15	AC	$ 25,000	$364,000
Engineering and Contingencies	30%			$666,000
Subtotal of Pipeline(s)				**$3,249,000**
Pump Station(s) - No pump station required				
Station 1				
Pump, building, & appurtances		hp		$0
Storage Tank		MG		$0
Engineering and Contingencies	35%			$0
Subtotal of Pump Station(s)				**$0**
Permitting and Mitigation	1%			**$27,000**
CONSTRUCTION TOTAL				**$3,276,000**
Interest During Construction		(18 months)		**$202,000**
TOTAL CAPITAL COST				**$3,478,000**
ANNUAL COSTS				
Debt Service				$253,000
Operation and Maintenance Costs				
Pipeline	1%			$27,000
Pump Station	2.50%			$0
Estimated Annual Power Cost	0	kW-H	$ 0.09	$0
Treated Water Cost	356,807	1000 gal	$ 7.00	$2,498,000
TOTAL ANNUAL COSTS				**$2,778,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$2,537
Per 1,000 Gallons				$7.79
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$2,306
Per 1,000 Gallons				$7.08

Table G-88
Wilmer Connection to DWU through Hutchins

Owner: Wilmer
Amount: 1,095 Acre-Feet per Year

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
12" Water Line				
Pipe	18,000	FT	$ 48	$864,000
ROW	8	AC	$ 10,000	$83,000
Engineering and Contingencies	30%			$259,000
Subtotal of Pipeline(s)				**$1,206,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	45	hp		$600,000
Storage Tank	0.2	MG		$230,000
Engineering and Contingencies	35%			$291,000
Subtotal of Pump Station(s)				**$1,121,000**
Permitting and Mitigation	1%			**$20,000**
CONSTRUCTION TOTAL				**$2,347,000**
Interest During Construction		(18 months)		**$145,000**
TOTAL CAPITAL COST				**$2,492,000**
ANNUAL COSTS				
Debt Service				$181,000
Operation and Maintenance Costs				
Pipeline	1%			$10,000
Pump Station	2.50%			$25,000
Estimated Annual Power Cost	142,633	kW-H	$ 0.09	$13,000
Treated Water Cost	356,807	1000 gal	$ 7.00	$2,498,000
TOTAL ANNUAL COSTS				**$2,727,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$2,490
Per 1,000 Gallons				$7.64
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$2,325
Per 1,000 Gallons				$7.14

Table G-89
Ellis County-Other - New Wells Trinity Aquifer

Owner:	Ellis County Other	
Amount:	201	Acre-Feet per Year
Water Depth	839	ft
Well Depth	2,579	ft
Well Yield	100	gpm
Well Size	8	in
Yield per well	161	Acre-Feet per Year (peak)
Yield per well	81	Acre-Feet per Year (average)
Wells Needed	3	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	7,737	LF	$280	$2,166,000
Connection to distribution	3		$150,000	$450,000
Engineering and Contingencies	30%			$785,000
Subtotal of Well(s)				**$3,401,000**
Permitting and Mitigation	1%			**$31,000**
CONSTRUCTION TOTAL				**$3,432,000**
Interest During Construction		(6 months)		**$74,000**
TOTAL CAPITAL COST				**$3,506,000**
ANNUAL COSTS				
Debt Service - Total Capital				$254,700
Operation and Maintenance				
Transmission	1.0%			$5,400
Well(s)	2.5%			$65,000
Chlorination	65,496	1000 gal	$0.25	$16,400
Pumping Costs	248,000	kW-h	$0.09	$22,300
TOTAL ANNUAL COSTS				**$363,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,809.95
Per 1000 Gallons				$5.55
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$542.79
Per 1000 Gallons				$1.67

Table G-90
Ellis County-Other - New Wells Woodbine Aquifer

Owner:	Ellis County Other	
Amount:	919	Acre-Feet per Year
Water Depth	481	ft
Well Depth	1,484	ft
Well Yield	100	gpm
Well Size	8	in
Yield per well	161	Acre-Feet per Year (peak)
Yield per well	81	Acre-Feet per Year (average)
Wells Needed	12	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	17,808	LF	$280	$4,986,000
Connection to distribution	12		$150,000	$1,800,000
Engineering and Contingencies	30%			$2,036,000
Subtotal of Well(s)				**$8,822,000**
Permitting and Mitigation	1%			$81,000
CONSTRUCTION TOTAL				**$8,903,000**
Interest During Construction		(6 months)		**$193,000**
TOTAL CAPITAL COST				**$9,096,000**
ANNUAL COSTS				
Debt Service - Total Capital				$660,800
Operation and Maintenance				
Transmission	1.0%			$21,600
Well(s)	2.5%			$149,600
Chlorination	299,457	1000 gal	$0.25	$74,900
Pumping Costs	679,000	kW-h	$0.09	$61,100
TOTAL ANNUAL COSTS				**$968,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,053.32
Per 1000 Gallons				$3.23
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$334.28
Per 1000 Gallons				$1.03

Table G-91
Ellis County-Other - Supplemental Wells Trinity Aquifer

Owner:	Ellis County Other	
Amount:	644	Acre-Feet per Year
Water Depth	839	ft
Well Depth	2,579	ft
Well Yield	100	gpm
Well Size	8	in
Yield per well	161	Acre-Feet per Year (peak)
Yield per well	81	Acre-Feet per Year (average)
Wells Needed	8	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	67,540	LF	$560	$37,822,000
Connection to distribution	8	LS	$150,000	$1,200,000
Engineering and Contingencies	30%			$11,707,000
Subtotal of Well(s)				**$50,729,000**
Permitting and Mitigation	1%			$468,000
CONSTRUCTION TOTAL				**$51,197,000**
Interest During Construction		(6 months)		**$1,109,000**
TOTAL CAPITAL COST				**$52,306,000**
ANNUAL COSTS				
Debt Service - Total Capital				$3,800,000
Operation and Maintenance	No additional Operation and Maintenance after update			
TOTAL ANNUAL COSTS				**$3,800,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$5,900.62
Per 1000 Gallons				$18.11
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$0.00
Per 1000 Gallons				$0.00

Table G-92
Ellis County-Other - Supplemental Wells Woodbine Aquifer

Owner:	Ellis County Other	
Amount:	322	Acre-Feet per Year
Water Depth	481	ft
Well Depth	1,484	ft
Well Yield	100	gpm
Well Size	8	in
Yield per well	161	Acre-Feet per Year (peak)
Yield per well	81	Acre-Feet per Year (average)
Wells Needed	4	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	38,721	LF	$210	$8,131,000
Connection to distribution	4	LS	$150,000	$600,000
Engineering and Contingencies	30%			$2,619,000
Subtotal of Well(s)				**$11,350,000**
Permitting and Mitigation	1%			$105,000
CONSTRUCTION TOTAL				**$11,455,000**
Interest During Construction		(6 months)		**$248,000**
TOTAL CAPITAL COST				**$11,703,000**
ANNUAL COSTS				
Debt Service - Total Capital				$850,200
Operation and Maintenance	No additional Operation and Maintenance after update			
TOTAL ANNUAL COSTS				**$850,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$2,640.37
Per 1000 Gallons				$8.10
UNIT COSTS (After 30 Years)				
Per acre-foot				$0.00
Per 1000 gallons				$0.00

Table G-93

Trinity River Authority Reuse for Dallas and Ellis County Irrigation from 10-Mile Creek Project (2010)

Owner: Trinity River Authority
Amount: 250 Ac-Ft/Yr

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)				
8" Water Line				
Pipe	3,000	LF	$48	$144,000
Right of Way Easements (Urban)	1	AC	$60,000	$60,000
Engineering & Contingenices (30%)				$43,000
Subtotal of Pipeline				**$247,000**
Pump Station(s)				
Station 1				
Pump Station	9	hp		$500,000
Engineering and Contingencies	35%			$175,000
Subtotal of Pump Station(s)				**$675,000**
Permitting and Mitigation	1%			**$8,000**
CONSTRUCTION TOTAL				**$930,000**
Interest During Construction		(6 months)		**$20,000**
TOTAL CAPITAL COST				**$950,000**
ANNUAL COSTS				
Debt Service				$69,000
Operation and Maintenance Costs				
Pipeline	1%			$1,700
Pump Station	2.50%			$15,000
Estimated Annual Power Cost	38,152	kW-H	$ 0.09	$3,400
Purchase of Reuse Water	250	AF/Y	$ 81.46	$20,400
TOTAL ANNUAL COSTS				**$109,500**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$438
Per 1,000 Gallons				$1.34
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$162
Per 1,000 Gallons				$0.50

Table G-94
Ellis Irrigation - New Wells Woodbine Aquifer (2010)

Owner:	Ellis Irrigation	
Amount:	563	Acre-Feet per Year
Water Depth	481	ft
Well Depth	1,484	ft
Well Yield	100	gpm
Well Size	8	in
Yield per well	161	Acre-Feet per Year (peak)
Yield per well	81	Acre-Feet per Year (average)
Wells Needed	7	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	10,388	LF	$168	$1,745,000
Connection to distribution	7	LS	$150,000	$1,050,000
Engineering and Contingencies	30%			$839,000
Subtotal of Well(s)				**$3,634,000**
Permitting and Mitigation	1%			**$34,000**
CONSTRUCTION TOTAL				**$3,668,000**
Interest During Construction		(6 months)		**$79,000**
TOTAL CAPITAL COST				**$3,747,000**
ANNUAL COSTS				
Debt Service - Total Capital				$272,200
Operation and Maintenance				
Transmission	1.0%			$12,600
Well(s)	2.5%			$52,400
Chlorination	183,454	1000 gal	$0.25	$45,900
Pumping Costs	418,000	kW-h	$0.09	$37,600
TOTAL ANNUAL COSTS				**$420,700**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$747.25
Per 1000 Gallons				$2.29
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$263.77
Per 1000 Gallons				$0.81

Table G-95
Ellis Manufacturing Additional Water from Waxahachie

Owner: Manufacturing
Amount: 685 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Operation and Maintenance Costs				
Pipeline	1.0%			$0
Pump Station	2.5%			$0
Estimated Annual Power Cost				$0
Treated Water Cost	223,325	1000 gal	$4.45	$993,800
TOTAL ANNUAL COSTS				**$993,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,450.04
Per 1,000 Gallons				$4.45
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,450.00
Per 1,000 Gallons				$4.45

Table G-96
Ellis Manufacturing Additional Water from Midlothian

Owner: Manufacturing
Amount: 1,940 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Operation and Maintenance Costs				
Pipeline	1.0%			$0
Pump Station	2.5%			$0
Estimated Annual Power Cost				$0
Treated Water Cost	632,151	1000 gal	$3.89	$2,459,100
TOTAL ANNUAL COSTS				**$2,459,100**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,267.58
Per 1,000 Gallons				$3.89
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,268.00
Per 1,000 Gallons				$3.89

Table G-97
Ellis Manufacturing Additional Water from Ennis

Owner: Manufacturing
Amount: 274 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Operation and Maintenance Costs				
Pipeline	1.00%			$0
Pump Station	2.50%			$0
Estimated Annual Power Cost				$0
Treated Water Cost	89,283	1000 gal	$3.41	$304,500
TOTAL ANNUAL COSTS				**$304,500**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,111.31
Per 1,000 Gallons				$3.41
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,111.00
Per 1,000 Gallons				$3.41

Table G-98
Ellis Manufacturing - New Wells in Woodbine Aquifer

Owner:	Ellis Manufacturing	
Amount:	101	Acre-Feet per Year
Water Depth	481	ft
Well Depth	1,484	ft
Well Yield	100	gpm
Well Size	8	in
Yield per well	161	Acre-Feet per Year (peak)
Yield per well	81	Acre-Feet per Year (average)
Wells Needed	2	

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
WELLS				
Groundwater wells	2,968	LF	$280	$831,000
Connection to distribution	2	LS	$150,000	$300,000
Engineering and Contingencies	30%			$339,000
Subtotal of Well(s)				**$1,470,000**
Permitting and Mitigation	1%			**$14,000**
CONSTRUCTION TOTAL				**$1,484,000**
Interest During Construction		(6 months)		**$32,000**
TOTAL CAPITAL COST				**$1,516,000**
ANNUAL COSTS				
Debt Service - Total Capital				$110,100
Operation and Maintenance				
Transmission	1.0%			$3,600
Well(s)	2.5%			$24,900
Chlorination	32,911	1000 gal	$0.25	$8,200
Pumping Costs	78,000	kW-h	$0.09	$7,000
TOTAL ANNUAL COSTS				**$153,800**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,522.77
Per 1000 Gallons				$4.67
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$432.67
Per 1000 Gallons				$1.33

Table G-99
Ellis Steam Electric Power Additional Water from Midlothian (2010)

Owner: Ellis County-Steam Electric Power
Amount: 160 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$0**
ANNUAL COSTS				
Debt Service				$0
Operation and Maintenance Costs				
Pipeline	1.0%			$0
Pump Station	2.5%			$0
Estimated Annual Power Cost				$0
Treated Water Cost	52,259	1000 gal	$5.77	$301,500
TOTAL ANNUAL COSTS				**$301,500**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,879.95
Per 1,000 Gallons				$5.76
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,880.00
Per 1,000 Gallons				$5.76

Table G-100
Trinity River Authority Ellis County Reuse for Steam Electric Power (2010)

Trinity River Authority

40,000 ac-ft/yr

Assume four 10,000 acre-feet per year projects, each with 20 miles of pipeline (5 miles urban, 15 rural)

Item	Quantity	Units	Unit Cost	Total Cost
CAPITAL COST - PHASE 1				
CONSTRUCTION COSTS - PHASE 1				
TRANSMISSION FACILITIES				
Pipeline(s)				
36" Rural Water Line				
Pipe	79,200	LF	$ 171	$13,543,000
ROW	36.4	Ac	$ 10,000	$364,000
36" Urban Water Line				
Pipe	26,400	LF	$ 257	$6,785,000
ROW	12.1	Ac	$ 60,000	$726,000
Engineering and Contingencies	30%			$6,098,000
Subtotal of Pipeline(s)				**$27,516,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	600	hp		$2,000,000
Engineering and Contingencies	35%			$700,000
Subtotal of Pump Station(s)				**$2,700,000**
Permitting and Mitigation	1%			**$268,000**
CONSTRUCTION TOTAL				**$30,484,000**
Interest During Construction		(12 months)		**$1,270,000**
TOTAL CAPITAL COST - PHASE 1				**$31,754,000**
ANNUAL COSTS - PHASE 1				
Debt Service				$2,306,900
Operation and Maintenance Costs				
Pipeline	1%			$243,900
Pump Station	2.50%			$60,000
Estimated Annual Power Cost	2,082,276	kW-H	$ 0.09	$187,400
Purchase of Reuse Water	10,000	AF/Y	$ 81.50	$815,000
TOTAL ANNUAL COSTS - PHASE 1				**$3,613,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$361
Per 1,000 Gallons				$1.11
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$131
Per 1,000 Gallons				$0.40

Table G-100, Continued

CAPITAL COST - PHASE 2				
CONSTRUCTION COSTS - PHASE 2				
TRANSMISSION FACILITIES				
Pipeline(s)				
36" Rural Water Line				
Pipe	79,200	LF	$ 171	$13,543,000
ROW	36.4	Ac	$ 10,000	$364,000
36" Urban Water Line				
Pipe	26,400	LF	$ 257	$6,785,000
ROW	12.1	Ac	$ 60,000	$726,000
Engineering and Contingencies	30%			$6,098,000
Subtotal of Pipeline(s)				**$27,516,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	600	hp		$2,000,000
Engineering and Contingencies	35%			$700,000
Subtotal of Pump Station(s)				**$2,700,000**
Permitting and Mitigation	1%			**$268,000**
CONSTRUCTION TOTAL				**$30,484,000**
Interest During Construction		(12 months)		**$1,270,000**
TOTAL CAPITAL COST - PHASE 2				**$31,754,000**
ANNUAL COSTS - PHASE 2				
Debt Service				$2,306,900
Operation and Maintenance Costs				
Pipeline	1%			$243,900
Pump Station	2.50%			$60,000
Estimated Annual Power Cost	2,082,276	kW-H	$ 0.09	$187,400
Purchase of Reuse Water	10,000	AF/Y	$ 81.50	$815,000
TOTAL ANNUAL COSTS - PHASE 2				**$3,613,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$361
Per 1,000 Gallons				$1.11
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$131
Per 1,000 Gallons				$0.40

Table G-100, Continued

CAPITAL COST - PHASE 3				
CONSTRUCTION COSTS - PHASE 3				
TRANSMISSION FACILITIES				
Pipeline(s)				
36" Rural Water Line				
Pipe	79,200	LF	$ 171	$13,543,000
ROW	36.4	Ac	$ 10,000	$364,000
36" Urban Water Line				
Pipe	26,400	LF	$ 257	$6,785,000
ROW	12.1	Ac	$ 60,000	$726,000
Engineering and Contingencies	30%			$6,098,000
Subtotal of Pipeline(s)				**$27,516,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	600	hp		$2,000,000
Engineering and Contingencies	35%			$700,000
Subtotal of Pump Station(s)				**$2,700,000**
Permitting and Mitigation	1%			**$268,000**
CONSTRUCTION TOTAL				**$30,484,000**
Interest During Construction		(12 months)		**$1,270,000**
TOTAL CAPITAL COST - PHASE 3				**$31,754,000**
ANNUAL COSTS - PHASE 3				
Debt Service				$2,306,900
Operation and Maintenance Costs				
Pipeline	1%			$243,900
Pump Station	2.50%			$60,000
Estimated Annual Power Cost	2,082,276	kW-H	$ 0.09	$187,400
Purchase of Reuse Water	10,000	AF/Y	$ 81.50	$815,000
TOTAL ANNUAL COSTS - PHASE 3				**$3,613,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$361
Per 1,000 Gallons				$1.11
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$131
Per 1,000 Gallons				$0.40

Table G-100, Continued

CAPITAL COST - PHASE 4				
CONSTRUCTION COSTS - PHASE 4				
TRANSMISSION FACILITIES				
Pipeline(s)				
36" Rural Water Line				
Pipe	79,200	LF	$ 171	$13,543,000
ROW	36.4	Ac	$ 10,000	$364,000
36" Urban Water Line				
Pipe	26,400	LF	$ 257	$6,785,000
ROW	12.1	Ac	$ 60,000	$726,000
Engineering and Contingencies	30%			$6,098,000
Subtotal of Pipeline(s)				**$27,516,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	600	hp		$2,000,000
Engineering and Contingencies	35%			$700,000
Subtotal of Pump Station(s)				**$2,700,000**
Permitting and Mitigation	1%			**$268,000**
CONSTRUCTION TOTAL				**$30,484,000**
Interest During Construction		(12 months)		**$1,270,000**
TOTAL CAPITAL COST - PHASE 4				**$31,754,000**
ANNUAL COSTS - PHASE 4				
Debt Service				$2,306,900
Operation and Maintenance Costs				
Pipeline	1%			$243,900
Pump Station	2.50%			$60,000
Estimated Annual Power Cost	2,082,276	kW-H	$ 0.09	$187,400
Purchase of Reuse Water	10,000	AF/Y	$ 81.50	$815,000
TOTAL ANNUAL COSTS - PHASE 4				**$3,613,200**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$361
Per 1,000 Gallons				$1.11
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$131
Per 1,000 Gallons				$0.40

Table G-101
Ellis County SEP Connection to Waxahachie (2010)

Owner: Ellis County Steam Electric Power
Amount 4,484 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
TRANSMISSION FACILITIES				
Pipeline				
24" Pipe	26,400	FT	$108	$2,851,000
ROW	12	AC	$10,000	$121,000
Engineering and Contingencies	30%			$855,000
Subtotal of Pipeline(s)				**$3,827,000**
Pump Station(s)				
Pump, building, & appurtances	70	hp		$636,000
Engineering and Contingencies	35%			$223,000
Subtotal of Pump Station(s)				**$859,000**
Permitting and Mitigation	1%			**$42,000**
CONSTRUCTION TOTAL				**$4,728,000**
Interest During Construction		(12 months)		**$197,000**
TOTAL CAPITAL COST				**$4,925,000**
ANNUAL COSTS				
Debt Service				$357,800
Operation and Maintenance Costs				
Pipeline	1.0%			$34,200
Pump Station	2.5%			$19,100
Annual Power Cost	167,638	kW-hr	$0.09	$15,000
Raw Water		1000 gal	$1.50	$2,190,000
TOTAL ANNUAL COSTS (First 30 Years)				**$2,616,100**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$583.43
Per 1,000 Gallons				$1.79
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$503.64
Per 1,000 Gallons				$1.55

Table G-102
BRA Main Stem to Supply Johnson County-Other

Owner: Johnson County-Other
Amount: 2,326 Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COST				
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipelines				
Pipeline 18 in.	105,600	LF	$72	$7,603,000
ROW Easements	48	Acres	$10,000	$480,000
Engineering and Contingencies (30%)	30.0%			$2,425,000
Subtotal of Pipelines				**$10,508,000**
Pumping Facilities				
40 HP Pump Station	1	LS	$580,000	$580,000
0.15 MG Elevated Storage Tank	1	LS	$1,200,000	$1,200,000
Engineering and Contingencies (35%)	35.0%			$623,000
Subtotal of Pump Stations				**$2,403,000**
Permitting and Mitigation	1%			**$113,000**
CONSTRUCTION TOTAL				**$13,024,000**
Interest During Construction		(18 months)		**$803,000**
TOTAL CAPITAL COST				**$13,827,000**
ANNUAL COSTS				
Debt Service - Total Capital				$1,005,000
Operation and Maintenance				
Purchase of water	757,929	1000 gal	$4.29	$3,252,000
Transmission	1.0%			$91,000
Storage tanks and Pumps	2.5%			$53,000
Pumping Costs	98,233	kW-h	$0.09	$9,000
TOTAL ANNUAL COSTS				**$4,410,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$1,895.96
Per 1000 Gallons				$5.82
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$1,463.89
Per 1000 Gallons				$4.49

Table G-103
Trinity River Authority Dallas and Johnson Counties Reuse for Steam Electric Power

Owner:	Trinity River Authority	
Dallas County	3,000	Acre-Feet per Year
Johnson County	20,000	Acre-Feet per Year
Total Amount:	23,000	Acre-Feet per Year

Item	Quantity	Unit	Unit Cost	Total Cost	Mtn Crk (13%)	Joe Pool (87%)
CAPITAL COSTS						
42" Pipeline	60,200	LF	$300	$18,060,000	$962,600	$17,097,400
Right of Way Easements (ROW)	41	Acre	$60,000	$2,488,000	$132,600	$2,355,400
Engineering & Contingencies (30%)	30%			$5,418,000	$289,000	$5,129,000
Total Pipeline Cost				**$25,966,000**	**$1,384,200**	**$24,581,800**
Cost of Pump Station - 1300 HP	1	LS	$3,036,000	$3,036,000	$396,000	$2,640,000
Engineering & Contingencies	35%			$1,063,000	$139,000	$924,000
Total Pump Station Cost				**$4,099,000**	**$535,000**	**$3,564,000**
TOTAL CAPITAL COST				**$30,065,000**	**$1,919,200**	**$28,145,800**
Permitting and Mitigation	1%			**$253,000**	**$16,000**	**$237,000**
Interest during Construction (12 months)				**$1,253,000**	**$80,000**	**$1,173,000**
Total Raw Water Delivery Capital Cost				**$31,571,000**	**$2,015,200**	**$29,555,800**
ANNUAL COSTS						
Debt Service (6% for 30 years)				$2,294,000	$146,400	$2,147,600
Power Cost	6,487,043	kW-h	$0.1	$584,000	$76,200	$507,800
Operation & Maintenance				$308,000	$23,400	$284,600
Purchase of Reuse Water	23,000	Ac-Ft	$81.5	$1,874,000	$244,400	$1,629,600
TOTAL ANNUAL COSTS				**$5,060,000**	**$490,400**	**$4,569,600**
UNIT COSTS (Mountain Creek) (During Amortization)						
Per Acre-Foot				$163.47		
Per 1,000 gallons				$0.50		
UNIT COSTS (Mountain Creek) (After Amortization)						
Per Acre-Foot				$115.00		
Per 1,000 gallons				$0.35		
UNIT COSTS (Joe Pool) (During Amortization)						
Per Acre-Foot				$228.48		
Per 1,000 gallons				$0.70		
UNIT COSTS (Joe Pool) (After Amortization)						
Per Acre-Foot				$121.00		
Per 1,000 gallons				$0.37		

Note: Cost to purchase reuse water is assumed to be $81.46 per acre-foot.

APPENDIX H

DETAILED COST ESTIMATES FOR ALTERNATIVE WATER MANAGEMENT STRATEGIES

Appendix H
Detailed Cost Estimates for Alternative Water Management Strategies

This appendix includes specific cost estimates for recommended water management strategies. The memorandum summarizing the cost estimating assumptions is included at the beginning of Appendix G.

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Table H-1
Dallas Supply to Ellis County Customers - Rockett SUD, Red Oak, and Waxahachie

Owners:	Rockett SUD, Red Oak, Waxahachie		**Cost Distribution (%)**		
Total Amount:	19,186 Ac-Ft/Yr		61.6%	19.6%	18.8%
			Projected Supply Distribution (Ac-Ft/Yr)		
			11,301	1,159	6,726

CONSTRUCTION COSTS

TRANSMISSION FACILITIES	**Qty.**	**Units**	**2Q 2007 Unit Cost**	**2Q 2007 Total Cost**	**Rockett SUD Total Cost**	**Red Oak Total Cost**	**Waxahachie Total Cost**
System Pipeline							
60" Water Line							
Pipe	35,000	FT	$ 460	$ 16,100,000			
ROW	16	AC	$ 60,000	$ 964,000			
54" Water Line							
Pipe	8,200	FT	$ 295	$ 2,419,000			
ROW	4	AC	$ 10,000	$ 38,000			
48" Water Line							
Pipe	32,700	FT	$ 250	$ 8,175,000			
ROW	15	AC	$ 10,000	$ 150,000			
Engineering and Contingencies	30%			$ 8,008,000	$ 4,932,000	$ 1,571,000	$ 1,505,000
Subtotal of System Pipeline				**$ 35,854,000**	**$ 22,082,000**	**$ 7,035,000**	**$ 6,737,000**
Waxahachie Pipeline							
36" Water Line							
Pipe	26,200	FT	$ 171	$ 4,480,000			
ROW	12	AC	$ 10,000	$ 120,000			
Engineering and Contingencies	30%			$ 1,344,000			$ 1,344,000
Subtotal of Waxahachie Pipeline				**$ 5,944,000**			**$ 5,944,000**
PERMITTING AND MITIGATION							
System Pipeline	1%			**$ 320,000**	**$ 197,000**	**$ 63,000**	**$ 60,000**
Waxahachie Pipeline	1%			**$ 54,000**			**$ 54,000**
CONSTRUCTION TOTAL				**$ 42,172,000**	**$ 22,279,000**	**$ 7,098,000**	**$ 12,795,000**
Interest During Construction	(18 months)			**$ 2,601,000**	**$ 1,374,000**	**$ 438,000**	**$ 789,000**
TOTAL CAPITAL COST				**$ 44,773,000**	**$ 23,653,000**	**$ 7,536,000**	**$ 13,584,000**
ANNUAL COSTS							
Debt Service				$ 3,253,000	$ 1,718,000	$ 547,000	$ 987,000
Operation and Maintenance Costs							
System Pipeline	1%			$ 320,000	$ 197,000	$ 63,000	$ 60,000
Waxahachie Pipeline	1%			$ 54,000			$ 54,000
Estimated Annual Power Cost	$0.09/kWh			$ -	$ -	$ -	$ -
Treated Water Demand Charge*	26	MGD	$ 123,190	$ 3,203,000	$ 1,973,000	$ 628,000	$ 602,000
Treated Water Volume Charge	6,251,796	1000 gal	$ 0.65	$ 4,064,000	$ 2,503,000	$ 797,000	$ 764,000
Total Annual Costs				**$ 10,894,000**	**$ 6,391,000**	**$ 2,035,000**	**$ 2,467,000**
UNIT COSTS (First 30 Years)							
Per Acre-Foot				$ 568	$ 541	$ 541	$ 684
Per 1,000 Gallons				$ 1.74	$ 1.66	$ 1.66	$ 2.10
UNIT COSTS (After 30 Years)							
Per Acre-Foot				$ 398	$ 395	$ 395	$ 411
Per 1,000 Gallons				$ 1.22	$ 1.21	$ 1.21	$ 1.26

Note: * The Treated Water Demand Charge is the same as what was used in the *2006 Region C Water Plan* . It was not adjusted in this updated cost estimate.

Table H-2
Johnson County SUD Purchase Water from Dallas

Owner:	Johnson County SUD				
Amount:	106	Ac-Ft/Yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
12" Water Line					
Pipe	164,000	FT	$ 48	$	7,872,000
ROW	75	AC	$ 10,000	$	753,000
Engineering and Contingencies	30%			$	2,362,000
Subtotal of Pipeline(s)				**$**	**10,987,000**
Pump Station(s)					
Station 1					
Pump, building, & appurtances	5	hp		$	480,000
Storage Tank	20,000	gal		$	80,000
Engineering and Contingencies	35%			$	196,000
Subtotal of Pump Station(s)				**$**	**756,000**
PERMITTING AND MITIGATION	1%			**$**	**101,000**
CONSTRUCTION TOTAL				**$**	**11,844,000**
Interest During Construction	(24 months)			**$**	**967,299**
TOTAL CAPITAL COST				**$**	**12,811,299**
ANNUAL COSTS					
Debt Service				$	931,000
Operation and Maintenance Costs					
Pipeline	1%			$	94,000
Pump Station	2.50%			$	17,000
Estimated Annual Power Cost	$0.09/kWh			$	2,000
Treated Water Cost	34,540	1000 gal	$ 3.29	$	114,000
Total Annual Costs				**$**	**1,158,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	10,925
Per 1,000 Gallons				$	33.53
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	2,142
Per 1,000 Gallons				$	6.57

Table H-3
Mountain Peak WSC Purchase Additional Water from Midlothian

Owner:	Mountain Peak WSC				
Amount:	401	Ac-Ft/Yr			
Item No. & Description	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service				$	-
Operation and Maintenance Costs					
Pipeline	1%			$	-
Pump Station	2.50%			$	-
Estimated Annual Power Cost	$0.09/kWh			$	-
Treated Water Cost	130,647	1000 gal	$ 4.20	$	549,000
Total Annual Costs				**$**	**549,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	1,369
Per 1,000 Gallons				$	4.20
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	1,369
Per 1,000 Gallons				$	4.20

Table H-4
Mountain Peak WSC Purchase Water from Rockett SUD

Owner:	Mountain Peak WSC				
Amount:	2,041	Ac-Ft/Yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
18" Water Line					
Pipe	100,000	FT	$ 72	$	7,200,000
ROW	46	AC	$ 10,000	$	459,000
Engineering and Contingencies	30%			$	2,160,000
Subtotal of Pipeline(s)				**$**	**9,819,000**
Pump Station(s)					
Station 1					
Pump, building, & appurtances	286	hp		$	1,340,000
Storage Tank	610,000	gal		$	450,000
Engineering and Contingencies	35%			$	627,000
Subtotal of Pump Station(s)				**$**	**2,417,000**
PERMITTING AND MITIGATION	1%			**$**	**115,000**
CONSTRUCTION TOTAL				**$**	**12,351,000**
Interest During Construction		(18 months)		**$**	**762,000**
TOTAL CAPITAL COST				**$**	**13,113,000**
ANNUAL COSTS					
Debt Service				$	953,000
Operation and Maintenance Costs					
Pipeline	1%			$	86,000
Pump Station	2.50%			$	54,000
Estimated Annual Power Cost	$0.09/kWh			$	84,000
Treated Water Cost	665,062	1000 gal	$ 2.08	$	1,383,000
Total Annual Costs				**$**	**2,560,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	1,254
Per 1,000 Gallons				$	3.85
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	787
Per 1,000 Gallons				$	2.42

APPENDIX I

MEETINGS WITH LARGE REGIONAL PROVIDERS AND MEETING WITH STUDY AREA PARTICIPANTS

Appendix I
Meetings with Large Regional Providers and Meeting with Study Area Participants

As discussed in Section 3 of this report, the consultants held two meetings with the large regional water providers and one group meeting with the study area participants. This appendix includes meeting notes from each of these three meetings:

- Meeting with Large Suppliers on December 19, 2007
- Meeting with Large Suppliers on October 20, 2008
- Meeting with Study Area Participants on November 25, 2008

Freese and Nichols

MEMORANDUM

TO: File

FROM: Stephanie Griffin

SUBJECT: Notes from the Meeting of the Large Suppliers Involved in the Region C/Brazos G Four County Study Held on December 19, 2007 at 10 AM at Freese and Nichols, Inc. (FNI) Fort Worth Office

DATE: January 6, 2008

I. Introductions

Stephanie Griffin opened the meeting and welcomed everyone. Everyone introduced himself/herself to the group. The following people attended the meeting:

Brad Brunett and Mike McClendon, Brazos River Authority (BRA)
Wayne Owen and Laura Blaylock, Tarrant Regional Water District (TRWD)
Danny Vance, Alison Mackey, and Glenn Clingenpeel, Trinity River Authority (TRA)
Jody Puckett, Dallas
Frank Crumb, Fort Worth
Stephanie Griffin and Tom Gooch, FNI
Alan Plummer and Brian McDonald, Alan Plummer Associates, Inc. (APAI)
Ed Motley and Rick Shaffer, Chiang, Patel and Yerby, Inc. (CPYI)
David Dunn, HDR Inc.

II. Study Background

Stephanie provided background information as to how this study came to be. She also reviewed the scope of work to be completed in this study. Wayne Owen added comments regarding the importance of this study to TRWD and their goals for the study.

III. Project Update and Discussion

A. Overview of WUG/WWP Meetings

Stephanie updated the group on the meetings held with nineteen water user groups and wholesale water providers in the fall. In addition to these meetings, the consultants sent surveys to the remaining entities within the study area. The consultants have prepared draft population and demand projections for this study with the input gathered from the entities.

Freese and Nichols, Inc. ◆ Engineers ◆ Environmental Scientists ◆ Architects
4055 International Plaza ◆ Suite 200 ◆ Fort Worth, Texas 76109-4895
(817) 735-7300 ◆ Metro (817) 429-1900 ◆ Fax (817) 735-7491

The consultants have developed a draft summary of "current" water supplies based on the 2006 regional water plans plus existing contracts. An initial comparison of projected demand to "current" supplies has been developed.

B. Draft Population and Demand Projections

Stephanie reviewed the population projections for Ellis and Johnson Counties, as well as the demand projections for these counties. Then, she presented graphs of the proposed population and demand projections for the entities within the study area whose projections are significantly different from the 2006 regional water plans.

Jody requested that the per capita water use be sent to the suppliers to review. Stephanie told her that we have that data and will send it to the suppliers. Jody also requested that the proposed demands be presented as new demands versus shifting demands. A graph showing how the demands will develop over time would be helpful.

Overall, most entities are seeing an increase in growth. The overall proposed population projections for this study are higher than the 2006 regional water plans but lower that the NCTCOG projections.

C. Current Supply vs. Projected Demand

Stephanie and Tom discussed new information that was gathered at the meetings with the various suppliers, including:

- Grand Prairie and Johnson County SUD plans to sell water to each other.
- The Rockett SUD-Waxahachie-Red Oak project to purchase water from Dallas is no longer being pursued.
- Rockett SUD and Waxahachie are developing a shared water treatment plant.
- Johnson County SUD would like additional TRWD water.

We discussed the draft comparison of the proposed demands to the current supplies for a number of entities. A few questions were raised about the current supplies for a handful of entities. Stephanie said she would look into these and get back with everyone.

Jody pointed out that Dallas has contracts with Rockett SUD and Ellis County WCID. The other contracts noted in the graphs as being Dallas contracts are really through one of these intermediary suppliers. Stephanie agreed to correct the wording on the graphs.

IV. Initial Thoughts on Changed Conditions

A. Brazos River Authority Comments

BRA commented that they would like to participate in providing additional water to the study area in the future. However, their current policy prohibits them from signing additional contracts until additional supplies have been made available. BRA has a waiting list of entities requesting water from the SWATS plant. The BRA is pursuing a system operations permit to provide for that additional supply.

BRA is allowing current contracting parties to return up to 20 percent of their raw water contracts per year. This water is then made available to entities on the waiting list.

B. Tarrant Regional Water District, Trinity River Authority, and Fort Worth Comments

TRWD is interested in what its primary contracting parties think.

TRA commented that they will rely on the preference of the other primary contracting parties. Tarrant County customers have priority. TRA manages the contracts in Ellis County for the TRWD supplies.

Fort Worth commented that TRWD should not take on additional customers in Ellis or Johnson Counties. Wayne, Danny and Frank discussed some of the contracting procedures of the four primary contracting parties. Frank suggested that the current procedure may need to be revisited. The current procedure allows the four contracting parties to add new customers without TRWD approval.

C. Dallas Comments

Dallas would like to see the per capita water use projections and the truly new demands versus shifting demands from one provider to another. Jody plans to contact Waxahachie and Rockett SUD following the holidays to ask about the plans for the existing contracts with Dallas.

D. Other Comments

Tom commented that this study has two parts to it – Ellis County and Johnson County. In Ellis County, TRWD has no formal commitment to supply additional water, but the implication is there because the transmission lines run through Ellis County. The same is not true in Johnson County. If the TRWD third pipeline does go through Johnson County, then an informal commitment would be implied.

The idea of marginal pricing for new customers can be explored.

V. Next Steps

Stephanie reviewed the next major steps in the study.

Stephanie will send the meeting notes and per capita water use figures to the meeting attendees.

Stephanie will provide a service area map for the next meeting. FNI will develop a comparison of truly new demands versus shifting demands. The group will meet again the last week of February or the first week of March.

VI. Adjournment

Freese and Nichols

MEMORANDUM

TO: File

FROM: Stephanie Griffin

SUBJECT: Notes from the Meeting of the Large Suppliers Involved in the Region C/Brazos G Four County Study Held on October 20, 2008 at 2 PM at Freese and Nichols, Inc. (FNI) Fort Worth Office

DATE: October 28, 2008

I. Welcome

Stephanie Griffin opened the meeting and welcomed everyone. The following people attended the meeting:

Brad Brunett and Mike McClendon, Brazos River Authority (BRA)
Wayne Owen, Tina Ptak and Laura Blaylock, Tarrant Regional Water District (TRWD)
Bill Smith, Alison Mackey, and Glenn Clingenpeel, Trinity River Authority (TRA)
Jody Puckett and Denis Qualls, Dallas
Stephanie Griffin, Tom Gooch and Rusty Gibson, FNI
John Minahan, Alan Plummer Associates, Inc. (APAI)
Rick Shaffer, Chiang, Patel and Yerby, Inc. (CPYI)
Kristi Shaw, HDR Inc.

II. Background on the Study

Stephanie reviewed the scope of work for the study and the current status of the project.

III. Project Update and Discussion

A. Final Population and Demand Projections

Stephanie reviewed the updated population and demand projections recommended in this study. In general, the projections for this study are higher than the 2006 regional water plans but lower that the NCTCOG projections. The population and demand memo is included as Appendix C to the main report. We also discussed the changes in demand on the regional water providers in the study area in terms of what customers had increasing or decreasing water demands.

B. Recommended Supply vs. Projected Demand Analysis

Stephanie reviewed the demand versus supply comparison for the entities with significant changed conditions. We discussed the proposed strategies for these entities. A few tables

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and figures were questioned during the discussion. Stephanie will review those and make any necessary adjustments.

The group discussed how the Dallas contracts with Ellis County entities should be shown. The agreement reached was to show the contracted supplies with Dallas, even if the entity has indicated that they plan to obtain water elsewhere. Denis will get back with Stephanie as to what amount to assume for Rockett SUD.

C. Cost Estimates

Stephanie reviewed the basic assumptions behind the cost estimates. She reviewed the summary of project costs by project type by county.

D. Discussion on New Demand

Tom presented information on the new demands being recommended in this study. This information was of interest to Jody at the December meeting. Tom explained what increases in water demands were due to growth and what increases were due to entities changing suppliers.

E. TRWD Policies

Tom reviewed the policy recommendations with regards to future TRWD contracts in Ellis and Johnson Counties. Tom agreed to review the policy discussion to ensure that those entities seeking contracts with TRWD get their contracts with DWU straightened out. Jody and Wayne agreed that the entities need to clarify their water management strategies.

IV. Schedule

Tom reviewed the next major steps in the study.

Oct 27 – Comments from Regional Providers and Consultants

Nov 10 – Draft Report to WUGs, WWPs, RWPGs, and Region C Web Site

Week of Nov 17 – Meeting with WUGs and WWPs

Dec 8 – Present Draft Report to RCWPG

Dec 18 – Submit Draft Report to TWDB

V. Adjourn

Freese and Nichols

MEMORANDUM TO FILE

FROM: Stephanie W. Griffin, P.E.

SUBJECT: Summary of Meeting to Discuss Four County Study Draft Report Held November 25, 2008 in Midlothian (Ellis, Johnson, Southern Dallas and Southern Tarrant Counties)

DATE: December 1, 2008

Overview

The consultant team for the Region C Water Planning Group hosted a meeting to discuss the proposed recommendations in the Four County Study draft report. The meeting was held on Tuesday, November 25, 2008 at 10:00 AM in the Midlothian Community Center located at 1 Community Dr, Midlothian, TX 76082. On November 10, the consultants sent a letter to the water user groups and wholesale water providers in the study area inviting them to participate in this meeting. A copy of the letter is included in Attachment A.

Meeting Attendees

Approximately 30 people attended the meeting. The sign-in sheets are included in Appendix B.

Presentation and Meeting Discussion

Stephanie Griffin presented the summary of the Four County Study draft report. The presentation is included in Attachment C.

Stephanie elaborated on the reasons for the study. The population projections for the *2006 Region C Water Plan* and the *2006 Brazos G Water Plan* were prepared in 2002. About six months later, the North Central Texas Council of Governments (NCTCOG) then updated their population projections, which were higher in Ellis and Johnson Counties than the region planning projections. The Regional Water Planning Groups wanted to compare what actually took place in terms of growth to what was previously projected to happen. Overall, the growth has been more than what the planning groups projected but les than what the NCTCOG projected.

Stephanie reviewed the current and recommended water supplies for each water user group in the study area. She also reviewed the list of current and potential customers of wholesale water providers. Stephanie discussed water conservation, supplemental wells, and temporary overdrafting of the Trinity aquifer. The contracting and operational issues for the Tarrant Regional Water District (TRWD) related to the study area were also presented.

Stephanie asked attendees to stop her during the presentation if the information on the particular

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entity's water supply situation was not correct. The following comments/corrections were provided:

- Terry Kelly (Johnson County SUD) asked if Grandview could use a Trinity Basin source instead of the BRA SWATS strategy. Grandview is located in the Trinity Basin portion of Johnson County. Stephanie aid she would have to look into this and get back with Terry.
- Ron McCuller (Grand Prairie) updated us on Grand Prairie's negotiations with Mansfield. The contract being negotiated will use treated water from Mansfield. The Grand Prairie groundwater cannot be sent through the same line as the treated water from Mansfield. Thus, the strategy for JCSUD to purchase water (6 MGD peak) from Grand Prairie should refer to treated water from Mansfield instead of groundwater.
- Terry Kelly (JCSUD) noted that the water levels in the Trinity aquifer are down. JCSUD has experienced declines in well production, including a well that used to produce 150 gpm that now produces 30 gpm.
- Should a water treatment plant expansion be included for Mansfield?
- The connection between Midlothian and Sardis-Lone Elm WSC is an emergency connection only. The connection is designed to be beneficial to both parties. Ron McCuller (Grand Prairie) added that Midlothian can use some of Grand Prairie's Joe Pool Lake raw water.
- The TRA contract for TRWD supplies for Nash Forreston WSC is through Waxahachie, not Rockett SUD.
- Grand Prairie and Cedar Hill are talking about Cedar Hill sending Dallas water to Grand Prairie through Cedar Hill's transmission lines. Cedar Hill would transport the water, but it would not be a true wholesale sale. Grand Prairie would be purchasing the water directly from Dallas.

Ron McCuller (Grand Prairie) requested that some discussion be added to the report that addressed the Joe Pool supply and the lack of a regional plan for this supply.

Ron McCuller commented on water conservation. His distribution system, like most, is designed for fire flows and peak day demands. The decreased water usage resulting from water conservation impacts the water quality in the distribution system. Thus, cities must flush their pipelines while trying to tell customers to use water efficiently. How much conservation can we do without impacting water quality?

Wayne Owen provided some additional comments on the TRWD operational and policy topics. Wayne explained the reason behind the year 2030 being the year for maximum contractual demands. This is the year in which the projected demands of the primary wholesale customers meet the current supply. The primary wholesale customers have an unconditional obligation to pay for system operations. TRWD will consider demands beyond 2030 as new supplies are brought online.

Wayne told the group that TRWD and Dallas are studying the possibility of developing the third pipeline from the Richland-Chambers and Cedar Creek supplies jointly with the Lake Palestine water for Dallas.

Wayne also noted that TRWD is including language to allow for a 60 day shutdown of the Ellis County pipelines in its new Ellis and Johnson County contracts. In exchange for the 60 day shutdown requirement, TRWD is willing to remove the "take or pay" provision that is typically included in its water supply contracts. It is possible that both lines could be taken down at one time. The suppliers in Ellis County need to have adequate backup supplies.

ATTACHMENT A

SAMPLE LETTER INVITING WATER USER GROUPS AND WHOLESALE WATER PROVIDERS TO COUTY-WIDE MEETING

REGION C WATER PLANNING GROUP

Senate Bill One Third Round of Regional Water Planning - Texas Water Development Board

November 10, 2008

<Title><First Name><Last Name>
<Job Title>
<Address 1>
<Address 2>
<City><State><Zip>

Dear <First Name> <Last Name>:

The Region C Water Planning Group has completed its draft report summarizing the Four County Study, covering Ellis, Johnson, southern Tarrant and southern Dallas counties. The draft report can be accessed on the Region C web site at www.regioncwater.org in the "Documents and Graphics" document category "Draft Documents".

The consultant team for the Region C Water Planning Group is hosting a meeting to discuss the proposed recommendations in the draft report. This meeting is scheduled for Tuesday, November 25, 2008 at 10:00 AM at the Midlothian Conference Center located at 1 Community Drive, Midlothian, Texas 76065.

The Region C Water Planning Group appreciates your participation in this meeting. We invite you (or a representative from your staff) to participate in this meeting. The information you provide at this meeting will help the Planning Group finalize this report.

If you have any questions about this meeting or the Region C Water Planning effort, please contact Stephanie Griffin of Freese and Nichols, Inc. at (817)735-7353 or by email at swg@freese.com. If you cannot attend the meeting but would like to provide input, please contact Stephanie before November 25, 2008. The Region C Water Planning Group appreciates your participation in the planning effort.

Sincerely,

James (Jim) M. Parks
Chair, Region C Water Planning Group

Cc: Russell Laughlin, Secretary
Angela Masloff, Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com
www.regioncwater.org

Mr. Wayne Owen
Tarrant Regional Water District
P.O. Box 4508
Fort Worth TX 76164

Mr. Bill Smith
Trinity River Authority
P.O. Box 240
Arlington TX 76004

Mr. Brad Brunett
Brazos River Authority
P.O. Box 7555
Waco TX 76714-7555

Ms. Jody Puckett
Dallas Water Utilities
1500 Marilla Street
Room 4A North
Dallas TX 75201

Mr. Frank Crumb
City of Fort Worth
1000 Throckmorton Street
Fort Worth TX 76102

Mr. Wade Rhodes
City of Bardwell
P. O. Box 271
Bardwell TX 76101

Mr. John Daniel
Bethany WSC
133 S. County Road 810
Alvarado TX 76009-8409

Mrs. Mary Cox
Brandon-Irene WSC
P.O. Box 87
Brandon TX 76628-0087

Mr. Chester Nolen
City of Cleburne
P.O. Box 677
Cleburne TX 76033

Mr. Steve Stroube
Community Water Company
P.O. Box 730
Corsicana TX 75151

Mr. Charlie James
City of Ferris
100 Town Plaza
Ferris TX 75125

Mr. Kent Smith
Files Valley WSC
P.O. Box 127
Itasca TX 76055

Mr. Larry Pennington
City of Glenn Heights
1938 South Hampton Road
Glenn Heights TX 75154

Ms. Stephanie Hodges
City of Godley
P.O. Box 27
Godley TX 76044

Mr. David Bowman
City of Grandview
304 East Criner
P.O. Box 425
Grandview TX 76050

Mr. Bruce Kuykendall
City of Italy
P.O. Box 840
Italy TX 76651

Ms. Paulette Hartman
City of Joshua
101 S. Main St.
Joshua TX 76058

Mr. Mike Baze
City of Keene
100 N. Mockingbird
Keene TX 76059

Mayor Medford Marion
City of Maypearl
P.O. Box 400
Maypearl TX 76064

Mr. Larry Bumpus
City of Milford
P. O. Box 538
Milford TX 76670-0538

Mayor Paul Klooster
City of Oak Leaf
301 Locust Dr.
Oak Leaf TX 75154

Mr. Tony Bumpus
City of Ovilla
105 S. Cockrell Hill Rd. #2
Ovilla TX 75154

Mr. Stephen Sparks
City of Palmer
P.O. Box 489
Palmer TX 75152

Mr. Marty Smith
Parker WSC
7001 County Road 1200
Cleburne TX 76031

Mayor Richard Blake
City of Pecan Hill
1094 S. Lowrance Rd.
Pecan Hill TX 75154

Mr. James Fortson
Rice WSC
1612 Elmwood Ave
Corsicana TX 75110

Mr. James Lyles
City of Rio Vista
P.O. Box 129
Rio Vista TX 76093

Mr. Earl (Roy E) Kendrick
City of Wilmer
128 North Dallas Ave.
Wilmer TX 75172

Mr. Kent Smith
Avalon Water and Sewer Service Corporation
c/o Hillco H2O Operator
P.O. Box 127
Itasca TX 76055

Mr. Paul Stevens
Ellis County WCID #1
P.O. Box 757
Waxahachie TX 75165

Mr. Leland Calvert
Nash-Forreston Water Supply
947 Forreston Road
Waxahachie TX 75165

Mr. Steve Sievers
Bethesda WSC
P O Box 130
Burleson TX 76097-0130

Mr. Dave Stringer
City of Burleson
141 W. Renfro
Burleson TX 76028

Mr. Harry Shaffer
Johnson County FWSD #1
P.O. Box 39
Joshua TX 76058-0039

Mr. Bud Moore
City of Alavardo
104 W College
Alvarado TX 76009

Ms. Julie Hunt
City of Arlington
MS 01-0200
P.O. Box 90231
Arlington TX 76004-3231

Mr. Joe Buchanan
Buena-Vista Bethel SUD
312 S. Oak Branch Rd.
Waxahachie TX 75167-7832

Ms. Ruth Antebi-Guten
City of Cedar Hill
P.O. Box 96
Cedar Hill TX 75106

Mr. Joel Daugherty
City of Duncanville
P.O. Box 380280
Duncanville TX 75138-0280

Mr. Steve Howerton
City of Ennis
P.O. Box 220
Ennis TX 75120-0220

Mr. Ron McCuller
City of Grand Prairie
P.O. Box 534045
Grand Prairie TX 75053

Mr. Terry Kelley
Johnson County SUD
P.O. Box 509
Cleburne TX 76033

Mr. Larry Ledbetter
City of Kennedale
405 Municipal Drive
Kennedal TX 76060

Mr. Bud Ervin
City of Mansfield
1200 E. Broad Street
Mansfield TX 76063-1896

Mr. Mike Adams
City of Midlothian
104 W. Avenue E
Midlothian TX 76065

Mr. Randel Krik
Mountain Peak SUD
5671 Waterworks Rd
Midlothian TX 76065-5851

Mr Charles Brewer
Red Oak
P.O. Box 393
Red Oak TX 75154

Ms. Kay Phillips
Rockett SUD
P.O. Box 40
Red Oak TX 75145

Mr. Paul Tischler
Sardis-Lone Elm WSC
6681 West Highland Rd.
Midlothian TX 76065

ATTACHMENT B
SIGN IN SHEETS

REGION C
Water Planning for North Texas

Four County Study Meeting
Ellis, Johnson, Southern Dallas, and Southern Tarrant Counties
November 25, 2008

SIGN IN SHEET

NAME	ADDRESS	PHONE	AFFILIATION	WRITTEN COMMENTS PROVIDED YES/NO
Ben Wilson	104 W Ave E Midlothian TX 76065	972-775 6663	Midlothian	—
Adam Campbell	1554 S Clark Cedar Hill, Tx 75104	972-291-5126	Cedar Hill	N
Bud Ervin	1200 E Broad Mansfield, TX 76063	817 477-2248	Mansfield	N
Ben Shankle Childress Engineers	211 N. Ridgeway Cleburne 76033	817 645-1118	Rockett, BVB, Mt. Rock ICSUD, Sardis, ...	N
Craig Wilson	510 Winding Creek Trail Oak Leaf TX 75154	972 8576.0280	City of Oak Leaf	N
Chester Nolen	10 N. Robinson Cleburne, TX	817 645.0401	City of Cleburne	~0
Wayne Owen Tina Ptak	800 E. North Side Dr FW 76102	817.335 2491	TRWD	—

REGION C
Water Planning for North Texas

Four County Study Meeting
Ellis, Johnson, Southern Dallas, and Southern Tarrant Counties
November 25, 2008

SIGN IN SHEET

NAME	ADDRESS	PHONE	AFFILIATION	WRITTEN COMMENTS PROVIDED YES/NO
DENIS QUALLS	1500 MARILLA DR. DALLAS TX 75201	214 670-3843	CITY OF DALLAS	
David Bailey	401 S ROGERS ST waxahachie, TX 75165	972 938-2101	city of waxahachie	
BART HARRISON	126 ALTON ADAMS DRIVE WAXAHACHIE, TX 75165	(972) 617-3524	ROCKETT SUD	
Kristi Shaw	4401 West Gate Suite 400 AUSTIN TX 78722	512 912 5118	HDR ENGINEERING	
RICK SHAFFER	1820 REGAL ROW, STE 200 DALLAS TX 75235	817 392 6821	CP&Y	
Michael Scott	401 S. ROGERS waxahachie, TX 75168	972-938-2101 x283	City of waxahachie	
Billy Kinney	104 W. AVE E Midlothian, TX 76065	972-775-1053	City of Midlothian	

REGION C
Water Planning for North Texas

Four County Study Meeting
Ellis, Johnson, Southern Dallas, and Southern Tarrant Counties
November 25, 2008

SIGN IN SHEET

NAME	ADDRESS	PHONE	AFFILIATION	WRITTEN COMMENTS PROVIDED YES/NO
Don Ives	104 W. College St. Alvarado, TX 76009	817-790 3351	City of Alvarado	
Ronda Quintana	301 Locust Drive Oak Leaf, TX 75154	972-617-2660	City of Oak Leaf	
Terry Kelley	2849 S. Hwy 171 Cleburne	817 760 5220	Johnson County SUD.	
Dick Dickeas	"	817-790-7777	"	
Wayne Pratt	312 S Oak Branch Waxahachie, TX 75[illegible]67	972 937.1212	Buena-Vista Bethel SUD	
Joe Buchanan	" "	" "	" "	
John Minann	1320 S. Wilcox St. Ft. Worth TX 76[illegible]	817-80[illegible] .700	APAI	

REGION C
Water Planning for North Texas

Four County Study Meeting
Ellis, Johnson, Southern Dallas, and Southern Tarrant Counties
November 25, 2008

SIGN IN SHEET

NAME	ADDRESS	PHONE	AFFILIATION	WRITTEN COMMENTS PROVIDED YES/NO
Ron McCuller	PO Box 534045 GP TX 75053-4045	972 2378066	City of GP	No
Doug Cuny	11	972 237-8222	11	No
Bart Hines	5300 South Collins Arlington	817 493-5157	Trinity River Authority	No
Chris Metz	P.O. Box 846 Italy, TX 76651	214 491-9158	City of Italy	NO
Mike McClendon	4600 Cobbs Drive Waco, TX 76710	254-761-3164	BRA	NO
TERRY HAFER	104 W. College Alvarado	817-783 6539	City of Alvarado	No
Brad Brunett	Brazos River Authority 4600 Cobbs Dr. Waco, TX 76714	254-761-3171	BRA	No

REGION C
Water Planning for North Texas

Four County Study Meeting
Ellis, Johnson, Southern Dallas, and Southern Tarrant Counties
November 25, 2008

SIGN IN SHEET

NAME	ADDRESS	PHONE	AFFILIATION	WRITTEN COMMENTS PROVIDED YES/NO
Alan Thomas	800 E. Northside Dr. Fortworth 76102	817-335-2491	TRWD	
Mary Goza	City of Kennedale			

ATTACHMENT C
MEETING PRESENTATION

Four County Study

Region C Water Planning Group

November 25, 2008
Freese and Nichols, Inc.

Agenda

- Background Information
- Population and Demand Projections
- Summary by Water User Group
- Summary by Wholesale Water Provider
- Input from Water Providers
- Public Comments

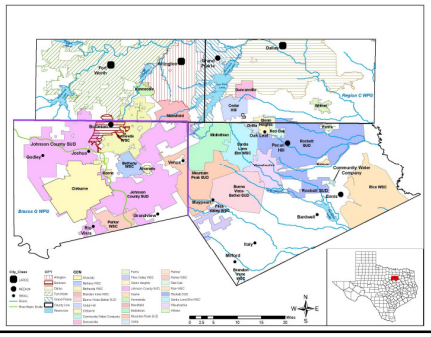
Overview

- Study Period – 2010 to 2030
- Study Area – Ellis and Johnson Counties, southern Dallas and Tarrant Counties
- Reasons for the Study
  - NCTCOG population projections for the study area are much higher than projections in the 2006 regional water plans
  - Changes in preferred water management strategies

Overview

- Joint study between Region C and Brazos G
- Matching funds provided by TRWD

Four County Study Area



Basic Steps in the Study

- Met with or surveyed Water User Groups (WUGs) and Wholesale Water Providers (WWPs) in the study area
- Reviewed recent population and water use data
- Developed population projections, per capita water use, and demand values
- Revised Water Management Strategies to meet projected demands
- Updated cost estimates for Water Management Strategies

Scope of Work Remaining

- Meeting with study area WUGs/WWPs in group setting (Today)
- Present draft report to RWPGs (December 8)
- Submit draft to TWDB (by December 31)

Water User Groups with Increased Population Projections in 2030

- Alvarado
- Bethany WSC
- Buena Vista – Bethel SUD
- Burleson
- Cedar Hill
- Cleburne
- Ennis
- Ferris
- Files Valley WSC
- Grand Prairie
- Grandview
- Johnson County SUD
- Joshua
- Kennedale
- Mansfield (Johnson County)
- Midlothian
- Mountain Peak SUD
- Red Oak
- Rockett SUD
- Sardis-Lone Elm WSC
- Venus
- Waxahachie

Water User Groups with Decreased Population Projections in 2030

- Mansfield (Tarrant and Ellis Counties)
- Parker WSC

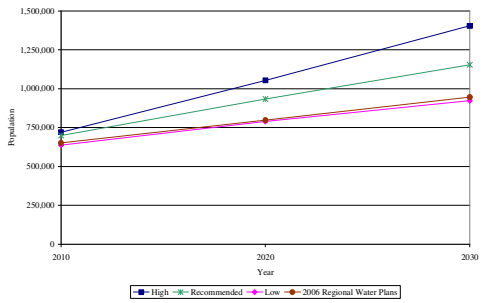
Water User Groups with No Change to Population Projections in 2030

- Acton MUD
- Bardwell
- Bethesda WSC
- Brandon-Irene WSC
- Community Water Company
- Duncanville
- Ellis County-Other
- Glenn Heights
- Godley
- Italy
- Johnson County-Other
- Keene
- Maypearl
- Milford
- Oak Leaf
- Ovilla
- Palmer
- Pecan Hill
- Rice WSC
- Rio Vista
- Wilmer

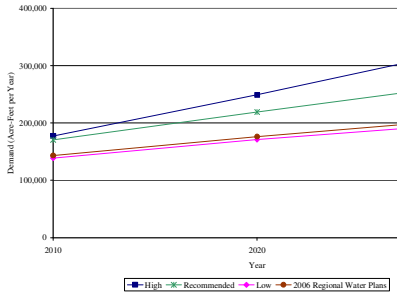
Four County Study Draft Report

- Population Projections Summary
  - Population and demand growing faster than projected in the regional water plans
  - County total population growing slower than projected by NCTCOG

Population Projections for Study Area



Demand Projections for Study Area



Four County Study

Summary by Water User Group

Summary by Water User Group

- Acton MUD
  - Current Sources
    - Trinity Aquifer
    - Brazos River Authority Surface Water and Treatment Systems (BRA SWATS)
  - No shortage; no recommended strategies

Summary by Water User Group

- Alvarado
  - Current Sources
    - Trinity Aquifer
    - Johnson County SUD
  - Recommended Strategies
    - Temporary Overdraft Trinity Aquifer (New Wells)
    - Additional Johnson County SUD
    - Purchase TRWD Sources (through TRA) with Midlothian Providing Water Treatment

Summary by Water User Group

- Bardwell
  - Current Sources
    - Water Conservation
    - Woodbine Aquifer
  - Recommended Strategies
    - Additional Woodbine Aquifer (New Wells)
    - Purchase Water from Ennis (TRWD Sources)
    - Supplemental Well

Summary by Water User Group

- Bethany WSC
  - Current Sources
    - Trinity Aquifer
  - Recommended Strategies
    - Keene (BRA SWATS System*)
    - Johnson County SUD

* Must be approved by the four existing BRA SWATS customers and BRA.

Summary by Water User Group

- Bethesda WSC
  - Current Sources
    - Water Conservation
    - Trinity Aquifer
    - Fort Worth (TRWD Sources)
  - Recommended Strategies
    - Additional Water from Fort Worth (TRWD Sources)
    - Purchase Water from Arlington (TRWD)
    - Supplemental Wells

Summary by Water User Group

- Brandon-Irene WSC
  - Current Sources
    - Water Conservation
    - Aquilla WSC (Lake Aquilla)
    - Trinity Aquifer
  - No shortage; no recommended strategies

Summary by Water User Group

- Buena-Vista Bethel SUD
  - Current Sources
    - Water Conservation
    - Trinity Aquifer
    - TRWD (from TRA through Waxahachie)
  - Recommended Strategies
    - Additional TRWD (from TRA through Waxahachie)
    - Additional Trinity Aquifer (Existing Wells)
    - Supplemental Wells
- Burleson
  - Current Sources
    - Fort Worth (TRWD Sources)
  - No shortage; no recommended strategies

Summary by Water User Group

- Cedar Hill
  - Current Sources
    - Water Conservation
    - Dallas Sources
    - Joe Pool Lake (not in use)
    - Trinity Aquifer
    - Additional Wells in Trinity Aquifer
  - Recommended Strategies
    - Purchase Additional Water from Dallas
    - Supplemental Wells

Summary by Water User Group

- Cleburne
  - Current Sources
    - Water Conservation
    - Lake Pat Cleburne
    - BRA Lake Aquilla
    - BRA Lake Whitney (not yet connected)
    - Reuse for Steam Electric Power
    - Trinity Aquifer
  - Recommended Strategies
    - Additional Reuse
    - Additional BRA System

Summary by Water User Group

- Community Water Company
  - Current Sources
    - Water Conservation
    - Lake Bardwell (through Ennis)
  - Recommended Strategies
    - TRA Ellis County Water Supply Project (Ennis)
- Duncanville
  - Current Sources
    - Water Conservation
    - Dallas Sources
    - Joe Pool Lake (not in use)
  - Recommended Strategies
    - Purchase Additional Water from Dallas

Summary by Water User Group

- Ellis County-Other
  - Current Sources
    - Water Conservation
    - Lake Bardwell (through Ennis)
    - Waxahachie Sources
    - Purchase from Rockett SUD
    - Trinity Aquifer
    - Woodbine Aquifer
  - Recommended Strategies
    - Additional Rockett SUD
    - TRWD (TRA) (from Buena-Vista Bethel SUD through Waxahachie)
    - Additional Trinity Aquifer (New Wells)
    - Additional Woodbine Aquifer (New Wells)
    - Supplemental Wells

Summary by Water User Group

- Ennis
  - Current Sources
    - Water Conservation
    - Lake Bardwell (TRA)
    - Direct Reuse (Steam Electric Purposes)
    - Indirect Reuse from Lake Bardwell (TRA)
    - TRWD (through TRA)
    - TRWD (TRA through Rockett SUD – retail customers)
  - No shortage, no recommended strategies

Summary by Water User Group

- Ferris
  - Current Sources
    - Water Conservation
    - TRWD (from TRA through Rockett SUD)
    - Woodbine Aquifer
    - Supplemental Wells
  - No shortage; no recommended strategies

Summary by Water User Group

- Files Valley WSC
  - Current Sources
    - Water Conservation
    - Lake Aquilla (through Aquilla WSC)
  - Recommended Strategies
    - TRWD (TRA) (from Buena Vista-Bethel SUD through Waxahachie)
- Glenn Heights
  - Current Sources
    - Water Conservation
    - Dallas Source
    - Trinity Aquifer
    - Supplemental Wells
  - No shortage; no recommended strategies

Summary by Water User Group

- Godley
  - Current Sources
    - Trinity Aquifer
  - Recommended Strategies
    - BRA SWATS* (possibly through Johnson County SUD)

Summary by Water User Group

- Grand Prairie
  - Current Sources
    - Water Conservation
    - Dallas Sources
    - Trinity Aquifer
    - Fort Worth (TRWD)
    - Joe Pool Lake (TRA)
    - Midlothian Sources
    - Supplemental Wells

Summary by Water User Group

- Grand Prairie
  - Recommended Strategies
    - Additional Midlothian
    - Johnson County SUD Supplies
    - Mansfield (TRWD Sources)
    - Arlington (TRWD Sources)
    - Cedar Hill (Dallas Sources)

Summary by Water User Group

- Grandview
  - Current Sources
    - Woodbine Aquifer
    - Trinity Aquifer
  - Recommended Strategies
    - BRA SWATS* (possibly through Johnson County SUD)

Summary by Water User Group

- Italy
  - Current Sources
    - Water Conservation
    - Trinity Aquifer
    - Woodbine Aquifer
    - TRWD (from TRA through Waxahachie)
  - Recommended Strategies
    - Additional Woodbine Aquifer (New Wells)
    - Supplemental Wells

Summary by Water User Group

- Johnson County-Other
  - Current Sources
    - Water Conservation
    - Trinity Aquifer
    - Woodbine Aquifer
  - Recommended Strategies
    - BRA (through Johnson County SUD)

Summary by Water User Group

- Johnson County SUD
  - Current Sources
    - Water Conservation
    - Lake Granbury (BRA SWATS)
    - Trinity Aquifer
    - Mansfield (TRWD Sources)
  - Recommended Strategies
    - Temporary Overdraft of Trinity Aquifer in 2010 (Existing Wells)
    - Additional Mansfield (TRWD Sources)
    - Grand Prairie (groundwater)

Summary by Water User Group

- Joshua
  - Current Sources
    - Johnson County SUD (BRA SWATS)
  - No shortage; no recommended strategies
- Keene
  - Current Sources
    - Trinity Aquifer
    - Lake Granbury (BRA SWATS)
  - Recommended Strategies
    - Temporary Overdraft of Trinity Aquifer in 2010 (existing wells)

Summary by Water User Group

- Kennedale
  - Current Sources
    - Water Conservation
    - Trinity Aquifer
    - Fort Worth (TRWD Sources)
    - Supplemental Wells
  - No shortage; no recommended strategies
- Mansfield
  - Current Sources
    - TRWD Sources
    - Water Conservation
  - No shortage; no recommended strategies

Summary by Water User Group

- Maypearl
  - Current Sources
    - Water Conservation
    - Trinity Aquifer
    - Woodbine Aquifer
    - TRWD (from TRA through Waxahachie)
  - Recommended Strategies
    - Additional Woodbine Aquifer (Existing Wells)
    - Additional Woodbine Aquifer (New Wells)
    - Supplemental Wells

Summary by Water User Group

- Midlothian
  - Current Sources
    - Water Conservation
    - Joe Pool Lake (TRA)
    - TRWD (through TRA)
    - Sardis-Lone Elm WSC (retail supplies)
  - Recommended Strategies
    - Additional TRWD (through TRA) for Alvarado
    - Additional TRWD (through TRA) for Grand Prairie
    - Additional TRWD (through TRA)

Summary by Water User Group

- Milford
  - Current Sources
    - Water Conservation
    - Files Valley WSC (Lake Aquilla)
    - Woodbine Aquifer
    - Supplemental Wells
  - No shortage; no recommended strategies

Summary by Water User Group

- Mountain Peak SUD
  - Current Sources
    - Water Conservation
    - Midlothian Sources
    - Trinity Aquifer
  - Recommended Strategies
    - Additional Trinity Aquifer (New Wells)
    - Woodbine Aquifer (New Wells)
    - Supplemental Wells

Summary by Water User Group

- Oak Leaf
  - Current Sources
    - Water Conservation
    - Dallas Sources (Glenn Heights)
    - TRWD (from TRA through Rockett SUD)
  - No shortage; no recommended strategies

Summary by Water User Group

- Ovilla
  - Current Sources
    - Water Conservation
    - Dallas Sources
    - Sardis-Lone Elm WSC (retail supplies)
    - Woodbine Aquifer
    - Supplemental Wells
  - Recommended Strategies
    - Purchase additional water from Dallas

Summary by Water User Group

- Palmer
  - Current Sources
    - Water Conservation
    - Woodbine Aquifer
    - TRWD (from TRA through Rockett SUD)
    - Supplemental Wells
  - No shortage; no recommended strategies

Summary by Water User Group

- Parker WSC
  - Current Sources
    - Trinity Aquifer
    - Files Valley WSC (Aquilla WSD)
  - Recommended Strategies
    - BRA SWATS through Johnson County SUD
    - Supplemental Wells

Summary by Water User Group

- Pecan Hill
  - Current Sources
    - Water Conservation
    - Rockett SUD Sources
  - No shortage; no recommended strategies
- Red Oak
  - Current Sources
    - Water Conservation
    - Woodbine Aquifer
    - Dallas Sources
    - TRWD (from TRA through Rockett SUD) (not in use)
    - TRWD (through TRA) (not in use)
    - Supplemental Wells
  - No shortage; no recommended strategies

Summary by Water User Group

- Rice WSC
  - Current Sources
    - Water Conservation
    - Lake Bardwell (Ennis)
    - Navarro Mills Reservoir (Corsicana)
  - Recommended Strategies
    - TRWD (from TRA through Ennis)
    - Additional Water From Corsicana

Summary by Water User Group

- Rio Vista
  - Current Sources
    - Trinity Aquifer
  - Recommended Strategies
    - Temporary overdraft of the Trinity Aquifer in 2010
    - BRA SWATS (possibly through Johnson County SUD)

Summary by Water User Group

- Rockett SUD
  - Current Sources
    - Water Conservation
    - Midlothian Sources
    - TRWD (through TRA)
    - TRWD (through TRA) for Ferris
    - TRWD (through TRA) for Palmer
    - TRWD (through TRA) for Nash-Forreston WSC (County-Other)
    - Lake Waxahachie (Waxahachie)
    - Trinity Aquifer
    - Dallas Sources (not in use)
  - Recommended Strategies
    - Additional TRWD (through TRA)
    - Additional TRWD (through TRA) for Sardis-Lone Elm WSC

Summary by Water User Group

- Sardis-Lone Elm WSC
  - Current Sources
    - Water Conservation
    - Trinity Aquifer
    - Woodbine Aquifer
  - Recommended Strategies
    - TRWD (from TRA through Rockett SUD)
    - Overdraft Trinity Aquifer (New Wells)
    - Supplemental Wells

Summary by Water User Group

- Venus
  - Current Sources
    - Woodbine Aquifer
    - Trinity Aquifer
    - Midlothian (TRWD Sources through TRA)
  - No shortage; no recommended strategies

Summary by Water User Group

- Waxahachie
  - Current Sources
    - Lake Bardwell (TRA)
    - Lake Waxahachie
    - TRWD (through TRA) (not in use)
    - TRWD (through TRA) for Buena Vista-Bethel SUD
    - TRWD (through TRA) for Maypearl
    - TRWD (through TRA) for Avalon WSC (County-Other)
    - TRWD (through TRA) for Italy
    - Reuse
    - Dallas Supplies (not in use)
    - Water Conservation
  - Recommended Strategies
    - Additional TRWD (through TRA)
    - Additional TRWD (through TRA) for Buena Vista-Bethel SUD

Summary by Water User Group

- Wilmer
  - Current Sources
    - Trinity Aquifer
  - Recommended Strategies
    - Water Conservation
    - Dallas Sources
    - Temporary overdrafting of Trinity Aquifer
    - Supplemental Wells

Summary by Water User Group

- Ellis County Manufacturing
  - Current Sources
    - Trinity Aquifer
    - Woodbine Aquifer
    - Midlothian
    - Waxahachie
    - Ennis (TRA Lake Bardwell)
  - Recommended Strategies
    - Waxahachie-Rockett SUD Project (TRWD Sources)
    - Midlothian
    - Reuse

Summary by Water User Group

- Ellis County Mining
  - Current Sources
    - Woodbine Aquifer
  - No shortage; no recommended strategies
- Ellis County Steam Electric Power
  - Current Sources
    - Ennis Direct Reuse
    - Midlothian (TRA Joe Pool Lake)
  - Recommended Strategies
    - Midlothian
    - TRA Direct Reuse

Summary by Water User Group

- Johnson County Manufacturing
  - Current Sources
    - Trinity Aquifer
    - Cleburne
  - Recommended Strategies
    - Direct Reuse

Summary by Water User Group

- Johnson County Mining
  - Current Sources
    - Local Supplies
    - Trinity Aquifer
    - Cleburne
  - Recommended Strategies
    - BRA Main Stem Lake/Reservoir
    - Mansfield

Summary by Water User Group

- Johnson County Steam Electric Power
  - Current Sources
    - Cleburne
  - Recommended Strategies
    - Direct Reuse

Wholesale Water Providers

Current and Potential Customers in the Study Area

Brazos River Authority

- Current Customers
  - Acton MUD
  - Aquilla WSD
  - Cleburne
  - Files Valley WSC
  - Johnson County SUD
  - Keene
- Potential Customers
  - Bethany WSC (through Keene)
  - Godley
  - Grandview
  - Johnson County-Other
  - Parker WSC
  - Rio Vista

Dallas Water Utilities

- Current Customers
  - Cedar Hill
  - Duncanville
  - Glenn Heights
  - Grand Prairie
  - Oak Leaf (through Glenn Heights)
  - Ovilla
  - Red Oak
  - Rockett SUD (not in use)
  - Waxahachie (not in use)
- Potential Customers
  - Wilmer

TRWD Contracts and Recommended Contracts Managed by TRA in Study Area

Entity	Current Average Day Contract Amount (MGD)	Recommended Increase (MGD)	Recommended Contract Amount (MGD)
Alvarado (through Midlothian)	0.000	1.000	1.000
Avalon WSC (Ellis Co. Other)	0.600	0.000	0.600
Buena Vista-Bethel SUD	0.850	0.700	1.550
Ennis	3.560	0.000	3.560
Ferris	0.720	0.000	0.720
Grand Prairie (through Midlothian)	2.000	4.500	6.500
Italy	0.500	0.000	0.500
Maypearl	0.370	0.000	0.370
Midlothian	6.330	3.500	9.830
Nash-Forreston WSC	0.250	0.000	0.250
Palmer	0.271	0.000	0.271
Red Oak	1.800	0.000	1.800
Rockett SUD	6.050	0.200	6.250
Sardis-Lone Elm WSC	0.000	5.800	5.800
Venus (through Midlothian)	1.000	0.000	1.000
Waxahachie	4.650	4.000	8.650
Total	**28.951**	**19.700**	**48.651**

TRA Contracts for TRA Sources

- Cedar Hill
- Duncanville
- Ennis
- Grand Prairie
- Midlothian
- Rockett SUD
- Waxahachie
- Dallas County Irrigation
- Ellis County Steam Electric Power

Arlington

- No Current Customers
- Potential Customers
  - Bethesda WSC
  - Grand Prairie

Cedar Hill

- No Current Customers
- Potential Customer
  - Grand Prairie

Cleburne

- Current Customers
  - Johnson County Steam Electric Power
  - Mining
  - Manufacturing
- No Potential Additional Customers

Ennis

- Current Customers
  - Community Water Company
  - Ellis County-Other (East Garret WSC)
  - Rice WSC
  - Ellis County Manufacturing, Steam Electric Power
- Potential Customer
  - Bardwell

Fort Worth

- Current Customers
  - Bethesda WSC
  - Burleson
  - Grand Prairie
  - Kennedale
- No Potential Additional Customers

Grand Prairie

- No Current Customers
- Potential Customer
  - Johnson County SUD

Johnson County SUD

- Current Customers
  - Alvarado
  - Johnson County FWSD (Joshua)
  - Johnson County Mining
- Potential Customers
  - Bethany WSC
  - Grand Prairie (2010)

Mansfield

- Current Customers
  - Johnson County SUD
- Potential Customers
  - Grand Prairie
  - Johnson County Mining

Midlothian

- Current Customers
  - Grand Prairie
  - Mountain Peak SUD
  - Rockett SUD
  - Venus
  - Ellis County Steam Electric Power
  - Ellis County Mining
- Potential Customer
  - Alvarado

Rockett SUD

- Current Customers
  - Ennis
  - Ferris
  - Lancaster
  - Oak Leaf
  - Palmer
  - Pecan Hill
  - Red Oak
  - Waxahachie
  - Ellis County-Other
- Potential Customers
  - Ellis County-Other (East Garret WSC)
  - Sardis-Lone Elm WSC

Waxahachie

- Current Customers
  - Ellis County-Other
  - Ellis County Manufacturing
- Potential Customers
  - Buena Vista-Bethel SUD
  - Italy
  - Maypearl
  - Ellis County Steam Electric Power

Cost Estimates

Recommended Strategies

Projected Costs

New Wells	$ 35,951,000
Supplemental Wells	$105,836,000
New Water Treatment Plants	$ 49,006,000
Reuse Projects	$223,927,000
Water Treatment Plant Exp	$304,463,000

Projected Costs

Cleburne Lake Whitney Diversion	$ 36,910,000
Backup Supply Pump Station	$ 15,945,000
South Ellis County Supply Line	$ 10,327,000
Pipelines and Pump Stations	$253,111,000
Total Capital Costs	**$1,035,476,000**

Contracting and Operational Issues for TRWD

Future Contracts in Study Area

Background

- TRA manages contracts for TRWD in Ellis County and Johnson County
- TRWD contracts with its four primary customers prohibits contracts to supply demands beyond the currently available supply, 2030
- TRWD will contract to meet up to 2030 demands in excess of local supplies
- TRWD will consider contracts beyond 2030 after new supplies are brought online

Background

- TRWD is willing to provide water to Trinity Basin portion of Johnson County
- BRA is agreeable to jointly supplying Johnson County
- TRWD requires new and expanded contracts to pay a "buy-in" based on amount of contract, except for the four contracting parties

60 Day Shut Down Clause

- Required in all new TRWD contracts in Ellis and Johnson Counties
- Allows TRWD to perform maintenance
- Assures that customers can operate during transmission interruption
- May be reduced to 30 days after 3rd pipeline is completed

Existing Contracts with Dallas

- A few entities requesting TRWD supplies have contracts for Dallas water that are not being used
- TRWD's policy is not to contract beyond an entity's projected 2030 need
- TRWD may consider the Dallas contracts when determining an entity's 2030 need

A Regional Approach

- Recommend interconnection to local sources to provide adequate backup
- Coordinate system operation with TRWD
- Prioritize local supplies before calling on TRWD supplies

Additional Assumptions

- Industrial demands will be considered based on existing contracts
- Conservation practices must be consistent with TRWD's primary wholesale customers

Four County Study

- Discussion
  - Are the current supplies correct?
  - Do you agree with the proposed Water Management Strategies?

Public Comments

- Please complete a speaker card before speaking.
- Time allowed is 3 minutes per person.

Four County Study

- Closing Thoughts
  - Please provide comments by noon Monday, December 8th .

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APPENDIX J

REGION C WATER PLANNING GROUP RESPONSES TO TWDB COMMENTS ON DRAFT REPORT

Appendix J
Region C Water Planning Group Responses to TWDB Comments on Draft Report

The Region C Water Planning Group received comments from the Texas Water Development Board (TWDB) on the December 2008 Draft Water Supply Study for Ellis County, Johnson County, Southern Dallas County, and Southern Tarrant County. This appendix shows the TWDB comment in italicized text followed by the Region C response.

TWDB Comments and Region C Responses

a. *Please note that TWDB's acceptance of a final report for this study does not constitute approval of any revised population or water demand projections contained therein. The formal procedure for requesting revised projections is stated in TAC 357.5 (d) (2): "Before requesting a revision to the population and water demand projections, the regional water planning group shall discuss the issue at a public meeting for which notice has been posted pursuant to the Open Meetings Act in addition to being published on the internet and mailed at least 14 days before the meeting to every person or entity that has requested notice of regional water planning group activities. The public will be able to submit oral or written comment at the meeting and written comments for 14 days following the meeting. The regional water planning group will summarize the public comments received in its request for projection revisions. Within 45 days of receipt of a request from a regional water planning group for revision of population or water demand projections, the executive administrator shall consult with the requesting regional water planning group and respond to their request."*

   Noted. The Region C Planning Group will follow the formal procedure for requesting revised population and demand projections where it is determined that changes are needed.

b. *In addition to submitting an electronic copy of the final report, please submit electronic copies of all appendices as well as all figures in the report, as required by the contract between TWDB and Region C.*

   Noted. Electronic copies of all appendices and figures in the report will be submitted with the electronic copy of the final report.

c. *Please include a list of the names of the utilities and cities and personnel that attended each of the meetings in the appendix of the report or as an alternative, if there was a meeting memo report written for each meeting, please include that in the appendix.*

   Table 3.2 "Meetings with WUGs and WWPs" was added to the report. This table includes meeting dates, entities represented, and personnel that attended. Appendix I "Meetings with Large Regional Providers and Meeting with Study Area Participants" was also added to the report.

d. *Scope of Work, Item C states that this study will include the review of specific publications. The draft report does not indicate that this review has taken place. Please*

summarize the findings of these publications in the final report. Also, please list these publications in Appendix A (References).

Several reports were provided by water user groups during this study. Those reports have been summarized and added as a new section, Section 2.3. The references for these reports have also been added to Appendix A. In some cases, such as that of the Arlington study regarding potential wholesale sales, the entity simply provided us an overview of the report findings and not an actual copy of the report.

e. *Scope of Work, Item H states that the study will "Analyze alternative approaches to provide water to eastern and central Ellis County and develop a recommended system, including phasing and specific implementation plans". Scope of Work Item I states the study will "Develop a specific implementation plan for strategies" for eastern and central Ellis County. Although strategies were updated in the study including estimates of capital and operating costs and alternatives are listed for the Sokoll Water Treatment Plant, the report does not include evaluations of alternatives for any other entities in this part of the study area nor does it include the phasing and specific implementation plans as required by the scope of work. Please include the analysis of the alternative approaches as well as the phasing and implementation plans for the recommended approach in the final report.*

The timing associated with the recommended strategies is discussed in the draft report. We have added an implementation chapter, Chapter 6, which includes a more specific implementation plan and a table with recommended strategies and their approximate in-service dates.

Most entities provided us with their preferred water management strategies, which are the strategies included in the draft report. Alternative strategies have been added as a new chapter, Chapter 7. Cost estimates for these alternative strategies are included in a new appendix, Appendix H.

f. *Scope of Work Item K states that up to six conceptual alternatives to supply water to Johnson County will be developed by this study. The draft report does not include this information. Please include this information in the final report or justify its omission.*

While the scope of work indicated that up to six conceptual alternatives for water supply in Johnson County would be studied, the entities with whom we met provided us with their preferred water management strategies. In many cases, these entities had prepared their own studies of various alternatives and provided us with the recommended strategies resulting from these studies. Therefore, we focused on the analysis of these preferred strategies. No changes were made to the report based on this comment.

g. *Scope of Work Item M states that the study will "Develop a recommended system, including phasing and specific implementation plans" for Johnson County. Although strategies were updated in the study including estimates of capital and operating cost, the report does not include phasing and specific implementation plans. Please include phasing and implementation plans in the final report or justify their omission.*

The timing associated with the recommended strategies is discussed in the draft report. We have added an implementation chapter, Chapter 6, which includes a more specific

implementation plan and a table with recommended strategies and their approximate in-service dates.

h. *For Figure ES.1 on Page ES-2 (this figure is also in Section 1 as Figure 1.2), please consider adding the county and planning group names to the map.*

Figures ES.1 and 1.2 were labeled with the regional water planning group names in the draft report. These labels have been enlarged for clarity. The county names have been added to these two figures.

i. *Figure 1.2 on Page 1-2 should be a map of Region C as indicated in the text on page 1-1.*

Figure 1.2 was accidentally inserted where Figure 1.1 should have been placed in the draft report. Figures 1.1 and 1.2 have been inserted in the correct places in the final report.

j. *Chapter 4 gives a good summary of information for Ellis and Johnson counties but does not include as much summary information for the other portions of the study area -- Southwest Dallas and Southeast Tarrant Counties. Please summarize information and provide graphs and summary tables for all study areas in the final report.*

Information regarding Southwest Dallas County and Southeast Tarrant County has been summarized and included in Chapter 4. Four figures have been added similar to Figures 4.1 through 4.4 in the draft report. These figures represent the population and demand projections for the portions of Dallas and Tarrant Counties included in the study area. Tables ES.1 and 4.1 have also been updated to include Southern Dallas and Southern Tarrant County information. Because only a portion of Dallas County and Tarrant County are included in this study, we are unable to develop meaningful figures showing average day water demand projections by category for these two areas within the study area, such as Figures 5.6 and 4.6 in the draft report.

k. *In Chapter 4, please include a more detailed explanation of the methodology used to determine the increases in population and demand that are recommended in the report. Also, please define the "low" and "high" projections and explain how they were selected.*

Appendix C contains a memo that explains the methodology used in developing the low, high, and recommended projections. Some of this text has been added to Section 4.1 and Section 4.2. Definitions of low and high projections have been added, along with the selection criteria for each.

l. *Although Chapter 4 discusses the different sources for population projections data including the US Census, North Central Texas Council of Government (NCTCOG), and the Texas State Data Center, none of these sources provide projections for non-city utilities. In the final report, please explain that for utilities, unlike cities, only limited projections data is available to develop updates. Please note this distinction in the memorandum in Appendix C as well.*

A note has been added to Chapter 4 and Appendix C explaining that the Census, NCTCOG, and the Texas State Data Center do not provide projections for non-city utilities.

m. *In Chapter 5, please include a county-level summary comparison of projected demand, current supply, and water management strategy volumes.*

This report was developed to show each water user group as a complete entity, not as an entity broken down by county and/or basin. While the population and demand projections are broken down by county and basin, the current water supplies and recommended water management strategies were not broken down by county and basin. The water supply analysis for each water user group within the study area considered the entity as a complete unit without regards for divisions across county and/or river basin lines. A meaningful county-level summary cannot be established. However, a summary table (Table 5.21) for the study area has been added to the end of Chapter 5. The summary table includes the projected water demands, current water supplies based on existing contracts, and water management strategies.

n. *In the Appendix C memo it states "…the recommended projection is typically based on information provided by the entities, which is usually more than the regional water plan projections and less than the NCTCOG projection." However, the recommended values for the individual entities in Table 1 show that in the vast majority of cases, the recommended value is equal to both the "high" and "low" value or the recommended value is the "high" projection. Only the county level sums for the Ellis, Johnson, and Southern Tarrant counties are between the low and high values. Please clarify this statement and provide more quantitative narration for the recommended projections as compared to the 2006 Region C Water Plan.*

In Table 1 of Appendix C, 16 of the 44 water user groups in the study area have the same projections listed in the "low", "high", and "recommended" columns. Nine of these 16 water user groups did not respond to the survey. Therefore, we assumed that these entities were in agreement with the projections as recommended in the 2006 regional water plans and were not studied any further. One of these sixteen entities, Bethesda WSC, met with the consultants in person and indicated that the 2006 regional water plan projections are appropriate for their utility and did not see the need to adjust the projections. In all sixteen cases, the "low", "high", and "recommended" were set equal to the projections approved in the 2006 regional water plan. The recommended projections for the remaining 28 water user groups are the result of information provided by the entities or their wholesale (or potential wholesale) water provider. Text explaining this has been added to Appendix C.

o. *In Appendix C Table 1, please annotate the table with the source of the recommended projections (NCTCOG, 2006 Region C Water Plan, Revised Projections from Survey, Freese & Nichols's Study, etc.). Although the figures in Appendix D present the source of the recommended projections for some water user groups, Appendix D does not include all entities that were a part of this study.*

Annotations have been added to Tables 1 and 5 of Appendix C indicating the source of the recommended projection.

p. *In Appendix D, please include summary graphs for all entities that were a part of this study.*

Population projection graphs for Bardwell, Brandon-Irene WSC, Community Water Company, Glenn Heights, Italy, Keene, Maypearl, Milford, Oak Leaf, Ovilla, Palmer, Pecan Hill, Rice WSC, Acton MUD, Godley, Rio Vista, and Wilmer were not included in Appendix D because their low projection, high projection, and recommended projection did not change. These entities did not provide alternative projections for consideration in this study. Thus, Region C did not adjust the population projection from the 2006 Region C Water Plan. Introductory text has been added to Appendices D and E to better explain why the figures have been included in each appendix.

The year 2030 high population and demand projections for Italy and Keene should have been the same as their low and recommended projections. This correction has been made to all related tables and figures in Appendix C and the main report.

The graph for Bethesda WSC has been removed from Appendix D because they did not provide input on a range of projections. Similarly, Bethesda WSC was also removed from Appendix E.

q. *In Appendix D, please consistently note the source of the recommended value. Some of the graphs list the source and some just show "recommended projection."*

The source of recommended projection has been added to all figures in Appendix D.

r. *In Appendix D, please show the NCTCOG's projection on all graphs.*

The NCTCOG population projections are available for cities within the study area. NCTCOG does not develop population projections for non-city utilities. The NCTCOG population projections have been added to Appendix D, if available.

s. *Please consider adding a brief text introduction to Appendix F that describes what the tables and figures represent.*

Introductory text has been added to Appendix F explaining the information being presented in the tables and figures within this appendix.

Other Revisions

Although no other comments were received, the following adjustments have been made to the final report:

- Figures added to Chapter 4 were also included in Appendix C.
- Appendix J was added to reflect the TWDB comments on the draft report and the Region C responses to those comments.
- "Chiang, Patel and Yerby, Inc." was changed to "CP&Y, Inc." to reflect the change in the company's name.
- Due to the insertion of additional references, the references were renumbered to reflect the order in which they appear in the report.
- Introductory text was added to Appendices D, E, and G.