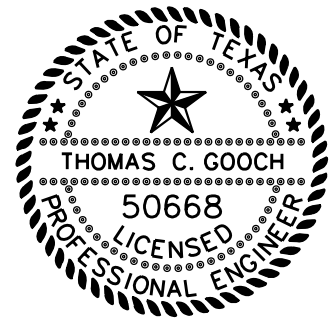


**2006 Region C Water Plan
Errata Sheet
July 6, 2006**



Thomas C. Gooch, P.E.

In response to TWDB's comments, a memorandum regarding the strategy evaluation for environmental flows is attached.

Main Report

Page 3.5, Table 3.2 – The ninth entry from the bottom shows “Chapman (UTRWD)” with a year 2010 supply of 49,976. The correct entry should read “Chapman (NTMWD)” for the same amount of water.

Page 3.6, Table 3.3 – The Run-of-the-River Supply for Irrigation in Jack County should be 0 acre-feet per year (not 110). The total irrigation supplies by Run-of-the-River should be 20,095 AF/Y. This impacts Table 3.1 on page 3.2 as well. The total for “Other Local Supply” and the “Region C Total” should be 110 acre-feet per year less than what is shown in each decade.

Page 4D.4, Table 4D.2 –The costs included in the table for Lake Texoma – Blend strategy represent 50,000 acre-feet per year supply, not 113,000 acre-feet per year.

Page 4E.9 – The Total Capital Costs in Table 4E.2 should be \$2,755,892,000.

Page 4E.11, Table 4E.3 – The quantity of water supply associated with the costs for the Lake Texoma – Blend alternative strategy should be 50,000 Ac-Ft/Yr (not 113,000). This also impacts Tables 4D.2, 4E.16 and Table U-95.

Page 4E.38, Table 4E.13 – The Total Capital Costs should read \$337,051,000.

Page 4E.43, Table 4E.16 – The capital cost for Lake Texoma should be \$91,284,000. The unit costs should be \$1.07 for pre-amortization and \$0.25 for post amortization.

Page 4E.76, Table 4E.44 – The Capital Cost for the Additional TRA/Waxahachie Indirect Reuse should be \$19,682,000 and the Total Capital Costs should read \$28,334,000.

Page 4F.9, Table 4F.5 – The cost of the supplemental wells should be \$28,072,980 (not \$33,243,702). The total capital cost should be \$42,305,980 (not \$47,476,702).

Page 4F.18, Table 4F.9 – “Purchase reuse from TRA” should be added as a recommended water management strategy for Irrigation.

Page 4F.19, Table 4F.10 – The cost of supplemental wells should be \$44,514,279 (not \$41,714,719). The total capital cost should be \$97,970,841 (not \$95,171,281).

Appendix U

Table U-10 – The entry for basic conservation for the City of Dallas needs to be replaced with the attached information.

Table U-13 – The cost for the supplemental well for Gainesville should be replaced as follows:

Gainesville	2010	2020	2030	2040	2050	2060
Number of Wells	4	1	3	0	0	0
Construction Cost	\$1,574,000	\$393,500	\$1,180,500	\$0	\$0	\$0

Table U-13 entry for Bolivar WSC (Denton County) needs to be replaced with a total of 12 supplemental wells (2 installed in each decade). The construction cost is \$531,760 in each decade (2010-2060). The well capacity is 157 gpm at a well depth of 952 feet. (see attached.)

Table U-13 entry for Bolivar WSC (Cooke County) needs to be replaced with a total of 4 supplemental wells (one installed in 2010, 2020, 2040, and 2050). The construction cost is \$801,652 in each of these decades. The well capacity is 157 gpm at a well depth of 952 feet. (See attached.)

Table U-14 – Delete the entry for Midlothian.

Table U-15 – The Capital Cost for the Midlothian water treatment plant expansion should be \$9,393,346 for a 5 MGD expansion. An entry for a Denison WTP expansion in 2020 should be added with a capital cost of \$7,200,000.

Several cost estimate tables need to be replaced with the more recent versions of the costs. The following tables should be replaced with those that are attached to this errata sheet:

- Table U-89 – Trinity River Authority Reuse from Denton Creek Wastewater Treatment Plant
- Table U-95 – Upper Trinity Regional Water District Alternative Strategy Costs
- Table U-110 – renamed “Gainesville Water Treatment Plant Expansion”
- Table U-111 – Cooke County Water Supply Project
- Table U-112 – Gainesville Indirect Reuse

Table U-311 – Gainesville Divert Water from Gainesville to Moss Lake should be added.

Table U-312 – Additional Lake Texoma (Interim Raw Water Sale to NTMWD) should be added.

Appendix V

Page 27 – Denton County Irrigation: add water management strategy of TRA Reuse of 3,750 AF/Y beginning in 2020 and extending through 2060.

DB07 Database

Comments were received on the data entry into the Texas Water Development Board (TWDB) database (DB07) after adoption of the regional water plan. Minor adjustments to supplies allocated to water user groups were made to the TWDB database as a result of these comments. These adjustments do not change the overall analysis and recommendations included in the plan.

Data presented in the text of the Region C water plan may not exactly match the values in the DB07 due to rounding differences associated with county, basin and regional splits in the DB07. These differences are very minor and do not change the overall analysis and recommendations included in the plan.

Cost data entered into the TWDB database include strategies implemented by 2060. This results in an overall capital cost for Region C of approximately \$13.2 billion. Recommended strategies implemented after 2060 include the Toledo Bend Phase 2 strategy to Tarrant Regional Water District and North Texas Municipal Water District. The total capital cost for Region C cited in the Executive Summary of the adopted Region C Water Plan (page ES.9) includes the Toledo Bend Phase 2 project.



MEMORANDUM

TO: Kevin Ward, Texas Water Development Board

FROM: Simone Kiel

SUBJECT: Region C Strategy Evaluation

DATE: April 14, 2006

As part of the environmental evaluation of water management strategies, the potential impacts to stream flows were assessed following the guidelines provided by the Texas Water Development Board. For new reservoirs and diversions of natural flow, instream flow requirements were evaluated using the Consensus Criteria for Environmental Flows. The flow criteria were included in the appropriate water availability models during the evaluation of available supply from these strategies.

For reuse strategies, a regional evaluation of the impacts of reuse on stream flows was conducted and the findings are reported in Chapter 4B and Chapter 7.

A synopsis of the impacts from strategies on instream flows is presented in Appendix T of the adopted Region C Water Plan.

**Correction to Table U-10
Supply and Costs by User Group for Basic Conservation Package**

Replacement Values for Table U-10

Water User Group	Total Annual Cost per Acre-Foot						Value of Total Supply from Basic Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Dallas	\$130	\$80	\$68	\$60	\$54	\$52	10,128	18,043	22,483	26,529	32,954	39,886	\$1,312,324	\$1,451,878	\$1,525,450	\$1,598,223	\$1,764,681	\$2,058,767

Note: There are no capital costs for the Basic Conservation Package.

**Corrections to Table U-13
Costs Estimates for Supplemental Wells to Maintain Current Groundwater Production Capacity**

Replacement Values for Table U-13

Water User Group	County	Aquifer	# Wells in 2005	Well Capacity	Well Depth (ft)	Installation Schedule						Construction Costs (including engineering, contingencies, and permitting)					
						2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Gainesville	Cooke	Trinity (Antlers)	8	404	969	4	1	3				\$1,574,000	\$393,500	\$1,180,500			

Additions to Table U-13

Water User Group	County	Aquifer	# Wells in 2005	Well Capacity (gpm)	Well Depth (ft)	Installation Schedule						Construction Costs (including engineering, contingencies, and permitting)					
						2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Bolivar WSC	Cooke	Trinity (Antlers)	4	157	952	1	1		1	1		\$400,826	\$400,826		\$400,826	\$400,826	
Bolivar WSC	Denton	Trinity	12	157	952	2	2	2	2	2	2	\$801,652	\$801,652	\$801,652	\$801,652	\$801,652	\$801,652

Table U-89
Trinity River Authority Reuse from Denton Creek Wastewater Treatment Plant

Owner:	Trinity River Authority		
Amount:	15,000 Ac-Ft/Yr		
Irrigation	7,500 Ac-Ft/Yr	Denton and Tarrant Counties	
Municipal	7,500 Ac-Ft/Yr	Tarrant County	

IRRIGATION FOR DENTON AND TARRANT COUNTIES

	Size	Quantity	Unit	Unit Price	1998 Cost*	2002 Cost
Cost of Additional Pipeline						
Main Pipeline	24-inch	18,000	LF	\$99		\$1,782,000
Distribution Pipeline	8-inch	17,500	LF	\$30		\$525,000
Right of Way Easements (Urban)		16	AC	\$30,000		\$489,000
Engineering & Contingenices (30%)						\$692,000
Total Pipeline Cost						\$3,488,000
Pump Station & Facilities						
Pump Station					\$550,000	\$606,000
Chlorine Bleach Facility					\$100,000	\$110,000
3 - 7 MG Storage Ponds					\$394,000	\$434,000
Potable Water Supply Backup Water		6	EA	\$10,000	\$60,000	\$66,000
Engineering and Contingencies (35%)						\$426,000
Total Pump Station & Facilities Cost						\$1,642,000
Cost of Permitting						\$500,000
Interest During Construction			(24 months)			\$460,000
Total Capital Cost						\$6,090,000
Denton County Capital Cost						\$3,045,000
Tarrant County Capital Cost						\$3,045,000
ANNUAL COSTS (Denton County)						
Debt Service (6% for 30 years)						\$221,000
Electricity					\$44,060	\$49,000
Chlorine Cost					\$39,000	\$43,000
Operation & Maintenance						\$28,000
Purchase of Reuse Water						\$305,000
Total Annual Costs						\$646,000

Table U-89, continued

UNIT COSTS - Denton County (With Debt Service)

Per Acre-Foot		\$172
Per 1,000 gallons		\$0.53

UNIT COSTS - Denton County (Without Debt Service)

Per Acre-Foot		\$113
Per 1,000 gallons		\$0.35

ANNUAL COSTS (Tarrant County)

Debt Service (6% for 30 years)		\$221,000
Electricity	\$44,060	\$49,000
Chlorine Cost	\$39,000	\$43,000
Operation & Maintenance		\$28,000
Purchase of Reuse Water		\$305,000
Total Annual Costs		\$646,000

UNIT COSTS - Tarrant County (With Debt Service)

Per Acre-Foot		\$172
Per 1,000 gallons		\$0.53

UNIT COSTS - Tarrant County (Without Debt Service)

Per Acre-Foot		\$113
Per 1,000 gallons		\$0.35

MUNICIPAL REUSE TO LAKE GRAPEVINE

Assume no Capital Costs		\$0.00
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ANNUAL COSTS (Tarrant County)

Purchase of Reuse Water		\$611,000
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UNIT COSTS - Tarrant County

Per Acre-Foot		\$81
Per 1,000 gallons		\$0.25

Note: Cost to purchase reuse water is assumed to be \$81.46 per acre-foot.
1998 Cost information is based on Freese and Nichols 1998 Study.

**Table U-95
Upper Trinity Regional Water District Alternative Strategy Costs**

Capital Costs

Strategy	User	Basis for Cost		UTRWD Cost	
		Amount	Capital Cost	Amount	Capital Cost
Toledo Bend	NTMWD	200,000	\$886,002,000	48,000	\$212,640,000
Wright Patman - System	DWU	130,000	\$625,756,000	38,000	\$182,913,000
Wright Patman - Raise Flood Pool	DWU	112,100	\$572,036,000	38,000	\$193,911,000
Wright Patman - Texarkana	DWU	100,000	\$473,553,000	38,000	\$179,950,000
Texoma - Blend	All	50,000	\$182,587,700	25,000	\$91,294,000
George Parkhouse North	NTMWD	118,960	\$362,322,000	35,000	\$106,601,000
George Parkhouse South	NTMWD	108,480	\$480,099,000	35,000	\$154,899,000
Additional Reuse	Permitting	N/A	N/A	15,000	\$1,000,000

Annual Costs

Strategy	User	Basis for Cost		
		Amount	Pre-Am	Post-Am
Toledo Bend	NTMWD	200,000	\$101,622,000	\$37,255,000
Wright Patman - System	DWU	130,000	\$69,479,000	\$24,018,000
Wright Patman - Raise Flood Pool	DWU	112,100	\$54,799,000	\$13,241,000
Wright Patman - Texarkana	DWU	100,000	\$55,618,000	\$21,215,000
Texoma - Blend	All	50,000	\$17,406,000	\$4,141,000
George Parkhouse North	NTMWD	118,960	\$35,198,000	\$8,876,000
George Parkhouse South	NTMWD	108,480	\$43,901,000	\$9,022,000
Additional Reuse	Permitting	N/A		

Strategy

Strategy	Basis for Cost			Comments
	UTRWD Amount	Pre-Am	Post-Am	
Toledo Bend	48,000	\$25,953,000	\$10,505,000	Add \$0.10 per thousand gal to pump to Lewisville
Wright Patman - System	38,000	\$20,309,000	\$7,021,000	DWU delivered to Lewisville
Wright Patman - Raise Flood Pool	38,000	\$18,576,000	\$4,488,000	
Wright Patman - Texarkana	38,000	\$21,135,000	\$8,062,000	
Texoma - Blend	25,000	\$8,703,000	\$2,071,000	
George Parkhouse North	35,000	\$11,496,000	\$3,752,000	Add \$0.10 per thousand gal to pump to Lewisville
George Parkhouse South	35,000	\$15,305,000	\$4,051,000	
Additional Reuse	15,000	\$72,649	\$0.00	No annual costs

Table U-95, Continued

Unit Costs

	UTRWD		
	Amount	Pre-Am	Post-Am
Toledo Bend	48,000	\$1.66	\$0.67
Wright Patman - System	38,000	\$1.64	\$0.57
Wright Patman - Raise Flood Pool	38,000	\$1.50	\$0.36
Wright Patman - Texarkana	38,000	\$1.71	\$0.65
Texoma - Blend	25,000	\$1.07	\$0.25
George Parkhouse North	35,000	\$1.01	\$0.33
George Parkhouse South	35,000	\$1.34	\$0.36
Additional Reuse	15,000	\$0.01	\$0.00

Table U-110
Gainesville Water Treatment Plant Expansion

Probable Owner: Gainesville
Quantity: 560 AF/Y

CONSTRUCTION COSTS

WATER TREATMENT FACILITIES

Water Treatment Plant Expansion

Plant Expansion	2.00 MGD	\$3,550,000
Engineering and Contingencies	35%	\$1,243,000
Subtotal of Water Treatment Facilities		\$4,793,000

PERMITTING AND MITIGATION	1%	\$43,000
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CONSTRUCTION TOTAL		\$4,836,000
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Interest During Construction	(6 months)	\$105,000
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TOTAL CAPITAL COST		\$4,941,000
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ANNUAL COSTS

Debt Service		\$359,000
Operation and Maintenance Costs		
Estimated Annual Power Cost	\$0.06/kWh	\$13,000
WTP	182,477 1000 gal	\$0.35 \$64,000
Raw Water Cost		\$0
Total Annual Costs		\$436,000

UNIT COSTS (First 30 Years)

Per Acre-Foot	\$ 779	
Per 1,000 Gallons	\$ 2.39	

UNIT COSTS (After 30 Years)

Per Acre-Foot	\$ 138	
Per 1,000 Gallons	\$ 0.42	

Note: Raw water costs not included because these are incurred even if this strategy is not implemented.

**Table U-111
Cooke County Water Supply Project**

Probable Owner:	Cooke County	
Quantity:	2,202 AF/Y	2020
	3,691 AF/Y	2040

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline(s)	Qty.	Units	Unit Cost	2020 Phase I Cost	2040 Phase II Cost
30" Water Line					
Pipe	62,657	FT	\$86	\$5,388,000	\$0
ROW	29	AC	\$3,000	\$86,000	\$0
14" Water Line					
Pipe	6,900	FT	\$48	\$331,000	\$0
ROW	3	AC	\$30,000	\$95,000	\$0
14" Water Line					
Pipe	79,490	FT	\$32	\$2,544,000	\$0
ROW	36	AC	\$3,000	\$109,000	\$0
12" Water Line					
Pipe	28,730	FT	\$28	\$804,000	\$0
ROW	13	AC	\$3,000	\$40,000	\$0
10" Water Line					
Pipe	11,831	FT	\$24	\$284,000	\$0
ROW	5	AC	\$3,000	\$16,000	\$0
8" Water Line					
Pipe	71,398	FT	\$20	\$1,428,000	\$0
ROW	25	AC	\$3,000	\$74,000	\$0
Engineering and Contingencies	30%			\$3,234,000	\$0
Subtotal of Pipeline(s)				\$14,433,000	\$0
Pump Station(s)					
Station 1					
Pump, bldg, & appurtenances	406	hp		\$1,512,000	\$0
Storage Tank	0	gal		\$0	\$0
Station 2					
Pump, bldg, & appurtenances	113	hp		\$662,000	\$0
Storage Tank	1,110,000	gal		\$293,000	\$0
Station 3					
Pump, bldg, & appurtenances	40	hp		\$341,000	\$0
Storage Tank	190,000	gal		\$90,000	\$0
Station 4					
Pump, bldg, & appurtenances	6	hp		\$62,000	\$0
Storage Tank	40,000	gal		\$30,000	\$0
Engineering and Contingencies	35%			\$1,047,000	\$0
Subtotal of Pump Station(s)				\$4,037,000	\$0

Table U-111, continued

WATER TREATMENT FACILITIES

Water Treatment Plant

Phase 1 Plant Expansion	4 MGD	\$6,050,000	\$0
Phase 2 Plant Expansion	3 MGD	\$0	\$5,100,000
Engineering and Contingencies	35%	\$2,118,000	\$1,785,000
Subtotal of Water Treatment Plant		\$8,168,000	\$6,885,000

PERMITTING AND MITIGATION	1%	\$165,000	\$0
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CONSTRUCTION TOTAL		\$26,803,000	\$6,885,000
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Interest During Construction

Phase 1	(24 months)	\$2,096,000	\$0
Phase 2	(6 months)	\$0	\$149,000

TOTAL CAPITAL COST		\$28,899,000	\$7,034,000
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ANNUAL COSTS

Debt Service		\$2,099,000	\$511,000
Operation and Maintenance Costs			
Pipeline	1%	\$129,000	\$0
Pump Station	2.50%	\$90,000	\$0
Estimated Annual Power Cost	\$0.06/kWh	\$111,000	\$0
WTP			
Phase 1	717,524 1000 gal	\$0.35	\$251,000
Phase 2	485,049 1000 gal	\$0.35	\$0
Raw Water Cost		\$359,000	\$243,000
Total Annual Costs		\$3,039,000	\$924,000

UNIT COSTS

	With Raw Water		Gainesville - Without Raw Water	
	Per Acre-Foot	Per 1,000 Gallons	Per Acre-Foot	Per 1,000 Gallons
2010	\$0	\$0.00	\$0	\$0.00
2020	\$1,380	\$4.24	\$1,217	\$3.74
2030	\$1,380	\$4.24	\$1,217	\$3.74
2040	\$1,074	\$3.30	\$911	\$2.79
2050	\$505	\$1.55	\$342	\$1.05
2060	\$505	\$1.55	\$342	\$1.05

Note: Raw water is assumed to cost \$163 per acre-foot.

**Table U-112
Gainesville Indirect Reuse**

Probable Owner: Gainesville
Quantity: 561 AF/Y

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline(s)	Qty.	Units	Unit Cost	Cost
12" Reclaimed Water Line				
Pipe	73,818	FT	\$28	\$2,067,000
ROW	34	AC	\$3,000	\$102,000
Engineering and Contingencies	30%			\$620,000
Subtotal of Pipeline(s)				\$2,789,000

Pump Station(s)

Station 1				
Pump, bldg, & appurtenances	86	hp		\$558,000
Storage Tank		gal		\$0
Station 2				
Pump, bldg, & appurtenances	70	hp		\$488,000
Storage Tank		gal		\$0
Engineering and Contingencies	35%			\$366,000
Subtotal of Pump Station(s)				\$1,412,000

WASTEWATER TREATMENT FACILITIES

Wastewater Treatment Plant

Advanced Treatment Capacity	0.50	MGD		\$950,000
Engineering and Contingencies	35%			\$333,000
Subtotal of Water Treatment Plant				\$1,283,000

WATER TREATMENT FACILITIES

Water Treatment Plant	1.00	MGD		\$2,000,000
Engineering and Contingencies	35%			\$700,000
Subtotal of Water Treatment Plant				\$2,700,000

PERMITTING AND MITIGATION 1% **\$37,000**

CONSTRUCTION TOTAL **\$8,221,000**

Interest During Construction (12 months) **\$343,000**

Table U-112, continued

TOTAL CAPITAL COST				\$8,564,000
ANNUAL COSTS				
Debt Service				\$622,000
Operation and Maintenance Costs				
Pipeline	1%			\$25,000
Pump Station	2.50%			\$31,000
Estimated Annual Power Cost	\$0.06/kWh			\$31,000
Advanced Treatment Operation	182,802	1000 gal	\$0.48	\$88,000
WTP	182,802	1000 gal	\$0.35	\$64,000
Total Annual Costs				\$861,000

Table R-70, continued

UNIT COSTS (First 30 Years)

Cost per ac-ft	\$1,535
Cost per 1000 gallons	\$4.71

UNIT COSTS (After 30 Years)

Cost per ac-ft	\$426
Cost per 1000 gallons	\$1.31

Table U-311
Gainesville Divert Water from Red River to Moss Lake

Owner: Gainesville
Amount: 1,121 Ac-Ft/Yr

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline(s)	Qty.	Units	Unit Cost	Cost
16" Water Line				
Pipe	13,200	FT	\$37	\$488,000
ROW		6 AC	\$3,000	\$18,000
Engineering and Contingencies	30%			\$146,000
Subtotal of Pipeline(s)				\$506,000

Pump Station(s)

Station 1				
Pump, building, & appurtances	116	hp		\$1,049,000
Storage Tank		0 gal		\$0
Engineering and Contingencies	35%			\$367,000
Subtotal of Pump Station(s)				\$1,416,000

PERMITTING AND MITIGATION	1%			\$18,000
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CONSTRUCTION TOTAL				\$1,940,000
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Interest During Construction	(6 months)			\$42,000
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TOTAL CAPITAL COST				\$1,982,000
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ANNUAL COSTS

Debt Service				\$144,000
Operation and Maintenance Costs				
Pipeline	1%			\$6,000
Pump Station	2.50%			\$42,000
Estimated Annual Power Cost	\$0.06/kWh			\$23,000
Raw Water Cost	1,121 ac-ft		\$163	\$183,000
Total Annual Costs				\$398,000

Table U-311, continued

UNIT COSTS (First 30 Years)

Per Acre-Foot	\$355
Per 1,000 Gallons	\$1.09

UNIT COSTS (After 30 Years)

Per Acre-Foot	\$227
Per 1,000 Gallons	\$0.70

Note: Raw water is assumed to cost \$163 per acre-foot.

Table U-312
Additional Lake Texoma (Interim Raw Water Sale to NTMWD)

Owner:	GTUA		
Lake Texoma Storage:	50,000 Ac-Ft		
Water Right Amount:	56,500 Ac-Ft/Yr		
Anticipated Interim Sale (NTMWD)	20,000 Ac-Ft/Yr		
	Units	Unit Cost	
Permitting for new water right			\$100,000
Purchase of storage from COE	acre-feet	\$300	\$15,000,000
CONSTRUCTION TOTAL			\$15,100,000
Interest During Construction		(12 months)	\$629,000
TOTAL CAPITAL COST			\$15,729,000
ANNUAL COSTS			
Debt Service (6% for 30 years)			\$1,143,000
Total Annual Costs			\$1,143,000
UNIT COSTS (Before Amortization)			
Per Acre-Foot			\$57
Per 1,000 Gallons			\$0.18
UNIT COSTS (After Amortization)			
Per Acre-Foot			\$0
Per 1,000 Gallons			\$0.00