

2016 REGION C WATER PLAN

DECEMBER 2015

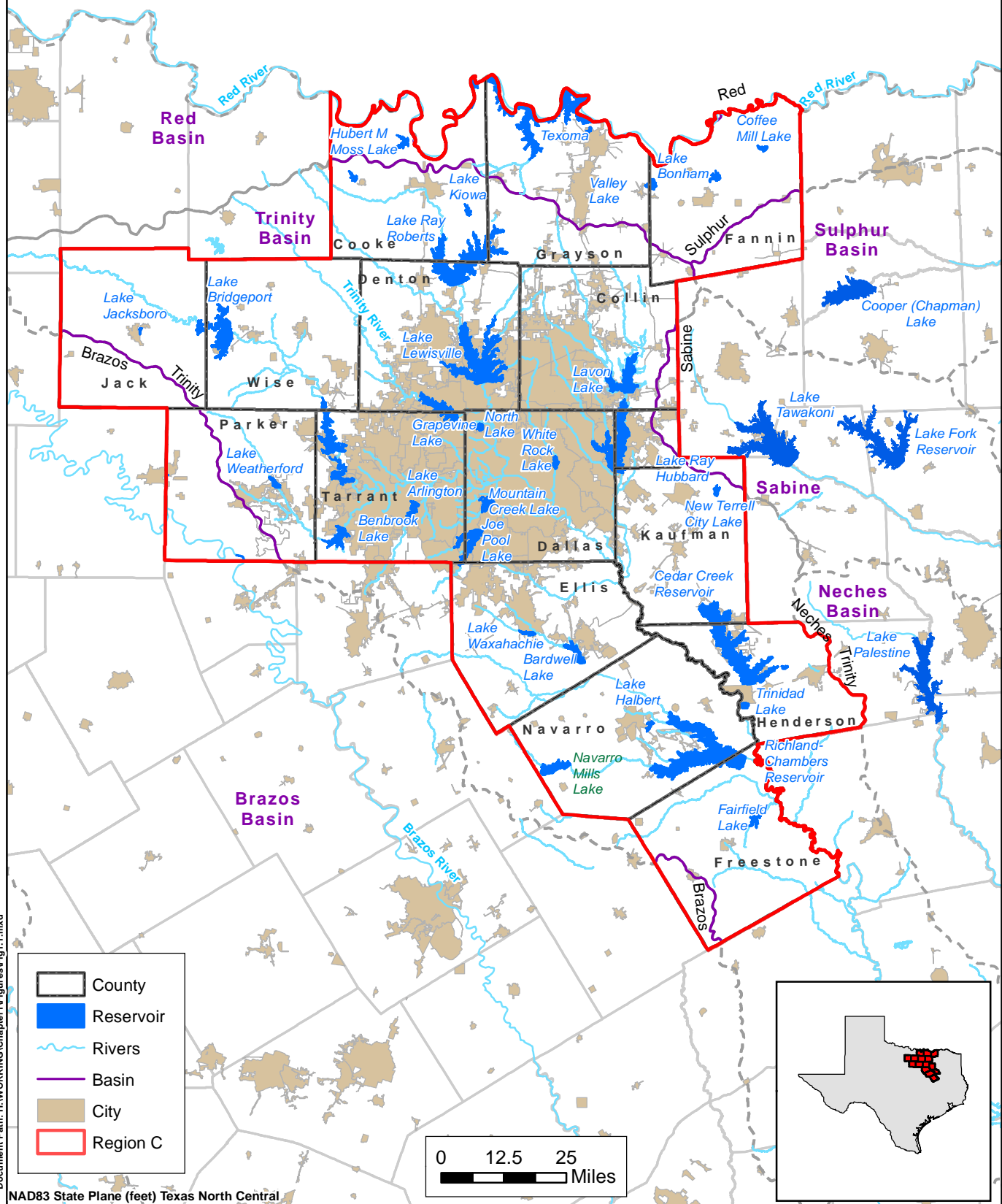
Executive Summary

This report presents the *2016 Region C Water Plan* developed in the fourth round of the Senate Bill One regional water planning process. Region C covers all or part of 16 North Central Texas counties, as shown in Figure ES.1. The Region C water plan was developed under the direction of the 22-member Region C Water Planning Group. An initially prepared regional water plan was adopted by the Region C Water Planning Group on April 20, 2015 and was made available for public and state agency comment during the summer of 2015. This final *2016 Region C Water Plan* was produced based on the initially prepared plan, comments, and other updates, and this final plan was approved by the Region C Water Planning Group on November 9, 2015.

The *2016 Region C Water Plan* includes the following chapters:

1. Description of Region C
2. Population and Water Demand Projections
3. Analysis of Water Supply Currently Available to Region C
4. Identification of Water Needs
5. Identification, Evaluation and Selection of Water Management Strategies
 - 5A. Methodology for Evaluation and Selection of Water Management Strategies
 - 5B. Evaluation of Major Water Management Strategies
 - 5C. Recommended Water Management Strategies for Wholesale Water Providers
 - 5D. Recommended Water Management Strategies for Water User Groups by County
 - 5E. Water Conservation and Reuse
 - 5F. Texas Water Development Board Required Tables
6. Impacts of Regional Water Plan and Consistency with Long-Term Protection of the Water Resources, Agricultural Resources, and Natural Resources
7. Drought Response
8. Unique Stream Segments, Unique Reservoir Sites, and Legislative Recommendations
9. Infrastructure Funding Recommendations
10. Plan Approval Process and Public Participation
11. Implementation and Comparison to Previous Regional Water Plan

Region C and Outside Water Supplies Designated as Special Water Resources for Use in Region C



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

ES.1 Current Water Needs and Supplies in Region C

As of the 2010 census, the population of Region C was 6,477,835, which represented 25 percent of Texas' total population. The estimated population as of July 2012 was 6,716,014, an increase of 3.7 percent in two years. The two most populous counties in Region C, Dallas and Tarrant, have 65 percent of the region's population. Region C is heavily urbanized, with 83 percent of the population located in cities with populations in excess of 20,000 people.

Physical Setting

Most of Region C is in the upper portion of the Trinity River Basin, with smaller parts in the Red, Brazos, Sulphur, and Sabine River Basins. Figure ES.1 shows the major streams in Region C. Precipitation increases from west to east in the region. The average runoff in the region also increases from the west to the east, while evaporation is higher to the west. These patterns of rainfall, runoff, and evaporation result in more abundant water supplies in the eastern part of Region C than in the west.

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

Water Use

Water use in Region C has increased significantly in recent years, primarily in response to increasing population. The regional water use in the year 2011 was 1,508,886 acre-feet. It is interesting to note that Region C, with over 25 percent of Texas' population, had only 8.3 percent of the state's water use in 2011. About 90 percent of the current water use in Region C is for municipal supply.

Current Sources of Water Supply

About 90 percent of the water use in Region C is supplied by surface water, but groundwater can be an important source of supply, especially in rural areas. Most of the surface water supply in Region C comes from major reservoirs, including reservoirs in the region and reservoirs outside of Region C that supply water for the region. The Trinity aquifer is the largest source of groundwater in Region C, with

some use in the Woodbine, Carrizo-Wilcox and other minor aquifers. The current use of groundwater is close to or greater than the long-term reliable supply available in some parts of Region C.

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

Water Providers in Region C

Water providers in Region C include 41 wholesale water providers and 360 water user groups. In 2011, the three largest wholesale water providers in Region C (Dallas Water Utilities, Tarrant Regional Water District, and North Texas Municipal Water District) provided the majority of the water used in the region. Cities and towns provide most of the retail water service in Region C.

ES.2 Projected Need for Water

Population Projections

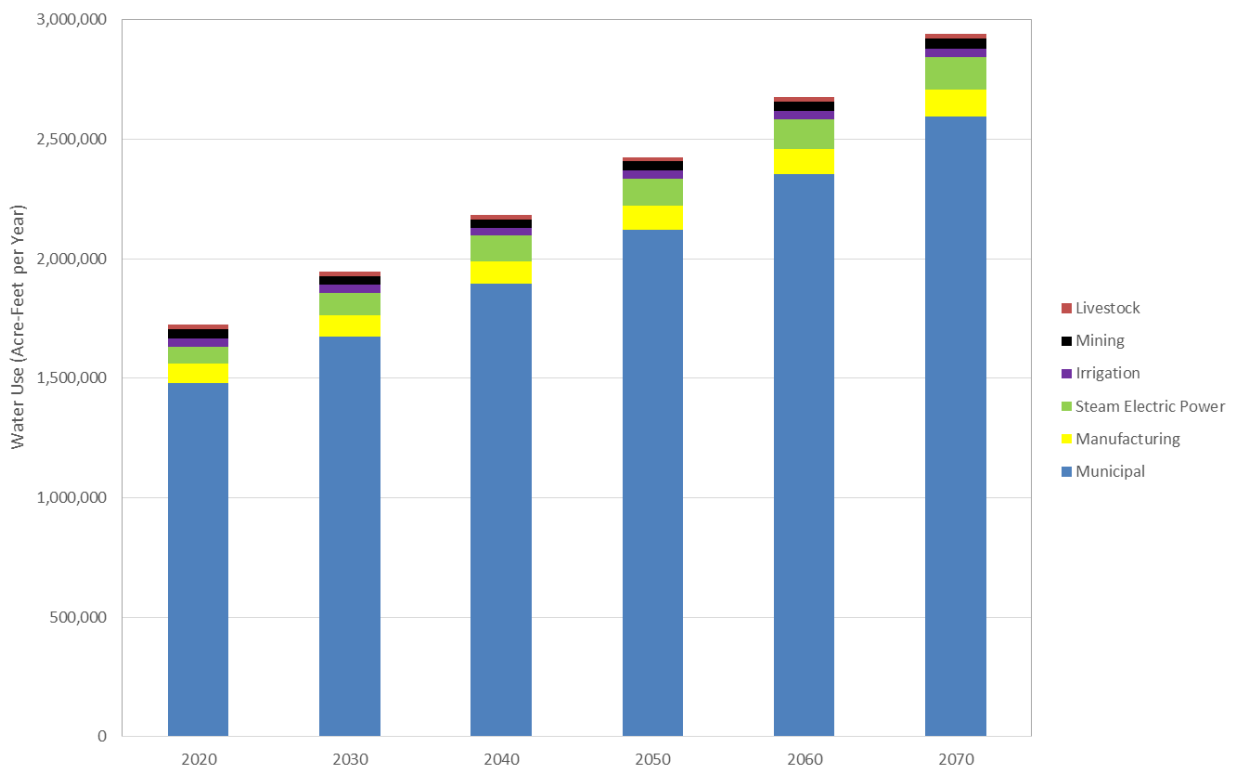
The population of Region C is projected to grow from 6,477,835 in the year 2010 to 9,908,572 in 2040 and 14,347,915 in 2070. These projections have been approved by the Texas Water Development Board, as required by TWDB planning guidelines. This projection reflects a substantial slowing in the rate of growth that has been experienced in Region C over the last 50 years. The distribution of the projected population by county and city is discussed in Chapter 2.

Demand Projections

Figure ES.2 shows the projected dry-year demands for water in Region C, which total 2.2 million acre-feet per year in 2040 and 2.9 million acre-feet per year in 2070. As has been the case historically, municipal demands are projected to make up the majority of the water use in Region C. The 2060 projected demand is almost 600,000 acre-feet per year lower than the projections in the *2011 Region C Water Plan*. The total municipal 2060 gallons per capita per day (gpcd) in the 2011 Plan was 200 as opposed to the total municipal gpcd of 165 in the 2016 Plan. (It should be noted that these gpcd's reflect demands before any conservation water management strategies have been applied). Dry-year demands are significantly higher than normal year demands, especially for municipal use (because of increased

lawn irrigation use). Normal-year demands in Region C might be 10 to 15 percent lower than dry-year demands.

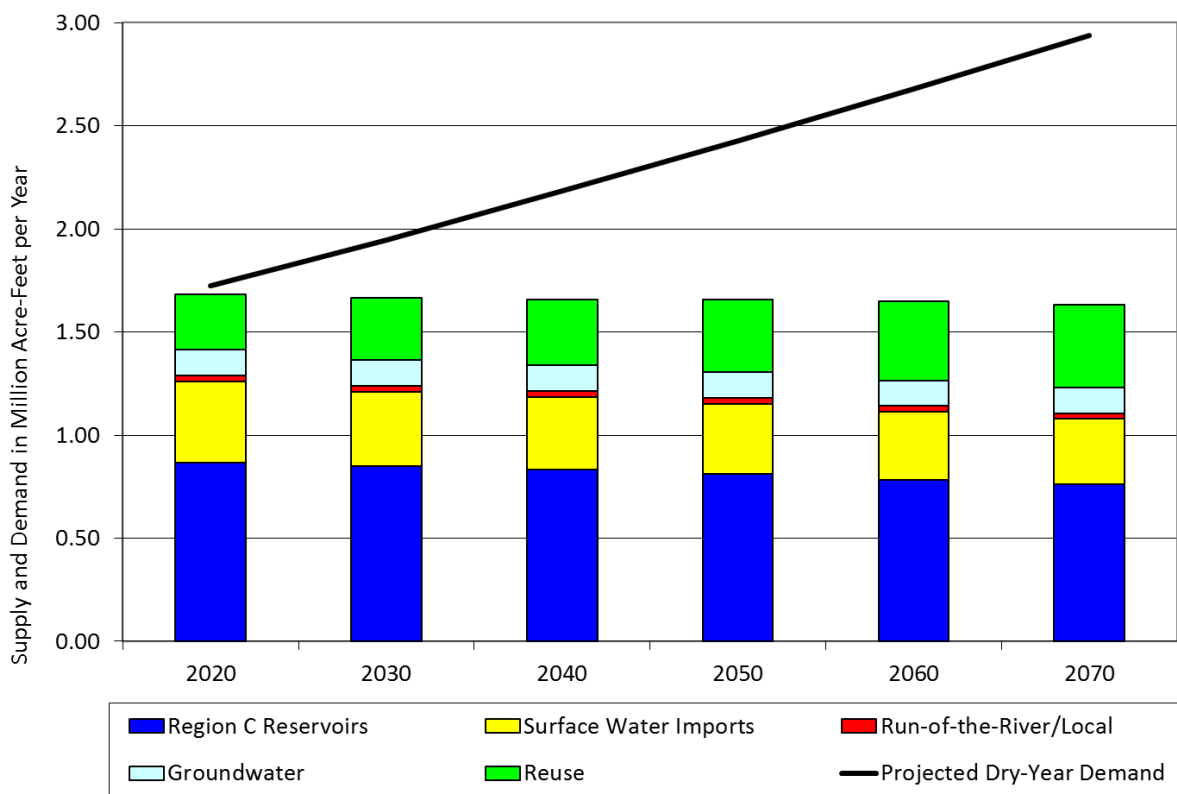
Figure ES.2
Adopted Projections for Dry-Year Water Use by Category in Region C



Comparison of Supply and Demand

Figure ES.3 shows a comparison of supplies currently available to Region C and projected demands. Currently available supplies are almost constant over time at 1.7 million acre-feet per year, as sedimentation in reservoirs is offset by increases in reuse supplies due to increased return flows. With the projected 2070 demand of 2.9 million acre-feet per year, the region has a shortage of 1.2 million acre-feet per year by 2070. Meeting the projected shortage and leaving a reasonable reserve of planned supplies beyond projected needs will require the development of significant new water supplies for Region C over the next 50 years.

Figure ES.3
Comparison of Currently Available Supplies and Projected Demands



Socio-Economic Impacts of Not Meeting Projected Water Needs

The Texas Water Development Board conducted an analysis of the socio-economic impacts of not meeting the projected water needs in Region C. By not meeting water needs in Region C, TWDB estimates the annual combined lost income in 2070 would be \$34.6 billion and that 2070 employment would be reduced by over 373,000 jobs. More information on the socio-economic analysis is included in Chapter 6.

ES.3 Identification and Selection of Water Management Strategies

The Region C Water Planning Group identified and evaluated a wide variety of potentially feasible water management strategies in developing this plan. Water supply availability, costs and environmental impacts were determined for conservation and reuse efforts, the connection of existing supplies, and the development of new supplies.

As required by TWDB regulations, the evaluation of water management strategies was an equitable comparison of all feasible strategies and considered the following factors:

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

Water Conservation and Reuse

The Region C Water Planning Group considered the municipal water conservation strategies suggested as best management practices by the Conservation Implementation Task Force and recommended a water conservation program and reuse projects for Region C that accomplish the following:

- Including the 246,869 acre-feet per year of conservation built into the demand projections (for low flow plumbing fixtures, efficient residential clothes washer standards, and efficient residential dishwasher standards), a total conservation and reuse supply of over 1.16 million acre-feet per year by 2070, 41 percent of the region's demand without conservation.
- A dry-year per capita municipal use for the region (after crediting for conservation and reuse) ranging from 119 gpcd in 2020 to 105 gpcd by 2070.

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

Recommended Water Management Strategies

Table ES.1 lists the major recommended water management strategies for Region C. (Major water management strategies are those supplying over 60,000 acre-feet per year or involving the construction of a reservoir.) Table ES.3 at the end of this chapter lists all the recommended water management strategies. Figure ES.4 shows the location of the recommended major water management strategies. In total, the Region C plan includes water management strategies to develop 1.79 million acre-feet per year of new supplies, for a total available supply of 3.43 million acre-feet per year in 2070. The supply is about 16 percent greater than the projected demand, leaving a reasonable reserve to provide for difficulties in developing strategies in a timely manner, droughts worse than the drought of record, greater than expected growth, and supply for needs beyond this planning horizon.

Figure ES.5 shows the makeup of the 3.43 million acre-feet per year of supplies proposed to be available to the region by 2070. About 37 percent of the supply is already available to the region from surface water and groundwater; a little over a quarter (27 percent) is developed from conservation and reuse

efforts, 16 percent is from the connection of existing supplies, and 20 percent is from the development of new supply including reservoirs and run-of-river projects.

The plan includes only five major new reservoirs (compared to more than 25 developed to supply water for Region C over the last 60 years.)

Cost of the Proposed Plan

Most of the new supplies for Region C will be developed by the major wholesale water providers in the region. Table ES.2 shows the amount of new supply proposed for the five largest wholesale water providers in Region C and the cost to develop that supply. The total cost of implementing all of the water management strategies in the plan is \$23.6 billion. The specific recommended water management strategies recommended for wholesale water providers and water user groups are discussed in sections 5C and 5D of the report.

Table ES.1
Recommended Major Water Management Strategies for Region C

Strategy	Supplier	Supply in 2070 (Ac-Ft/Yr)	Supplier Capital Cost
Conservation	Multiple	135,991	\$420,878,859
Reuse Implementation (Main Stem Trinity River)	Dallas	149,093	\$718,944,000
Connect Lake Palestine	Dallas	110,670	\$900,817,000
Sulphur Basin Supplies	TRWD	280,000	\$3,004,413,000
	NTWMD	174,800	\$1,206,634,000
	UTRWD	35,000	\$305,499,000
Lower Bois d'Arc Creek Reservoir	NTWMD	120,200	\$625,610,000
Toledo Bend	NTWMD	100,000	\$1,248,461,000
Cedar Creek Wetlands (Reuse)	TRWD	88,059	\$139,078,000
Lake Texoma blending	NTWMD	97,838	\$521,775,000
Lake Columbia	Dallas	56,050	\$327,187,000
Lake Ralph Hall and Associated Reuse	UTRWD	50,121	\$316,160,000
Oklahoma	NTWMD	50,000	\$167,541,000
Neches Run-of-River	Dallas	47,250	\$226,790,000
Lake Tehuacana	TRWD	41,600	\$742,730,000
Lake Texoma Desalination	GTUA	41,076	\$142,222,000

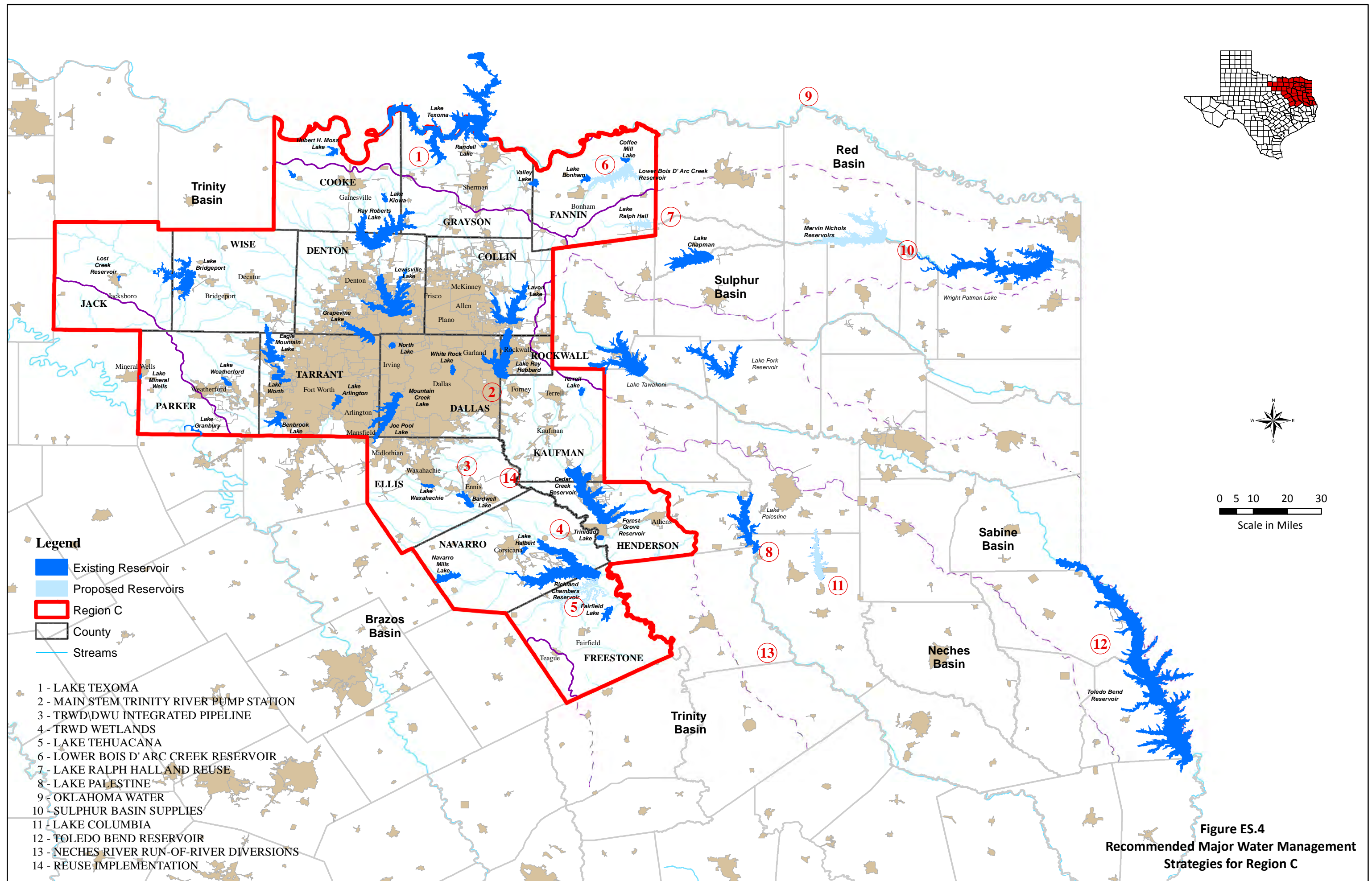


Figure ES.5
Sources of Water Available to Region C as of 2070

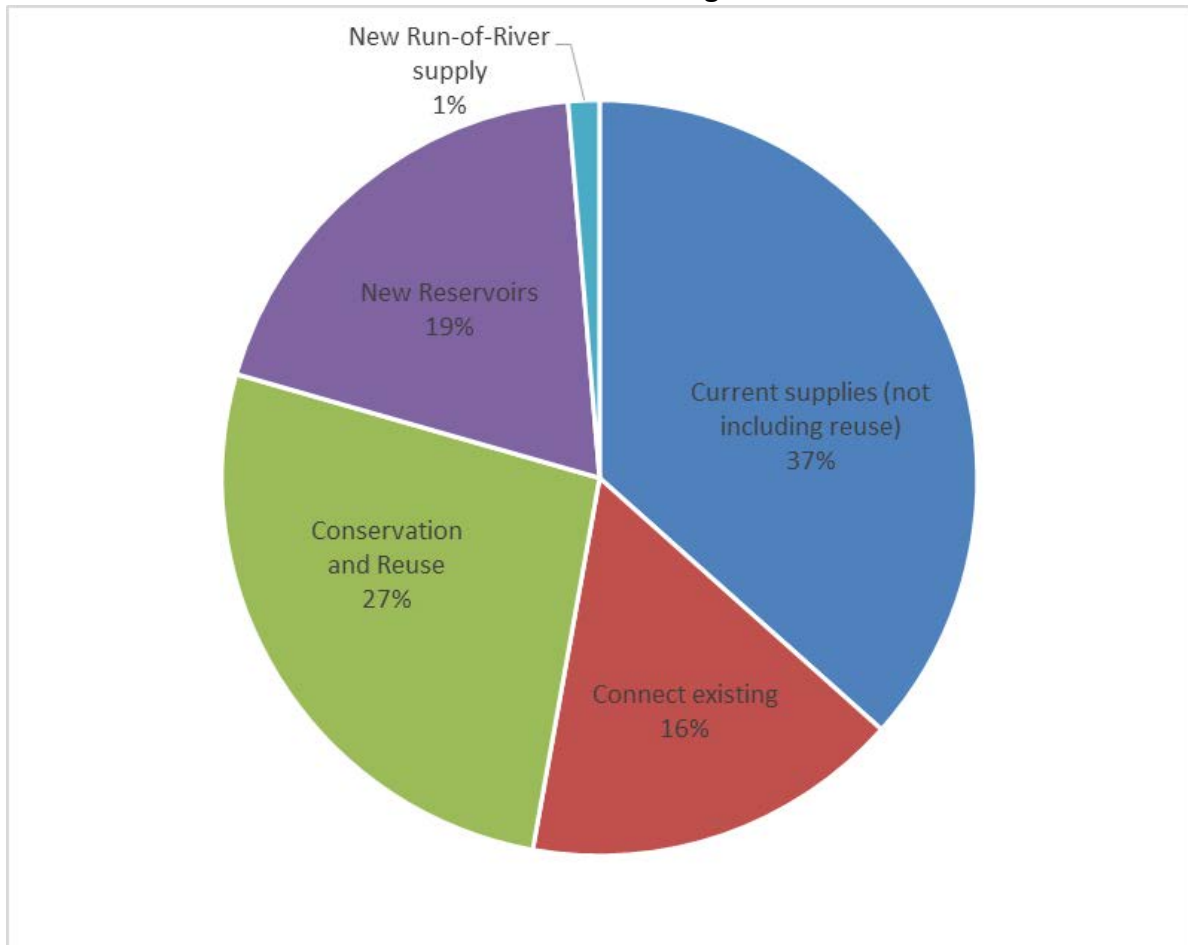


Table ES.2
2070 Supplies for the Largest Wholesale Providers and for Region C

Wholesale Water Provider	Supplies Available in 2070 from Current Sources^(a)	Supplies Available in 2070 from New Strategies^(a)	Total Supplies Available in 2070^(a)	% of Total Supply from Conservation and Reuse	Cost of Strategies (Millions)
Dallas Water Utilities	506,363	414,323	920,686	31.9%	\$4,265
Tarrant Regional Water District	489,024	483,702	972,726	23.4%	\$5,620
North Texas Municipal Water District	383,146	580,122	963,268	20.6%	\$8,209
City of Fort Worth	282,992	257,766	540,757	26.1%	\$1,198
Trinity River Authority	114,996	142,426	257,422	42.8%	\$81
Upper Trinity Regional Water District	41,002	130,566	171,568	26.9%	\$1,325
Greater Texoma Utility Authority	23,333	69,837	93,170	10.0%	\$240
Total for Region C^(b)	1,631,508	1,795,148	3,426,565		\$23,640
2070 Demand in Region C			2,939,880		
Management Supply Factor for Region C			1.166		

Notes:

(a) Current sources include only those that are connected. Some supplies are used by more than one supplier. For example, TRWD supplies water to TRA and Fort Worth, DWU supplies water to UTRWD, etc.

(b) Total for Region C is not a sum of the numbers above. It includes other providers as well. Some supplies serve multiple suppliers.

Table ES.3
Summary of Recommended Strategies - Region C WWP's and WUGs*

**volumes shown in gray italics are infrastructure projects to utilize the supply volumes from other strategies*

Entity	Recommended Strategy	Capital Cost	Cost Table	First Decade of Water Strategy	First Decade Water Supply Volume (acre-feet/year)	First Decade Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2070 Water Supply Volume (acre-feet/year)	Year 2070 Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2020 Water Supply Volume (acre-feet/year)	Year 2030 Water Supply Volume (acre-feet/year)	Year 2040 Water Supply Volume (acre-feet/year)	Year 2050 Water Supply Volume (acre-feet/year)	Year 2060 Water Supply Volume (acre-feet/year)	Year 2070 Water Supply Volume (acre-feet/year)
Multiple	Conservation - Municipal	\$420,878,859	Q-10	2020	55,532	\$853	131,108	\$153	55,532	88,085	96,213	108,956	120,028	131,108
Multiple	Conservation - Non-Municipal	\$0	Q-11	2020	34	\$310	4,883	\$310	34	731	2,936	4,053	4,488	4,883
Dallas	Main Stem Pump Station	\$44,481,000	Q-34	2020	34,751	\$153	34,751	\$46	34,751	34,751	34,751	34,751	34,751	34,751
Dallas	Main Stem Balancing Reservoir (Reuse)	\$674,463,000	Q-35	2050	84,075	\$607	114,342	\$175	0	0	0	84,075	102,011	114,342
Dallas	Connect Lake Palestine (Palestine to IPL, Dallas Portion of IPL, IPL to Bachman)	\$900,817,000	Q-36, Q-37, Q-48	2030	110,670	\$1,524	106,239	\$834	0	110,670	109,563	108,455	107,347	106,239
Dallas	Neches Run-of-River	\$226,790,000	Q-38	2060	47,250	\$697	47,250	\$697	0	0	0	0	47,250	47,250
Dallas	Lake Columbia	\$327,187,000	Q-39	2070	56,050	\$914	56,050	\$914	0	0	0	0	0	56,050
Dallas	Infrastructure to Treat & Deliver to Customers	\$2,087,784,000	Q-40	2020	34,751	\$569	358,632	\$82	34,751	145,421	144,314	227,281	291,359	358,632
Tarrant Regional WD	Integrated Pipeline (IPL)	\$1,733,914,000	Q-48	2020	71,270	\$1,084	123,091	\$239	71,270	102,480	122,353	135,403	132,461	123,091
Tarrant Regional WD	Additional Cedar Creek Lake	\$0		2020	32,636	\$0	15,898	\$0	32,636	30,583	28,315	25,609	21,368	15,898
Tarrant Regional WD	Add'l Richland-Chambers Reuse	\$0		2020	38,634	\$0	19,134	\$0	38,634	34,734	30,834	26,934	23,034	19,134
Tarrant Regional WD	Cedar Creek Reuse	\$139,078,000	Q-49	2030	37,163	\$182	88,059	\$50	0	37,163	63,204	82,860	88,059	88,059
Tarrant Regional WD	Tehuacana	\$742,730,000	Q-50	2040	41,600	\$1,382	41,600	\$150	0	0	41,600	41,600	41,600	41,600
Tarrant Regional WD	Sulphur Basin Supply	\$3,004,413,000	Q-18	2050	72,670	\$1,131	280,000	\$267	0	0	0	72,670	72,670	280,000
North Texas MWD	Removal of Chapman Silt Barrier	\$1,793,000	Q-19	2020	3,620	\$20	3,135	N/A	3,620	3,523	3,426	3,329	3,232	3,135
North Texas MWD	Dredge Lake Lavon	\$1,967,000	Q-20	2020	7,959	\$20	6,390	N/A	7,959	7,735	7,399	7,062	6,726	6,390
North Texas MWD	Add'l measure to access full Lavon yield	\$20,823,000	Q-21	2020	14,461	\$205	10,130	\$84	14,461	13,505	12,661	11,818	10,974	10,130
North Texas MWD	Main Stem PS (additional East Fork wetlands - TRA)	\$71,743,000	Q-22	2020	53,088	\$153	0	\$46	53,088	37,913	25,366	13,599	3,235	0
North Texas MWD	Lower Bois d'Arc Creek Res.	\$625,610,000	Q-23	2020	16,815	\$506	113,600	\$71	16,815	120,200	120,200	118,000	115,800	113,600
North Texas MWD	Lake Chapman Pump Station Expansion	\$25,638,000	Q-24	2020										
North Texas MWD	Additional Lake Texoma - Blend with Lower Bois d'Arc water	\$174,179,000	Q-25	2040	39,571	\$518	37,867	\$150	0	0	39,571	39,333	38,600	37,867
North Texas MWD	Sulphur Basin Supplies	\$1,206,634,000	Q-18	2060	45,367	\$710	174,800	\$710	0	0	0	0	45,367	174,800
North Texas MWD	Additional Lake Texoma - Blend with Sulphur Basin water	\$347,596,000	Q-26	2060	15,122	\$642	58,267	\$642	0	0	0	0	15,122	58,267
North Texas MWD	Toledo Bend Phase 1	\$1,248,461,000	Q-57	2060	100,000	\$1,325	100,000	\$1,325	0	0	0	0	100,000	100,000
North Texas MWD	Oklahoma	\$167,541,000	Q-27	2070	50,000	\$508	50,000	\$508	0	0	0	0	0	50,000
North Texas MWD	Infrastructure to Treat & Deliver to Customers								0	0	0	0	0	0
North Texas MWD	Fannin County Water Supply System	\$45,753,900	Q-150	2020	56	\$914	12,760	\$614	56	912	2,436	4,666	8,466	12,760
North Texas MWD	Treatment and Distribution (CIP)	\$4,270,998,000	Q-28	2020	95,943	\$837	554,189	\$194	95,943	182,876	208,623	193,141	339,056	554,189
Fort Worth	Alliance Direct Reuse	\$16,083,000	Q-68	2020	2,800	\$161	7,841	\$20	2,800	2,800	7,841	7,841	7,841	7,841
Fort Worth	Future Direct Reuse	\$129,976,000	Q-67	2020	2,688	\$1,363	8,166	\$268	2,688	6,934	8,166	8,166	8,166	8,166
Fort Worth	Eagle Mountain 35 mgd expansion	\$68,472,000	Q-13	2030	19,618	\$417	19,618	\$124	0	19,618	19,618	19,618	19,618	19,618
Fort Worth	West Plant 23 mgd expansion	\$48,082,000	Q-13	2030	12,892	\$446	12,892	\$134	0	12,892	12,892	12,892	12,892	12,892
Fort Worth	Rolling Hills 50 mgd expansion	\$93,960,000	Q-13	2030	414	\$401	28,025	\$121	0	414	28,025	28,025	28,025	28,025
Fort Worth	West Plant 35 mgd expansion	\$68,472,000	Q-13	2040	19,618	\$417	19,618	\$124	0	0	19,618	19,618	19,618	19,618
Fort Worth	Eagle Mountain 30 mgd expansion	\$59,977,000	Q-13	2040	15,710	\$427	16,815	\$127	0	0	15,710	16,815	16,815	16,815
Fort Worth	50 mgd expansion-1	\$93,960,000	Q-13	2050	28,025	\$401	28,025	\$121	0	0	0	28,025	28,025	28,025
Fort Worth	50 mgd expansion-2	\$93,960,000	Q-13	2050	13,099	\$401	28,025	\$121	0	0	0	13,099	28,025	28,025
Fort Worth	50 mgd expansion-3	\$93,960,000	Q-13	2060	23,923	\$401	28,025	\$401	0	0	0	0	23,923	28,025
Fort Worth	50 mgd expansion-4	\$93,960,000	Q-13	2070	28,025	\$401	28,025	\$401	0	0	0	0	0	28,025

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**volumes shown in gray italics are infrastructure projects to utilize the supply volumes from other strategies*

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Fort Worth	50 mgd expansion-5	\$93,960,000	Q-13	2070	7,913	\$401	7,913	\$401	0	0	0	0	0	7,913
Fort Worth	Cost Participation in Water delivery line to Customers (Trophy Club and Westlake)	\$5,233,000	Q-197	2020	0	N/A	0	N/A	0	0	0	0	0	0
Trinity River Authority	TRWD Water:													
Trinity River Authority	Tarrant Co. WSP	\$0		2030	1,629	\$316	17,205	\$316	0	1,629	6,922	11,204	14,388	17,205
Trinity River Authority	Ellis Co. WSP	\$0		2020	3,726	\$316	49,386	\$316	3,726	6,698	10,932	16,783	26,616	49,386
Trinity River Authority	Freestone County SEP	\$0		2030	604	\$0	2,920	\$0	0	604	1,315	1,945	2,462	2,920
Trinity River Authority	Ennis Indirect Reuse	Included in Ennis costs in Table 5C.41		2040	518	\$0	3,696	\$0	0	0	518	1,392	3,696	3,696
Trinity River Authority	Joe Pool Lake Reuse**	N/A	None	2020	1,914	N/A	4,368	N/A	1,914	2,835	4,041	4,368	4,368	4,368
Trinity River Authority	Additional Los Colinas Reuse	\$15,017,000	Q-58	2020	7,000	\$392	7,000	\$212	7,000	7,000	7,000	7,000	7,000	7,000
Trinity River Authority	Dallas County Reuse (SEP)	\$8,661,000	Q-59	2030	2,000	\$590	2,000	\$228	0	2,000	2,000	2,000	2,000	2,000
Trinity River Authority	Ellis County Reuse (SEP)	\$17,958,000	Q-60	2060	2,200	\$557	4,700	\$557	0	0	0	0	2,200	4,700
Trinity River Authority	Freestone Co. Reuse (SEP)	\$30,593,000	Q-61	2050	6,760	\$613	6,760	\$235	0	0	0	6,760	6,760	6,760
Trinity River Authority	Kaufman Co. Reuse (SEP)	\$8,763,000	Q-62	2020	1,000	\$935	1,000	\$283	1,000	1,000	1,000	1,000	1,000	1,000
Trinity River Authority	Tarrant and Denton Co. Reuse	Included in Fort Worth costs in Table 5C.10		2020	3,921	\$0	11,537	\$0	3,921	3,921	11,537	11,537	11,537	11,537
Trinity River Authority	Central Reuse to Irving	Included in Irving costs in Section 5D.		2020	28,025	\$0	28,025	\$0	28,025	28,025	28,025	28,025	28,025	28,025
Trinity River Authority	Central Reuse to NTMWD (via Main Stem Pump Station)	Included in NTMWD costs in Table 5C.8		2020	53,088	\$0	0	\$0	53,088	37,913	25,366	13,599	3,235	0
Upper Trinity RWD	Chapman Silt Barrier	Included under NTMWD in Table 5C.8		2020	998	\$0	864	\$0	998	972	945	918	891	864
Upper Trinity RWD	Additional Supplies from DWU (Up to Current Contracts)*	\$0		2020	1,819	\$482	18,017	\$482	1,819	6,205	11,048	14,115	16,458	18,017
Upper Trinity RWD	Lake Ralph Hall	\$316,160,000	Q-52	2030	34,050	\$584	34,050	\$80	0	34,050	34,050	34,050	34,050	34,050
Upper Trinity RWD	Lake Ralph Hall Indirect Reuse	\$0	None	2030	9,733	\$0	16,071	\$0	0	9,733	14,967	15,335	15,703	16,071
Upper Trinity RWD	Additional Direct Reuse	\$13,213,000	Q-53	2030	560	\$590	2,240	\$94	0	560	1,121	2,240	2,240	2,240
Upper Trinity RWD	Contract Renewal with Commerce for Lake Chapman supply	\$0	None	2040	2,813	\$3	5,547	\$3	0	0	2,813	2,799	2,786	5,547
Upper Trinity RWD	Contract Renewal with Commerce for Lake Chapman - Reuse	\$0	None	2040	1,428	\$0	3,069	\$0	0	0	1,428	1,464	1,500	3,069
Upper Trinity RWD	Additional DWU (Contract Increase)	\$0	None	2050	5,605	\$482	11,210	\$482	0	0	0	5,605	11,210	11,210
Upper Trinity RWD	Sulphur Basin Supplies	\$305,499,000	Q-18	2060	9,083	\$906	35,000	\$906	0	0	0	0	9,083	35,000
Upper Trinity RWD	Treatment and Distribution System Improvements	\$690,554,000	Q-54	2020	2,817		126,068		2,817	51,520	66,372	76,526	93,921	126,068
Greater Texoma UA	Texoma Raw water to Grayson Co SEP	\$24,356,000	Q-63	2030	6,548	\$388	6,548	\$78	0	6,548	6,548	6,548	6,548	6,548
Greater Texoma UA	Texoma Raw water to Fannin Co SEP	\$25,026,000	Q-128	2030	9,000	\$287	9,000	\$52	0	9,000	9,000	9,000	9,000	9,000
Greater Texoma UA	Grayson County Water Supply Project (Treatment of Lake Texoma)	\$92,840,000	Q-64	2020	187	\$841	25,528	\$534	187	1,990	4,333	7,214	13,903	25,528
Greater Texoma UA	Add'l NTMWD (Current CGMA Facilities)	\$0	None	2020	142	\$570	0	\$570	142	659	1,708	0	0	0

Table ES.3
Summary of Recommended Strategies - Region C WWP's and WUG's*

**volumes shown in gray italics are infrastructure projects to utilize the supply volumes from other strategies*

Entity	Recommended Strategy	Capital Cost	Cost Table	First Decade of Water Strategy	First Decade Water Supply Volume (acre-feet/year)	First Decade Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2070 Water Supply Volume (acre-feet/year)	Year 2070 Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2020 Water Supply Volume (acre-feet/year)	Year 2030 Water Supply Volume (acre-feet/year)	Year 2040 Water Supply Volume (acre-feet/year)	Year 2050 Water Supply Volume (acre-feet/year)	Year 2060 Water Supply Volume (acre-feet/year)	Year 2070 Water Supply Volume (acre-feet/year)
Greater Texoma UA	CGMA-East West Pipeline (NTMWD)	\$3,672,000	Q-65	2050	<i>4,698</i>	\$877	<i>11,400</i>	\$847	0	0	0	4,698	11,400	11,400
Greater Texoma UA	Parallel CGMA Pipeline (NTMWD)	\$59,492,000	Q-66	2060	<i>3,533</i>	\$1,232	<i>14,541</i>	\$1,232	0	0	0	0	3,533	14,541
Dallas County PCMUD	None													
Corsicana	New 8 MGD Halbert/Richland Chambers WTP (4 mgd increase from current plant)	\$37,370,000	Q-12	2020	2,242	\$1,991	2,242	\$596	2,242	2,242	2,242	2,242	2,242	2,242
Corsicana	Raw Water for Power Plant (Pipeline and PS)	\$16,331,000	Q-167	2030	5,440	\$323	5,440	\$72	0	5,440	5,440	5,440	5,440	5,440
Corsicana	8 MGD Expansion of Halbert/Richland Chambers WTP and expansion of pump station	\$21,689,000	Q-13	2050	4,484	\$577	4,484	\$173	0	0	0	4,484	4,484	4,484
Argyle WSC	Additional UTRWD	\$0		2020	<i>0</i>	\$976	<i>1,857</i>	\$976	0	375	1,033	1,473	1,690	1,857
Arlington	Additional Water from TRWD	\$0		2030	<i>4,780</i>	\$316	<i>31,464</i>	\$316	0	4,780	12,711	19,936	26,082	31,464
Athens MWA	Fish Hatchery Reuse	\$0	None	2020	2,872	\$33	2,872	\$33	2,872	2,872	2,872	2,872	2,872	2,872
Athens MWA	Infrastructure Improvements at WTP	\$2,900,000	Q-145	2020	<i>1,682</i>	\$59	<i>1,682</i>	\$37	1,682	1,682	1,682	1,682	1,682	1,682
Cross Timbers WSC	Additional UTRWD	\$0		2030	<i>208</i>	\$976	<i>923</i>	\$976	0	208	452	673	814	923
Cross Timbers WSC	Infrastructure to take delivery from UTRWD and to deliver water to customers	\$5,858,000	Q-99	2020	<i>208</i>	\$639	<i>923</i>	\$111	0	208	452	673	814	923
Denison	4 MGD WTP Expansion	\$13,168,000	Q-13	2030	2,242	\$701	2,242	\$209	0	2,242	2,242	2,242	2,242	2,242
Denison	4 MGD New WTP	\$19,888,000	Q-12	2060	2,242	\$1,059	2,242	\$1,059	0	0	0	0	2,242	2,242
Denison	4 MGD WTP Expansion	\$13,168,000	Q-13	2070	2,242	\$701	2,242	\$701	0	0	0	0	0	2,242
Denison	Expand Raw Water delivery from Lake Texoma	\$21,629,700	Q-137	2030	<i>2,242</i>	\$785	<i>6,726</i>	\$94	0	2,242	2,242	2,242	4,484	6,726
Denton	Existing supplies made available by treatment below:			2020	6,590		11,144		6,590	8,273	10,195	11,956	11,550	11,144
Denton	30 mgd Ray Roberts Plant Expansion	\$59,881,000	Q-13	2020	<i>2,674</i>	\$424	<i>16,815</i>	\$127	2,674	10,926	16,815	16,815	16,815	16,815
Denton	20 mgd Ray Roberts Plant Expansion	\$42,922,000	Q-13	2040	<i>3,368</i>	\$456	<i>11,210</i>	\$137	0	0	3,368	11,210	11,210	11,210
Denton	30 mgd Ray Roberts Plant Expansion	\$59,881,000	Q-13	2050	<i>16,815</i>	\$424	<i>16,815</i>	\$127	0	0	0	4,147	16,815	16,815
Denton	25 mgd Treatment Plant Expansion-1	\$51,402,000	Q-13	2060	<i>8,396</i>	\$437	<i>14,013</i>	\$437	0	0	0	0	8,396	14,013
Denton	25 mgd Treatment Plant Expansion-2	\$51,402,000	Q-13	2070	<i>11,318</i>	\$541	<i>11,318</i>	\$541	0	0	0	0	0	11,318
East Cedar Creek FWSD	Additional TRWD	\$0		2030	<i>147</i>	\$316	<i>1,779</i>	\$316	0	147	391	655	1,079	1,779
East Cedar Creek FWSD	2 mgd Treatment Plant Expansion	\$8,904,000	Q-13	2070	<i>962</i>	\$948	<i>962</i>	\$948	0	0	0	0	0	962
Ennis	Indirect Reuse	\$39,456,900	Q-108	2040	<i>518</i>	\$1,374	<i>3,696</i>	\$481	0	0	518	1,392	3,696	3,696
Ennis	Additional TRWD	\$0	None	2030	<i>93</i>	\$316	<i>13,143</i>	\$316	0	93	285	1,084	3,807	13,143
Ennis	6 MGD WTP expansion	\$17,433,000	Q-13	2040	<i>56</i>	\$619	<i>3,363</i>	\$186	0	0	56	2,479	3,363	3,363
Ennis	8 MGD WTP expansion	\$21,697,000	Q-13	2060	<i>4,142</i>	\$577	<i>4,484</i>	\$577	0	0	0	0	4,142	4,484
Ennis	16 MGD WTP expansion	\$36,138,000	Q-13	2070	<i>8,992</i>	\$479	<i>8,992</i>	\$479	0	0	0	0	0	8,992
Forney	Additional NTMWD	\$0		2020	<i>504</i>	\$554	<i>9,339</i>	\$554	504	1,789	2,712	3,760	5,695	9,339
Forney	Increase delivery infrastructure from NTWMD (pump station)	\$11,162,800	Q-154	2050	<i>0</i>	\$94	<i>9,339</i>	\$39	504	1,789	2,712	3,760	5,695	9,339
Gainesville	2.5 MGD WTP Expansion	\$9,970,000	Q-13	2060	560	\$850	1,401	\$850	0	0	0	0	560	1,401
Gainesville	6 MGD WTP Expansion	\$17,431,000	Q-13	2070	3,298	\$632	3,298	\$632	0	0	0	0	0	3,298
Gainesville	Infrastructure to deliver to customers	\$26,296,000	Q-82	2030	<i>204</i>	\$2,243	<i>1,825</i>	\$1,037	0	204	293	393	937	1,825
Gainesville	Expand Direct Reuse	\$1,669,000	Q-81	2020	70	\$2,330	70	\$342	70	70	70	70	70	70
Garland	Additional NTMWD	\$0		2020	<i>2,610</i>	\$554	<i>16,896</i>	\$554	2,610	8,870	11,946	13,393	15,074	16,896
Grand Prairie	DWU Pipeline and Additional DWU	\$34,306,000	Q-88	2020	<i>719</i>	\$313	<i>11,282</i>	\$59	719	3,274	7,252	9,105	10,344	11,282
Grand Prairie	Additional Fort Worth (TRWD)	\$0		2020	<i>0</i>	\$639	<i>1,286</i>	\$639	0	495	831	1,016	1,159	1,286
Grand Prairie	Mansfield (TRWD)	\$0		2020	<i>3,240</i>	\$815	<i>4,018</i>	\$815	3,240	3,188	3,296	3,490	3,773	4,018

Table ES.3
Summary of Recommended Strategies - Region C WWP's and WUGs*

**volumes shown in gray italics are infrastructure projects to utilize the supply volumes from other strategies*

Entity	Recommended Strategy	Capital Cost	Cost Table	First Decade of Water Strategy	First Decade Water Supply Volume (acre-feet/year)	First Decade Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2070 Water Supply Volume (acre-feet/year)	Year 2070 Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2020 Water Supply Volume (acre-feet/year)	Year 2030 Water Supply Volume (acre-feet/year)	Year 2040 Water Supply Volume (acre-feet/year)	Year 2050 Water Supply Volume (acre-feet/year)	Year 2060 Water Supply Volume (acre-feet/year)	Year 2070 Water Supply Volume (acre-feet/year)
Grand Prairie	Arlington (TRWD)	\$4,950,500	Q-87	2020	<i>1,100</i>	\$1,039	<i>2,197</i>	\$850	1,100	1,092	1,665	1,660	2,205	2,197
Lake Cities MUA	Additional UTRWD	\$0		2030	<i>417</i>	\$976	<i>1,612</i>	\$976	0	417	912	1,330	1,479	1,612
Mansfield	Add'l TRWD Supply	\$0		2020	<i>11,730</i>	\$316	<i>38,705</i>	\$316	11,730	14,385	19,068	27,424	32,870	38,705
Mansfield	15 MGD WTP Expansion	\$34,489,000	Q-13	2021	<i>8,408</i>	\$489	<i>8,408</i>	\$147	8,408	8,408	8,408	8,408	8,408	8,408
Mansfield	20 MGD WTP Expansion-1	\$42,984,000	Q-13	2025	<i>3,322</i>	\$456	<i>11,210</i>	\$137	3,322	5,977	10,660	11,210	11,210	11,210
Mansfield	20 MGD WTP Expansion-2	\$42,984,000	Q-13	2050	<i>7,806</i>	\$456	<i>11,210</i>	\$137	0	0	0	7,806	11,210	11,210
Mansfield	16 MGD WTP Expansion	\$36,188,000	Q-13	2060	<i>2,042</i>	\$482	<i>7,877</i>	\$482	0	0	0	0	2,042	7,877
Midlothian	Add'l TRWD	\$0		2020	<i>1,421</i>	\$316	<i>11,178</i>	\$316	1,421	3,031	5,297	7,402	9,286	11,178
Midlothian	6 MGD WTP Expansion-1	\$17,433,000	Q-13	2020	<i>1,246</i>	\$619	<i>3,363</i>	\$186	1,246	3,031	3,363	3,363	3,363	3,363
Midlothian	6 MGD WTP Expansion-2	\$17,433,000	Q-13	2040	<i>1,934</i>	\$619	<i>3,363</i>	\$186	0	0	1,934	3,363	3,363	3,363
Midlothian	6 MGD WTP Expansion-3	\$17,433,000	Q-13	2060	<i>2,560</i>	\$619	<i>3,363</i>	\$619	0	0	0	0	2,560	3,363
Mustang SUD	Additional UTRWD Supplies	\$0		2030	<i>2,243</i>	\$976	<i>12,022</i>	\$976	0	2,243	5,092	7,991	10,088	12,022
Mustang SUD	Infrastructure to deliver to customers	\$0		2030	<i>2,243</i>	\$0	<i>12,022</i>	\$0	0	2,243	5,092	7,991	10,088	12,022
North Richland Hills	Additional TRA (from TRWD)	\$0		2030	<i>283</i>	\$945	<i>1,712</i>	\$945	0	283	727	1,114	1,431	1,712
North Richland Hills	Additional Fort Worth (from TRWD)	\$0		2020	<i>5,078</i>	\$639	<i>5,067</i>	\$639	5,078	5,390	5,145	4,987	4,925	5,067
North Richland Hills	New Pipeline from Fort Worth (Cost share with Watagua)	\$8,091,833	Q-199	2020	<i>5,078</i>	\$297	<i>5,067</i>	\$40	5,078	5,390	5,145	4,987	4,925	5,067
Princeton	Additional NTMWD	\$0		2020	<i>91</i>	\$554	<i>3,594</i>	\$554	91	358	616	1,418	2,374	3,594
Rockett SUD	Additional Midlothian with Increase in Infrastructure (20" line)	\$11,874,000	Q-115	2020	<i>124</i>	\$854	<i>1,394</i>	\$140	124	504	860	1,101	1,273	1,394
Rockett SUD	Additional TRWD/TRA	\$0	None	2020	<i>4,934</i>	\$316	<i>24,899</i>	\$316	4,934	7,303	10,124	12,610	16,996	24,899
Rockett SUD	Sokoll 10 MGD Expansion-1	\$25,961,000	Q-13	2020	<i>4,934</i>	\$554	<i>5,605</i>	\$166	4,934	5,605	5,605	5,605	5,605	5,605
Rockett SUD	Sokoll 10 MGD Expansion-2	\$25,961,000	Q-13	2030	<i>1,698</i>	\$554	<i>5,605</i>	\$166	0	1,698	4,519	5,605	5,605	5,605
Rockett SUD	Sokoll 10 MGD Expansion-3	\$25,961,000	Q-13	2050	<i>1,400</i>	\$554	<i>5,605</i>	\$166	0	0	0	1,400	5,605	5,605
Rockett SUD	Sokoll 10 MGD Expansion-4	\$25,961,000	Q-13	2070	<i>5,605</i>	\$554	<i>5,605</i>	\$554	0	0	0	0	0	5,605
Rockwall	Additional NTMWD	\$0		2020	<i>749</i>	\$554	<i>12,990</i>	\$554	749	4,175	5,995	7,659	10,080	12,990
Rockwall	Increase delivery infrastructure from NTWMD	\$22,551,000	Q-183	2020	<i>0</i>	\$182	<i>12,990</i>	\$39	0	1,457	3,901	6,426	10,080	12,990
Seagoville	Additional DWU beyond Current Contract	\$0		2020	<i>1,107</i>	\$482	<i>5,756</i>	\$482	1,107	1,511	2,047	2,688	4,094	5,756
Seagoville	Infrastructure to take delivery from Dallas	\$0		2020	<i>0</i>	\$0	<i>0</i>	\$0	0	0	0	0	0	0
Seagoville	Infrastructure to deliver to customers	\$0		2020	<i>0</i>	\$0	<i>0</i>	\$0	0	0	0	0	0	0
Sherman	Grayson County Water Supply Project:													
Sherman	<i>10 MGD WTP Expansion (desal)</i>	\$17,328,500	Q-13	2020	<i>5,605</i>	\$919	<i>5,605</i>	\$401	5,605	5,605	5,605	5,605	5,605	5,605
Sherman	<i>10 MGD New WTP (desal)</i>	\$34,657,000	Q-12	2050	<i>5,605</i>	\$919	<i>5,605</i>	\$401	0	0	0	5,605	5,605	5,605
Sherman	<i>20 MGD WTP Expansion (desal)</i>	\$29,478,000	Q-13	2070	<i>11,210</i>	\$782	<i>11,210</i>	\$782	0	0	0	0	0	11,210
Terrell	Additional NTMWD	\$0		2020	<i>340</i>	\$570	<i>13,616</i>	\$570	340	1,854	3,776	6,587	9,936	13,616
Terrell	Infrastructure Upgrades to Deliver water to Wholesale Customers	\$3,714,000	Q-157	2020	<i>340</i>	\$616	<i>11,210</i>	\$587	340	1,854	3,776	6,587	9,936	13,616
Terrell		\$1,569,100	Q-158	2030	<i>2,803</i>	\$632	<i>2,803</i>	\$587						
Terrell		\$1,514,500	Q-159	2040	<i>4,484</i>	\$613	<i>4,484</i>	\$583						
Terrell		\$4,418,700	Q-160	2040	<i>4,484</i>	\$671	<i>4,484</i>	\$590						
Terrell		\$1,395,100	Q-161	2020	<i>6,726</i>	\$600	<i>6,726</i>	\$583						
Terrell		\$5,688,500	Q-162	2030	<i>4,484</i>	\$704	<i>4,484</i>	\$600						
Terrell	Additional Connection to NTMWD	\$25,559,100	Q-163	2040	<i>340</i>	\$776	<i>13,452</i>	\$616	340	1,854	3,776	6,587	9,936	13,616

Table ES.3
Summary of Recommended Strategies - Region C WWP's and WUGs*

**volumes shown in gray italics are infrastructure projects to utilize the supply volumes from other strategies*

Entity	Recommended Strategy	Capital Cost	Cost Table	First Decade of Water Strategy	First Decade Water Supply Volume (acre-feet/year)	First Decade Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2070 Water Supply Volume (acre-feet/year)	Year 2070 Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2020 Water Supply Volume (acre-feet/year)	Year 2030 Water Supply Volume (acre-feet/year)	Year 2040 Water Supply Volume (acre-feet/year)	Year 2050 Water Supply Volume (acre-feet/year)	Year 2060 Water Supply Volume (acre-feet/year)	Year 2070 Water Supply Volume (acre-feet/year)
Walnut Creek SUD	Additional TRWD	\$0	None	2030	<i>218</i>	\$316	<i>5,662</i>	\$316	0	218	686	1,476	3,291	5,662
Walnut Creek SUD	6 MGD WTP New	\$9,245,000	Q-12	2030	<i>218</i>	\$534	<i>3,363</i>	\$303	0	218	686	1,476	3,291	3,363
Walnut Creek SUD	0 MGD WTP Expansion-2	\$0	\$0	2050	<i>0</i>	\$0	<i>0</i>	\$0	0	0	0	0	0	0
Walnut Creek SUD	0 MGD WTP Expansion-3	\$0	\$0	2060	<i>0</i>	\$0	<i>0</i>	\$0	0	0	0	0	0	0
Walnut Creek SUD	New 12 MGD Eagle Mountain WTP	\$53,337,000	Q-12	2070	<i>2,299</i>	\$948	<i>2,299</i>	\$948	0	0	0	0	0	2,299
Waxahachie	Dredge Lake Waxahachie	\$31,973,500	Q-123	2030	705	\$3,796	705	NA	0	705	705	705	705	705
Waxahachie	Add'l TRA/TRWD	\$0	None	2040	<i>2,659</i>	\$355	<i>12,389</i>	\$355	0	0	2,659	4,809	7,900	12,389
Waxahachie	Ellis County Steam Electric Supply Project	\$15,009,000	Q-107	2040	<i>2,116</i>	\$342	<i>4,484</i>	\$62	0	0	2,116	4,129	4,484	4,484
Waxahachie	Existing Reuse made usable through additional treatment below:				510		884		510	671	1,104	1,319	1,020	884
Waxahachie	8 MGD Expansion of Howard Rd WTP	\$21,697,000	Q-13	2030	<i>4,484</i>	\$577	<i>4,484</i>	\$173	0	4,484	4,484	4,484	4,484	4,484
Waxahachie	10 MGD Expansion of Howard Rd WTP	\$25,961,000	Q-13	2050	<i>5,605</i>	\$554	<i>5,605</i>	\$166	0	0	0	5,605	5,605	5,605
Waxahachie	12 MGD Expansion of Howard Rd WTP	\$29,353,000	Q-13	2070	<i>6,726</i>	\$521	<i>6,726</i>	\$521	0	0	0	0	0	6,726
Waxahachie	36" Raw water line from IPL to Lake Waxahachie	\$1,073,400	Q-120	2030	<i>16,815</i>	\$325	<i>16,815</i>	\$317	0	4,484	4,484	10,089	10,089	16,815
Waxahachie	27" Raw water line from IPL to Howard Road Water Treatment Plant	\$3,176,400	Q-119	2030	<i>16,815</i>	\$372	<i>16,815</i>	\$321	0	4,484	4,484	10,089	10,089	16,815
Waxahachie	36" Raw water line from Lake Waxahachie to Howard Rd WTP	\$5,465,000	Q-121	2030	<i>16,815</i>	\$48	<i>16,815</i>	\$6	0	4,484	4,484	10,089	10,089	16,815
Waxahachie	Phase I Delivery Infrastructure to Customers in South Ellis County	\$15,220,700	Q-125	2030	<i>1,121</i>	\$558	<i>1,121</i>	\$78	0	281	1,121	1,121	1,121	1,121
Waxahachie	Phase II Delivery Infrastructure to Customers in South Ellis County	\$23,452,433	Q-126	2050	<i>5,875</i>	\$572	<i>5,875</i>	\$64	0	0	1,638	4,105	5,165	5,875
Waxahachie	48" TRWD Parallel Supply Line to Sokoll WTP	\$3,510,500	Q-122	2030	<i>16,815</i>	\$330	<i>16,815</i>	\$317	0	4,484	4,484	10,089	10,089	16,815
Waxahachie	Increase delivery infrastructure to Rockett SUD (30" Raw water Line)	\$11,894,900	Q-124	2030	<i>16,815</i>	\$163	<i>16,815</i>	\$15	0	4,484	4,484	10,089	10,089	16,815
Waxahachie	Raw Water Intake Improvements at Lake Bardwell	\$5,168,200	Q-127	2030	<i>16,815</i>	\$53	<i>16,815</i>	\$27	0	4,484	4,484	10,089	10,089	16,815
Weatherford	Indirect Reuse - Lake Weatherford/Sunshine	\$13,089,000	Q-177	2020	2,240	\$580	2,240	\$91	2,240	2,240	2,240	2,240	2,240	2,240
Weatherford	Add'l Water from TRWD	\$0	None	2030	<i>55</i>	\$316	<i>22,486</i>	\$316	0	55	628	4,589	12,490	22,486
Weatherford	8 MGD WTP Expansion*	\$36,408,000	Q-13	2020	<i>1,000</i>	\$1,026	<i>4,484</i>	\$345	1,000	1,000	1,000	4,484	4,484	4,484
Weatherford	14 MGD New WTP	\$60,521,000	Q-12	2050	<i>2,345</i>	\$922	<i>7,847</i>	\$277	0	0	0	2,345	7,847	7,847
Weatherford	24 MGD WTP Expansion	\$49,781,000	Q-13	2070	<i>12,395</i>	\$479	<i>12,395</i>	\$479	0	0	0	0	0	12,395
Weatherford	Expand Lake Benbrook PS	\$2,301,800	Q-178	2030	<i>0</i>	\$756	<i>0</i>	\$326	0	0	0	0	0	0
West Cedar Creek MUD	Additional TRWD	\$0	None	2020	<i>283</i>	\$316	<i>4,170</i>	\$316	283	566	902	1,346	2,537	4,170
West Cedar Creek MUD	6 MGD WTP Expansion	\$17,429,000	Q-13	2050	<i>427</i>	\$639	<i>3,251</i>	\$192	0	0	0	427	1,618	3,251
Wise County WSD	Additional TRWD	\$0	None	2020	<i>1,657</i>	\$316	<i>10,397</i>	\$316	1,657	2,383	3,205	5,859	8,136	10,397
Wise County WSD	10 MGD WTP Expansion-1	\$25,992,000	Q-13	2020	<i>1,657</i>	\$554	<i>5,605</i>	\$166	1,657	2,383	3,205	5,605	5,605	5,605
Wise County WSD	10 MGD WTP Expansion-2	\$25,992,000	Q-13	2050	<i>254</i>	\$648	<i>4,792</i>	\$192	0	0	0	254	2,531	4,792
WUGs by County														
Collin County														
Blue Ridge	Connection to NTMWD	\$2,403,656	Q-69	2020	<i>109</i>	\$678	<i>2,242</i>	\$590	0	109	308	1,363	2,242	2,242
Blue Ridge	Upsize connection to NTMWD	\$1,036,000	Q-70	2060	<i>895</i>	\$603	<i>3,080</i>	\$603	0	0	0	0	895	3,080

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Entity	Recommended Strategy	Capital Cost	Cost Table	First Decade of Water Strategy	First Decade Water Supply Volume (acre-feet/year)	First Decade Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2070 Water Supply Volume (acre-feet/year)	Year 2070 Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2020 Water Supply Volume (acre-feet/year)	Year 2030 Water Supply Volume (acre-feet/year)	Year 2040 Water Supply Volume (acre-feet/year)	Year 2050 Water Supply Volume (acre-feet/year)	Year 2060 Water Supply Volume (acre-feet/year)	Year 2070 Water Supply Volume (acre-feet/year)
Celina*	Connect to NTWMD	\$16,314,000	Q-71	2020	<i>1,500</i>	\$345	<i>5,000</i>	\$72	0	1,500	3,000	5,000	5,000	5,000
East Fork SUD*	Increase delivery infrastructure from NTWMD	\$3,500,000	Q-181	2020	<i>74</i>	\$795	<i>1,624</i>	\$616	74	308	483	758	1,108	1,624
Frisco*	Direct reuse	\$34,882,048	Q-74	2020	2,240	\$740	5,650	\$222	2,240	3,360	5,650	5,650	5,650	5,650
Melissa	Treated water supply line from NTMWD	\$2,124,324	Q-75	2020	<i>44</i>	\$877	<i>237</i>	\$127	44	131	165	188	211	237
Parker	Increase delivery infrastructure from NTMWD	\$1,651,000	Q-76	2030	<i>3,810</i>	\$44	<i>5,309</i>	\$18	0	3,810	5,398	5,366	5,337	5,309
Prosper*	Increase delivery infrastructure from NTWMD	\$3,786,000	Q-77 & Q-78	2020	<i>2,385</i>	\$72	<i>10,874</i>	\$13	0	2,385	5,243	8,098	10,934	10,874
Weston	Additional Groundwater (new wells)	\$824,000	Q-215	2020	71	\$1,348	71	\$376	71	71	71	71	71	71
Weston	Connect to NTMWD and supplies	\$27,130,000	Q-79	2020	<i>829</i>	\$173	<i>18,237</i>	\$49	0	829	4,600	11,501	18,301	18,237
Wylie Northeast SUD	Increase delivery infrastructure from NTWMD	\$4,250,000	Q-80	2020	<i>37</i>	\$437	<i>979</i>	\$75	37	163	243	360	594	979
Collin County Manufacturing	Additional Groundwater (new wells)	\$402,800	Q-72	2030	78	\$635	78	\$199	0	78	78	78	78	78
Cooke County														
Muenster	Develop Muenster Lake supply	\$8,504,000	Q-85	2020	280	\$4,392	280	\$1,851	280	280	280	280	280	280
Cooke County Mining	Direct Reuse (On-Site recycling)	\$0	None	2020	99	\$163	80	\$163	99	67	71	74	77	80
Dallas County														
Glenn Heights*	Increase delivery infrastructure from DWU	\$2,374,000	Q-86	2060	<i>289</i>	\$137	<i>1,925</i>	\$137	0	0	0	0	289	1,925
Irving	Lake Chapman Silt Barrier Removal	Included under NTMWD in Table 5C.8	\$0	2020	3,418	\$0	2,960	NA	3,418	3,326	3,235	3,143	3,052	2,960
Irving	TRA Central Reuse Project	\$39,960,000	Q-90	2020	28,025	\$497	28,025	\$377	28,025	28,025	28,025	28,025	28,025	28,025
Irving	Lake Chapman Booster Pump Station	\$8,546,000	Q-24	2020	0	NA	0	NA						
Dallas County Irrigation	Los Colinas Expansion	See TRA in Section 5C.	\$0	2030	<i>7,000</i>	See TRA	<i>7,000</i>	See TRA	0	7,000	7,000	7,000	7,000	7,000
Dallas County Steam Electric	Reuse (TRA)	See TRA in Section 5C.	\$0	2030	<i>2,000</i>	See TRA	<i>2,000</i>	See TRA	0	2,000	2,000	2,000	2,000	2,000
Rowlett	Increase delivery infrastructure from NTMWD	\$3,519,000	Q-214	2020	<i>695</i>	\$678	<i>4,125</i>	\$609	695	2,332	2,937	3,296	3,683	4,125
Sunnyvale	Additional pipeline from DWU	\$22,408,000	Q-93	2020	<i>142</i>	\$1,414	<i>2,279</i>	\$593	142	695	1,138	1,495	2,023	2,279
Wilmer	New Connection to Dallas (via Lancaster)	\$4,504,300	Q-95	2020	<i>207</i>	\$564	<i>800</i>	\$91	207	242	300	400	600	800
Wilmer	Direct Connection to Dallas 36" Transmission Line	\$15,999,500	Q-94	2040	<i>382</i>	\$528	<i>2,859</i>	\$59	0	0	382	876	1,409	2,859
Denton County														
Corinth	Upsize existing well	\$2,372,900	Q-98	2020	286	\$1,029	286	\$333	286	286	286	286	286	286
Corinth	New wells in Trinity Aquifer-2020	\$1,634,600	Q-96	2020	847	\$457	847	\$212	847	847	847	847	847	847
Corinth	New wells in Trinity Aquifer-2030	\$1,634,600	Q-97	2030	561	\$457	561	\$212	0	561	561	561	561	561
Denton County Other	New wells in Trinity Aquifer	\$2,772,023	Q-102	2020	504	\$1,005	504	\$310	504	504	504	504	504	504
Denton County Other	New wells in Woodbine Aquifer	\$11,691,860	Q-101	2020	817	\$1,361	817	\$383	817	817	817	817	817	817
Hackberry	Increase delivery infrastructure from NTWMD	\$1,731,000	Q-103	2050	<i>70</i>	\$502	<i>348</i>	\$85	0	0	0	70	200	348
Justin	New wells in Trinity Aquifer	\$2,115,500	Q-104	2020	244	\$0	244	\$302	244	244	244	244	244	244
Krum	New wells in Trinity Aquifer	\$1,533,200	Q-105	2020	577	\$299	1,025	\$175	577	707	866	1,025	1,025	1,025
Lewisville*	6 MGD WTP Expansion-2030	\$17,433,000	Q-13	2030	<i>1,386</i>	\$619	<i>3,363</i>	\$186	0	1,386	3,363	3,363	3,363	3,363

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Entity	Recommended Strategy	Capital Cost	Cost Table	First Decade of Water Strategy	First Decade Water Supply Volume (acre-feet/year)	First Decade Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2070 Water Supply Volume (acre-feet/year)	Year 2070 Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2020 Water Supply Volume (acre-feet/year)	Year 2030 Water Supply Volume (acre-feet/year)	Year 2040 Water Supply Volume (acre-feet/year)	Year 2050 Water Supply Volume (acre-feet/year)	Year 2060 Water Supply Volume (acre-feet/year)	Year 2070 Water Supply Volume (acre-feet/year)
Lewisville*	6 MGD WTP Expansion-2040	\$17,433,000	Q-13	2040	<i>1,081</i>	\$0	<i>3,363</i>	\$0	0	0	1,081	3,363	3,363	3,363
Lewisville*	7 MGD WTP Expansion-2050	\$19,565,000	Q-13	2050	<i>845</i>	\$0	<i>3,743</i>	\$0	0	0	0	845	3,879	3,743
Pilot Point	Additional groundwater	\$865,605	Q-106	2020	269	\$497	269	\$229	269	269	269	269	269	269
Trophy Club	Phase I-Increase delivery infrastructure from Ft Worth; joint project with Ft Worth, Westlake, Trophy Club	\$2,273,000	Q-197	2020	<i>896</i>	\$162	<i>2,560</i>	\$13	0	896	1,621	2,009	2,305	2,560
Trophy Club	Phase II-Increase delivery infrastructure from Ft Worth; 24" line	\$7,292,600	Q-198	2020	<i>896</i>	\$260	<i>2,560</i>	\$22	0	896	1,621	2,009	2,305	2,560
Denton County Manufacturing	Additional groundwater	\$777,700	Q-100	2020	184	\$604	184	\$251	184	184	184	184	184	184
Ellis County														
Ferris	Increase delivery infrastructure from Rockett SUD in future	\$2,578,000	Q-109	2060	<i>394</i>	\$202	<i>1,395</i>	\$202	0	0	0	0	394	1,395
Files Valley WSC	Connect to Waxahachie (TRWD through TRA)	See Waxahachie in Section 5C.2	\$0	2030	<i>55</i>	\$0	<i>72</i>	\$0	0	55	59	63	68	72
Mountain Peak SUD*	Additional wells (Woodbine)	\$1,812,605	Q-112	2020	7	\$727	7	\$145	7	7	7	7	7	7
Ovilla*	Increase delivery infrastructure from DWU	\$8,136,000	Q-92	2070	<i>1,494</i>	\$573	<i>1,494</i>	\$573	0	0	0	0	0	1,494
Palmer	Increase delivery infrastructure from Rockett SUD	\$6,628,000	Q-113	2020	<i>10</i>	\$694	<i>940</i>	\$104	10	72	151	245	387	940
Rice WSC*	Increase delivery infrastructure from Corsicana	\$6,983,000	Q-114	2040	<i>156</i>	\$675	<i>1,038</i>	\$114	0	0	156	402	698	1,038
Sardis-Lone Elm WSC	Increase delivery Infrastructure from Rockett SUD	\$1,992,000	Q-118	2020	<i>548</i>	\$138	<i>1,318</i>	\$13	0	0	548	1,026	1,342	1,318
Sardis-Lone Elm WSC	Connect to Midlothian	\$255,200	Q-117	2020	<i>1,121</i>	\$21	<i>1,121</i>	\$2	1,121	1,121	1,121	1,121	1,121	1,121
Ellis County Steam Electric	Waxahachie	See Waxahachie in Section 5C.2	\$0	2040	<i>2,116</i>	\$0	<i>4,484</i>	\$0	0	0	2,116	4,129	4,484	4,484
Ellis County Steam Electric	TRA direct reuse	See TRA in Section 5C.1	0	2060	<i>2,200</i>	See TRA	<i>4,700</i>	See TRA	0	0	0	0	2,200	4,700
Fannin County														
Ladonia	Lake Ralph Hall supply	\$12,134,600	Q-129	2030	<i>34</i>	\$14,204	<i>133</i>	\$6,629	0	34	57	89	134	133
Leonard	Water System Improvements	\$2,567,600	Q-207	2020	<i>148</i>	\$1,153	<i>273</i>	\$366	0	148	194	211	240	273
Southwest Fannin Co SUD*	Additional Groundwater (with transmission facilities)	\$2,348,823	Q-130	2030	100	\$2,559	100	\$589	0	100	100	100	100	100
Trenton	New Wells in Woodbine Aquifer	\$971,785	Q-131	2030	25	\$4,148	25	\$908	0	25	25	25	25	25
Fannin County Steam Electric	Lake Texoma (GTUA)	See GTUA in Section 5C.1.	\$0	2030	<i>9,000</i>	\$0	<i>9,000</i>	\$0	0	9,000	9,000	9,000	9,000	9,000
Freestone County														
Fairfield	New Water Treatment Plant and transmission	\$7,283,000	Q-132	2050	<i>191</i>	\$880	<i>897</i>	\$202	0	0	0	191	426	897
Freestone County Other	Increase delivery infrastructure from Corsicana	\$5,550,000	Q-133	2020	<i>40</i>	\$2,053	<i>266</i>	\$306	0	40	44	64	119	266
Freestone County Other	New delivery and treatment facilities from TRWD	\$39,845,900	Q-134	2030	<i>189</i>	\$1,388	<i>3,207</i>	\$349	189	145	115	368	1,175	3,207
Teague	New Wells in Carrizo-Wilcox Aquifer	\$1,145,600	Q-135	2050	200	\$765	200	\$285	0	0	0	200	200	200

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Freestone County Steam Electric	Additional TRWD supplies through TRA	\$0	None	2030	604	\$0	8,587	\$0	0	604	1,315	1,945	2,462	8,587
Freestone County Steam Electric	TRA direct reuse	See TRA in Section 5C	\$0	2050	6,760	See TRA	6,760	See TRA	0	0	0	6,760	6,760	6,760
Grayson County														
Bells	New well in Woodbine Aquifer	\$1,200,000	Q-136	2030	145	\$1,102	145	\$412	0	145	145	145	145	145
Gunter	New wells	\$2,080,600	\$0	2020	100	\$4,660	100	\$1,180	50	100	100	100	100	100
Southmayd	New Well in Woodbine	\$1,068,000	Q-141	2070	77	\$1,530	77	\$1,530	0	0	0	0	0	77
Van Alstyne	Water System Improvements	\$2,180,800	Q-142	2030	14	\$766	1,370	\$632	0	14	47	87	646	1,370
Grayson County Mining	New well in Trinity Aquifer	\$164,000	Q-138	2050	41	\$463	41	\$122	0	0	0	41	41	41
Grayson County Steam Electric	Additional Lake Texoma (GTUA)	See GTUA in Section 5C.1.	\$0	2030	6,548	\$0	6,548	\$0	0	6,548	6,548	6,548	6,548	6,548
Henderson County														
Eustace	New well in Carrizo-Wilcox	\$912,400	Q-146	2020	103	\$992	103	\$254	103	103	103	103	103	103
Payne Springs	Additional Wells (Carrizo-Wilcox)	\$892,000	Q-148	2020	145	\$749	145	\$232	145	145	145	145	145	145
Henderson County Steam Electric (Region C only)	TRWD (Cedar Creek Lake)	\$19,951,000	Q-147	2030	4,500	\$274	7,950	\$65	4,500	4,500	4,950	5,950	6,950	7,950
Jack County														
Jack County Other	Jacksboro (Lost Creek/Lake Jacksboro)	\$1,893,000	Q-151	2020	7	\$24,432	7	\$1,812	7	7	7	7	7	7
Jack County Other	Walnut Creek SUD	\$2,713,000	Q-152	2020	48	\$5,018	51	\$570	48	49	49	50	50	51
Jack County Mining	Indirect reuse (Jacksboro)	\$0	None	2020	330	\$815	359	\$815	330	342	348	351	356	359
Kaufman County														
College Mound WSC	Increase delivery from Terrell	\$5,348,000	Q-153	2020	55	\$525	1,028	\$88	55	220	346	475	725	1,028
Gastonia-Scurry SUD	Connect to Seagoville (DWU)	\$4,577,500	Q-155	2020	39	\$238	1,799	\$26	39	39	39	39	569	1,799
Kaufman County Other	0.8 MGD Water Treatment Plant for TRWD water	\$11,922,000	Q-149	2020	86	\$3,418	457	\$1,235	86	91	127	194	331	457
Mabank*	2 MGD WTP Expansion	\$8,905,000	Q-13	2030	67	\$948	1,121	\$283		67	249	717	1,121	1,121
Mabank*	3 MGD WTP Expansion	\$11,037,000	Q-13	2060	326	\$1,004	1,313	\$1,004					326	1,313
Mabank*	Increase delivery infrastructure from Cedar Creek Lake	\$262,000	Q-143	2060	1,447	\$11	2,434	\$11	0	67	249	717	1,447	2,434
Kaufman County Mining	Trinity Aquifer New well	\$484,000	Q-216	2040	344	\$154	344	\$35	0	0	344	344	344	344
Kaufman County Mining	Connect to NTWMD	\$4,098,000	Q-156	2060	3	\$2,317	171	\$2,317	0	0	0	0	3	171
Kaufman County Steam Electric	TRA direct reuse	See TRA in Section 5C	\$0	2020	1,000	See TRA	1,000	See TRA	1,000	1,000	1,000	1,000	1,000	1,000
Navarro County														
Blooming Grove	Groundwater	\$1,669,300	Q-164	2020	160	\$1,350	160	\$475	160	160	160	160	160	160
Chatfield WSC	New Well	\$1,000,000	Q-165	2020	150	\$936	150	\$376	150	150	150	150	150	150
MEN WSC	Increase delivery infrastructure from Corsicana (Upsize Lake Halbert Connection)	\$2,521,800	Q-166	2030	173	\$632	408	\$114	0	173	214	268	334	408

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Navarro Mills WSC	New wells (Woodbine)	\$1,339,500	Q-168	2050	79	\$993	79	\$370	0	0	0	79	79	79
Parker County														
Aledo	Parallel pipeline and pump station from Fort Worth	\$7,710,500	Q-169	2040	67	\$2,665	269	\$336	0	0	67	164	277	269
Annetta	Connect to Weatherford (TRWD)	\$2,077,600	Q-171	2030	25	\$2,216	196	\$1,326	0	25	28	35	90	196
Annetta North	Connect to Weatherford (TRWD)	\$59,400	Q-171	2040	7	\$1,395	38	\$1,264	0	0	7	16	25	38
Annetta South	Connect to Weatherford (TRWD)	\$1,183,300	Q-171	2040	5	\$6,136	22	\$1,636	0	0	5	10	16	22
Cresson*	New wells in Trinity Aquifer	\$917,300	Q-170	2020	113	\$941	113	\$259	113	113	113	113	113	113
Parker County Other	Water Treatment Plant and Transmission Facilities	\$116,775,000	Q-174	2060	3,635	\$1,668	9,618	\$1,668	0	0	0	0	3,635	9,618
Parker County Other	New wells in Trinity Aquifer	\$1,448,000	Q-173	2020	200	\$849	200	\$244	200	200	200	200	200	200
Parker County SUD*	Additional BRA with 1 MGD Treatment Plant Expansion	\$6,776,000	Q-13	2020	540	\$1,499	540	\$450	540	540	540	540	540	540
Parker County SUD*	Additional Groundwater (new wells in Trinity aquifer)	\$3,860,000	Q-172	2060	513	\$881	513	\$881	0	0	0	0	513	513
Springtown	Infrastructure improvements at Lake intake	\$280,200	Q-175	2020	67	\$119	236	\$25	67	244	237	230	227	236
Springtown	New wells in Trinity Aquifer	\$998,400	Q-176	2020	70	\$1,566	70	\$366	70	70	70	70	70	70
Willow Park	Connect to Weatherford (TRWD) Phase I	\$588,100	Q-171	2030	137	\$1,444	1,562	\$1,284	0	137	306	706	1,135	1,562
Rockwall County														
Blackland WSC*	Direct Connection to NTMWD	\$3,295,550	Q-179	2020	48	\$407	356	\$65	48	153	204	246	296	356
Cash SUD	Increase delivery infrastructure from NTMWD	\$6,654,700	Q-180	2020	1,165	\$531	1,042	\$53	1,165	1,075	782	824	927	1,042
Fate	Increase delivery infrastructure from NTMWD	\$15,075,000	Q-182	2060	390	\$528	2,982	\$528	0	0	0	0	390	2,982
Tarrant County														
Azle*	Water treatment plant expansion	\$11,046,000	Q-13	2020	162	\$805	1,641	\$241	162	255	383	607	925	1,641
Benbrook	Water treatment plant expansions	\$13,715,000	Q-13	2060	2,342	\$701	2,307	\$701	0	0	0	0	2,342	2,307
Bethesda WSC*	Connection to Arlington	\$18,698,000	Q-184	2020	1,416	\$704	2,614	\$104	1,416	1,619	1,833	2,072	2,336	2,614
Blue Mound	Purchase Existing Water System from Monarch Utilities	\$5,000,000	Q-185	2020	0	NA	0	NA	0	0	0	0	0	0
Burleson*	Increase delivery infrastructure from Fort Worth	\$21,780,000	Q-186	2040	967	\$401	5,541	\$72	0	0	967	2,386	3,922	5,541
Crowley	Increase delivery infrastructure from Fort Worth	\$11,558,000	Q-187	2030	184	\$394	3,028	\$75	0	184	678	1,297	2,347	3,028
Johnson County SUD*	Connect to Grand Prairie	\$86,140,000	Q-188	2020	6,726	\$1,248	6,726	\$176	6,726	6,726	6,726	6,726	6,726	6,726
Keller	Increase delivery infrastructure from Fort Worth	\$17,535,000	Q-189	2030	2,170	\$196	5,679	\$49	0	2,170	3,697	4,516	5,139	5,679
Kennedale	Increase delivery infrastructure from Ft Worth	\$3,685,000	Q-191	2040	188	\$1,284	277	\$192	0	0	188	239	283	277
Kennedale	Connect to Arlington	\$1,720,000	Q-190	2020	280	\$619	280	\$104	280	280	280	280	280	280
Pantego	Connect to Arlington	\$778,000	Q-192	2030	27	\$2,776	24	\$345	0	27	27	26	25	24
Pantego	Connect to Fort Worth	\$831,000	Q-193	2030	27	\$3,001	24	\$385	0	27	27	26	25	24
Pelican Bay	Azle (TRWD)	\$956,000	Q-194	2030	11	\$7,332	12	\$714	0	11	11	11	11	12
Southlake*	Increase delivery infrastructure from Ft Worth	\$43,035,000	Q-195	2020	141	\$479	8,349	\$46	0	141	2,157	4,198	6,264	8,349

Table ES.3
Summary of Recommended Strategies - Region C WWP's and WUG's*

**volumes shown in gray italics are infrastructure projects to utilize the supply volumes from other strategies*

Entity	Recommended Strategy	Capital Cost	Cost Table	First Decade of Water Strategy	First Decade Water Supply Volume (acre-feet/year)	First Decade Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2070 Water Supply Volume (acre-feet/year)	Year 2070 Estimated Annual Average Unit Cost (\$/acre-foot/year)	Year 2020 Water Supply Volume (acre-feet/year)	Year 2030 Water Supply Volume (acre-feet/year)	Year 2040 Water Supply Volume (acre-feet/year)	Year 2050 Water Supply Volume (acre-feet/year)	Year 2060 Water Supply Volume (acre-feet/year)	Year 2070 Water Supply Volume (acre-feet/year)
Watauga	Increase delivery infrastructure North Richland Hills/Fort Worth	\$1,874,676	Q-199	2020	980	\$69	1,225	\$9	980	1,119	1,254	1,208	1,192	1,225
Westlake*	Increase delivery infrastructure from Ft Worth; joint project with Ft Worth, Westlake, Trophy Club	\$2,961,000	Q-197	2020	42	\$162	3,335	\$13	42	705	1,596	2,181	2,765	3,335
Tarrant County Steam Electric	Direct reuse	\$13,080,000	Q-196	2030	1,528	\$560	2,360	\$94	0	1,528	2,360	2,360	2,360	2,360
Wise County														
Bridgeport	2 MGD WTP Expansion	\$8,911,000	Q-13	2050	40	\$948	1,121	\$283				40	827	1,121
Bridgeport	1.5 MGD WTP Expansion	\$7,844,000	Q-13	2070	489	\$1,916	489	\$1,916						489
Bridgeport	Expand Capacity of Lake intake and Pump Station	\$766,100	Q-200	2050	40	\$50	1,610	\$11	0	0	0	40	827	1,610
Chico	Increase delivery capacity from West Wise SUD	\$3,610,000	Q-201	2050	140	\$942	369	\$124	0	0	0	140	246	369
New Fairview	Connect to Rhome (TRWD through Walnut Creek SUD)	\$3,662,000	Q-202	2030	34	\$1,619	221	\$238	0	34	71	119	165	221
Newark	Connect to Rhome (TRWD through Walnut Creek SUD)	\$2,548,000	Q-203	2030	51	\$371	646	\$42	0	51	147	261	437	646
Runaway Bay	0.5 MGD Water Treatment Plant Expansion	\$4,078,000	Q-13	2070	100	\$4,855	100	\$4,855	0	0	0	0	0	100
Runaway Bay	Increase capacity of lake intake	\$52,500	Q-204	2070	100	\$51	100	\$51	0	0	0	0	0	100
West Wise SUD	0.8 MGD Water Treatment Plant Expansion	\$5,697,000	Q-13	2050	54	\$2,209	308	\$661	0	0	0	54	172	308
Wise County Manufacturing	New wells	\$1,636,600	Q-205	2020	250	\$757	250	\$209	250	250	250	250	250	250