APPENDIX J

ECONOMIC STUDY REPORT

Appendix J – Economic Study Report

I. INTRODUCTION

Reed Stowe & Yanke, LLC (RS&Y) was engaged to perform a probabilistic analysis of the regional economic impact associated with water supply alternatives, identified by Freese and Nichols (F&N), in the West Central Brazos study area. As a part of this study, RS&Y has conducted two different types of analysis.

Section II. Interconnections to Meet Supply Shortages provides a detailed description of the quantitative analysis RS&Y conducted to determine the economic impacts on local economies resulting from identified water shortages or water quality problems.

Section III. Water Reservoir Research and Case Studies details the research found regarding the potential impacts of water reservoirs on the local economies and RS&Y's findings of water reservoir case studies, identified by project participants.

II. INTERCONNECTIONS TO MEET SUPPLY SHORTAGES

F&N determined that the following water suppliers have water quality problems or are projected to have water shortages[1]:

- City of Strawn
- City of Throckmorton
- City of Lawn
- City of Rising Star
- Shackelford WSC
- Stephens County RWSC
- City of Sweetwater
- West Central Texas Municipal Water District

To mitigate these water shortages, F&N suggested different supply and distribution strategies. Some of these strategies have very concentrated local impacts, others benefit a multi-county area. RS&Y calculated economic impacts for the following projects:

- Eastland County WSD to the City of Strawn
- Lake Stamford to the City of Throckmorton
  - 340 acre-feet, treated at the City's water-treatment plant
- Abilene to the City of Lawn
  - Interconnection with Steamboat Mountain WSC
  - Direct Pipeline from the City of Abilene's south side distribution point
- Westbound WSC to the City of Rising Star
  - Upgrade of Westbound WSC's system
  - Nitrate treatment with back-up connection to Westbound WSC
- Midway Group Interconnections / Regional WTP
- New Groundwater development for the City of Sweetwater
- Contract Agreement between WCTMWD and BRA

RS&Y has calculated the economic impact on local economies resulting from identified shortages or water quality problems. RS&Y has assumed that population growth will be lower, if the water quality problems or shortages persist. Effects of these assumptions would include:

- Personal income spending in the region would decline, directly resulting in decreased local industry output.
- Local industries would make fewer purchases from supplying industries, adding *indirect effects.*
- Because industry output would be reduced, workers would be laid off, leading to *induced effects.*

The IMPLAN Group Inc. located in Minnesota has developed a model that calculates impacts on the entire local economy resulting from changes in demand from one industry. The model estimates indirect and induced effects (in form of a multiplier) derived from

[1] As per Excel-file costs_shortages.xls, received from Simone Kiel on August 15th, 2003

direct effects. RS&Y used the *Type SAM* multiplier that calculates indirect and induced effects as well as the effects from commuting, tax payments and savings.

Adjustments have been made for income not spent in the region (domestic and foreign imports). Appendix J1 provides a more detailed description on the theory behind this multiplier.

To compare the projects, RS&Y has carried out a Cost Benefit Analysis calculation for each scenario.

The Cost Benefit Analysis calculates project cash flows, which include benefits from higher population growth due to water availability. These benefits are reduced by expenses for water purchase, debt and other costs. Cash flows are discounted at the risk-free interest rate.

All calculations are based on the assumption that 2010 is the first year each project is in operation and that construction is finished by the end of 2009. Capital costs were escalated to the year 2009. Project costs and benefits of the years 2010 through 2060 were discounted back to the year 2009. If the project is moved to a different start date, discounted costs and benefits would change, however inflation effects partly offset the effects from discounting. Unless the project start date is changed significantly, impacts on project costs and benefits would not be material[2].

Project specific assumptions are listed separately for each project, other general assumptions that have been used are:

- Basis for all costs provided by F&N is September 2003 [3].
- All projects are 100% debt financed with an interest rate of 6% over 30 years.
- Water purchase and other cost have been escalated on an annual basis.
- Disposable income is 89% of household income, which represents the average disposable income in Texas for the period 1983-2002.
- The Cost Benefit analysis is based on a risk-free interest rate of 5.4% as per October 2003.

It should be noted that projections reaching far into the future have a higher probability of being affected by factors that cannot be accurately estimated today. This should be taken into consideration when interpreting results for the years 2020 and thereafter.

Eastland County WSD to the City of Strawn

To increase water supply to the City of Strawn, F&N evaluated costs for an installation of a pipeline from the Ranger supply line to the City of Strawn.

[2] So far the project team has not decided on significant operational date differentials of the various projects
[3] see Memo from Simone Kiel, dated July 24, 2003

Table 1

Total Capital Project Cost in 2003:	**$ 1,462,853**
Annual Cost	
Debt Service	$ 106,270
Water Purchase	$ 97,760
Other Cost	$ 13,280
Total Annual Cost	**$ 217,310**
Acre-feet / year	200
Cost of treated water	
per acre-foot	$ 1,087
per 1,000 gallons	$ 3.33

F&N estimated an increasing water demand for the City of Strawn from 156 acre-feet in 2010 to 196 acre-feet in 2060. Supply was assumed to remain constant at 160 acre-feet per year. This leads to water shortages that increase to 36 acre-feet in 2060.

The total population of the City of Strawn was 739 in 2000. The population projections for the years 2000 through 2060 as forecasted by the Texas Water Development Board have been used, assuming a population increase to 929 in 2060. For the purpose of this study, it was assumed that the population would not increase if no new water supply would be made available to the City. Should the project be operational by 2010, the growth is assumed to be equal to the projections made by the Texas Water Development Board.

To estimate the economic impact for the region, RS&Y made the assumption that population growth is directly affected by the water deficiency. Reduced population growth leads to less disposable personal income and less spending in the region, which finally results in reduced output of the local industries.

Table 1 in Appendix J2 shows all calculations in detail. Included in this table is the estimated number of households leaving or not relocating to the City because of the water shortage. The results are summarized in Table 2:

Table 2

Year	2010	2020	2030	2040	2050	2060
Disposable income lost if project is not realized	836,481	2,807,241	6,477,030	13,006,973	25,540,807	49,107,703
Disposable income not spent locally	(437,061)	(1,466,783)	(3,384,248)	(6,796,143)	(13,345,072)	(25,658,775)
Indirect effects	77,132	258,856	597,247	1,199,373	2,355,118	4,528,221
Induced effects	79,600	267,137	616,354	1,237,744	2,430,463	4,673,089
Total disposable income lost if project is not realized	**556,151**	**1,866,450**	**4,306,383**	**8,647,946**	**16,981,316**	**32,650,238**

all figures in $

City of Strawn Economic Effects

The Cost-Benefit Analysis calculation is shown in Table 3. It is assumed, that the project will be constructed in 2009 and is operating in 2010. Future cash flows have been discounted to the year 2009.

Table 3

	New Pipeline Construction
Total discounted project benefits [4]	$ 71,215,505
Total discounted project costs [5]	$ 4,542,545
Total discounted project cash flows [6]	**$ 66,672,960**
Cost-Benefit Ratio[7]	**15.68**

[4] Benefits resulting from higher household spending due to higher population growth are calculated for each year, discounted to the year 2009 and added up.
[5] Debt payments, water purchase costs and other costs are calculated for each year, discounted to the year 2009 and added up.
[6] Difference between project benefits and project costs
[7] Total discounted project benefits divided by total discounted project costs

Lake Stamford to City of Throckmorton

The City of Throckmorton is projected to need 338 acre-feet of additional supply by 2060. Table 4 provides a summary of costs associated with a new pipeline from Lake Stamford:

Table 4

Total Capital Project Cost in 2003:	**$ 5,197,300**
Annual Cost	
Debt Service	$ 377,580
Water Purchase	$ 110,790
Other Cost	$ 101,555
Total Annual Cost	**$ 589,925**
Acre-feet / year	340
Cost of treated water	
per acre-foot	$ 1,735
per 1,000 gallons	$ 5.32

F&N estimated an increasing water demand for the City of Throckmorton from 236 acre-feet in 2010 to 338 acre-feet in 2060. It was assumed that there was no future supply because the current supply source is uncertain.

The total population of the City of Throckmorton was 905 in 2000. The Texas Water development Board forecasts a stable population until 2010, thereafter declining to 688 in the year 2060. For the purpose of this study, it was assumed that the population would continue to decrease at the historic rate of -1.36%[8] if no new water supply would be made available to the City. Should the project be operational by 2010, the growth is assumed to be equal to the projections made by the Texas Water Development Board.

To estimate the economic impact for the region, RS&Y made the assumption that population growth is directly affected by the water deficiency. Reduced population growth leads to less disposable personal income and less spending in the region, which finally results in reduced output of the local industries.

Table 2 in Appendix J2 shows all calculations in detail. Included in this table is the estimated number of households leaving or not relocating to the City of Throckmorton because of the water shortage. The results are summarized in Table 5:

[8] City of Throckmorton growth rate 1990-2000, Source: Texas State Data Center

Table 5

Year	2010	2020	2030	2040	2050	2060
Disposable income lost if project is not realized	3,654,137	9,507,793	19,127,260	32,501,363	55,543,439	96,146,303
Disposable income not spent locally	(2,792,491)	(7,265,856)	(14,617,052)	(24,837,542)	(42,446,296)	(73,475,005)
Indirect effects	139,953	364,148	732,574	1,244,802	2,127,314	3,682,403
Induced effects	63,070	164,105	330,137	560,974	958,680	1,659,485
Total disposable income lost if project is not realized	**1,064,669**	**2,770,191**	**5,572,918**	**9,469,597**	**16,183,136**	**28,013,187**

all figures in $

City of Throckmorton Economic Effects

The Cost-Benefit Analysis calculation is shown in Table 6. It is assumed, that the project will be constructed in 2009 and is operating in 2010. Future cash flows have been discounted to the year 2009.

Table 6

	New Pipeline Construction
Total discounted project benefits [9]	$ 82,293,160
Total discounted project costs [10]	$ 11,476,556
Total discounted project cash flows [11]	**$ 70,816,604**
Cost-Benefit Ratio[12]	**7.17**

[9] Benefits resulting from higher household spending due to higher population growth are calculated for each year, discounted to the year 2009 and added up.
[10] Debt payments, water purchase costs and other costs are calculated for each year, discounted to the year 2009 and added up.
[11] Difference between project benefits and project costs
[12] Total discounted project benefits divided by total discounted project costs

City of Abilene to the City of Lawn

F&N determined two possibilities to supply water from the City of Abilene to the City of Lawn; a direct pipeline from Abilene's south side distribution point and an interconnection with Steamboat Mountain WSC. Table 7 details the costs for both strategies:

Table 7

	Scenario A: Pipeline from Abilene	**Scenario B: Steamboat Mountain WSC**
Total Capital Project Cost in 2003:	**$ 2,390,353**	**$ 1,873,737**
Annual Cost		
Debt Service	$ 173,700	$ 136,100
Water Purchase	$ 68,400	$ 97,800
Other Cost	$ 22,500	$ 21,525
Total Annual Cost	**$ 264,600**	**$ 255,425**
Acre-feet / year	150	150
Cost of treated water		
per acre-foot	$ 1,764	$ 1,703
per 1,000 gallons	$ 5.41	$ 5.23

F&N estimated that the water demand of the City of Lawn will remain at a constant level of 97 acre-feet per year for all years 2000 through 2060 and that the current water supply has quality problems.

The total population of the City of Lawn was 353 in 2000. The average population growth rate for the years 2000 through 2060 for Taylor County is forecasted to be 0.16% (Texas Water Development Board). No specific forecasted growth rates are available from TWDB for the City of Lawn. For the purpose of this study, it was assumed that the population would not increase if no new water supply would be made available to the City. Should the project be realized, the growth rate is assumed to be equal to 0.16% forecasted by the Texas Water Development Board.

To estimate the economic impact for the region, RS&Y made the assumption that population growth is directly affected by the water quality problems. Reduced population growth leads to less disposable personal income and less spending in the region, which finally results in reduced output of the local industries.

Tables 3a and 3b in Appendix J2 show all calculations in detail. Included in this table is the estimated number of households of the City of Lawn leaving or not relocating to the region due to insufficient water quality. The results are summarized in Table 8:

Table 8

Year	2010	2020	2030	2040	2050	2060
Disposable income lost if project is not realized	-	291,585	1,152,809	2,552,333	5,189,599	10,030,809
Disposable income not spent locally	-	(123,428)	(487,984)	(1,080,403)	(2,196,757)	(4,246,042)
Indirect effects	-	40,161	158,780	351,541	714,781	1,381,577
Induced effects	-	44,847	177,308	392,563	798,188	1,542,792
Total disposable income lost if project is not realized	-	253,165	1,000,913	2,216,034	4,505,811	8,709,137

all figures in $

City of Lawn Area Economic Effects

The Cost-Benefit Analysis calculation is shown in Table 9. It is assumed, that the project will be constructed in 2009 and is operating in 2010. Future cash flows have been discounted to the year 2009.

Table 9

	Pipeline from Abilene	**Steamboat Mountain WSC**
Total discounted project benefits [13]	$ 16,100,749	$ 16,100,749
Total discounted project costs [14]	$ 5,105,246	$ 5,232,233
Total discounted project cash flows [15]	**$ 10,995,503**	**$ 10,868,516**
Cost-Benefit Ratio[16]	**3.15**	**3.08**

[13] Benefits resulting from higher household spending due to higher population growth are calculated for each year, discounted to the year 2009 and added up.
[14] Debt payments, water purchase costs and other costs are calculated for each year, discounted to the year 2009 and added up.
[15] Difference between project benefits and project costs
[16] Total discounted project benefits divided by total discounted project costs

Westbound WSC to the City of Rising Star

F&N suggested strategies to increase the water supply to the City of Rising Star by expanding Westbound WSC's distribution system or installing a nitrate treatment and backup-connection to Westbound WSC. Table 10 details the costs for both strategies:

Table 10

	Scenario A: Distribution System Expansion	**Scenario B: Nitrate Treatment**
Total Capital Project Cost in 2003:	**$ 1,306,999**	**$ 734,718**
Annual Cost		
Debt Service	$ 95,000	$ 53,400
Water Purchase	$ 73,300	$ 24,400
Other Cost	$ 25,198	$ 12,280
Total Annual Cost	**$ 193,498**	**$ 90,080**
Acre-feet / year	150	150
Cost of treated water		
per acre-foot	$ 1,290	$ 601
per 1,000 gallons	$ 3.96	$ 1.84

F&N estimated that the water demand of the City of Rising Star decreases from 118 acre-feet in 2010 to 105 acre-feet in 2060 and indicated that the current water supply has quality problems.

The total population of the City of Rising Star was 835 in 2000. The Texas Water development Board forecasts a small increase in population until 2020, thereafter declining to 740 in the year 2060. For the purpose of this study, it was assumed that the population would continue to decrease at the historic rate of -0.28%[17] if no new water supply would be made available to the City. Should the project be operational by 2010, the growth is assumed to be equal to the projections made by the Texas Water Development Board.

To estimate the economic impact for the region, RS&Y made the assumption that population growth is directly affected by the water deficiency. Reduced population growth leads to less disposable personal income and less spending in the region, which finally results in reduced output of the local industries.
Tables 4a and 4b in Appendix J2 show all calculations in detail. Included in this table is the estimated number of households leaving or not relocating to the City due to insufficient water quality. The results are summarized Table 11:

[17] City of Rising Star growth rate 1990-2000, Source: Texas State Data Center

Table 11

Year	2010	2020	2030	2040	2050	2060
Disposable income lost if project is not realized	764,136	2,513,206	4,752,838	7,476,099	11,176,595	12,865,738
Disposable income not spent locally	(460,774)	(1,515,463)	(2,865,961)	(4,508,087)	(6,739,487)	(7,758,040)
Indirect effects	52,267	171,903	325,094	511,365	764,479	880,016
Induced effects	37,978	124,906	236,216	371,562	555,477	639,427
Total disposable income lost if project is not realized	**393,607**	**1,294,552**	**2,448,187**	**3,850,938**	**5,757,064**	**6,627,142**

all figures in $

City of Rising Star Area Economic Effects

The Cost-Benefit Analysis calculation is shown in Table 12. It is assumed, that the project will be constructed in 2009 and is operating in 2010. Future cash flows have been discounted to the year 2009.

Table 12

	Distribution System Expansion	**Nitrate Treatment**
Total discounted project benefits [18]	$ 31,806,159	$ 31,806,159
Total discounted project costs [19]	$ 4,040,362	$ 1,792,894
Total discounted project cash flows [20]	**$ 27,765,797**	**$ 30,013,266**
Cost-Benefit Ratio[21]	**7.87**	**17.74**

[18] Benefits resulting from higher household spending due to higher population growth are calculated for each year, discounted to the year 2009 and added up.
[19] Debt payments, water purchase costs and other costs are calculated for each year, discounted to the year 2009 and added up.
[20] Difference between project benefits and project costs
[21] Total discounted project benefits divided by total discounted project costs

Midway Group Interconnections / Regional WTP

To meet the needs of the Midway Group, this strategy proposes to supply water from Possum Kingdom Lake and transport it through a regional water treatment facility. The project would provide water to Shackelford, Stephens and Throckmorton Counties.

Table 13 details the costs for this project:

Table 13

	Midway Group Interconnection
Total Capital Project Cost in 2003:	**$ 16,892,976**
Annual Cost	
Debt Service	$ 1,227,260
Water Purchase	$ 79,500
Other Cost	$ 553,950
Total Annual Cost	**$ 1,860,710**
Acre-feet / year	1400
Cost of treated water	
per acre-foot	$ 1,329
per 1,000 gallons	$ 4.08

F&N forecasted water shortages for the three Counties increasing to 926 acre-feet in 2060. There is no supply shortage forecasted for the City of Breckenridge, which is also part of the Midway Group.

The total combined population of the three counties receiving water from the Midway Group was 12,526 in 2000. Population growth for the Midway Group participants was estimated by F&N and is assumed to be higher until 2030 thereafter slowing down, with an average growth of 0.92% annually, increasing the total population to 21,706 in 2060. For the purpose of this study, it was assumed that the population would not increase if no new water supply would be made available to the Midway Group. Should the project be realized, the growth is assumed to be equal to the forecast made by F&N.

To estimate the economic impact for the region, RS&Y made the assumption that population growth is directly affected by the water deficiency. Reduced population growth leads to less disposable personal income and less spending in the region, which finally results in reduced output of the local industries.

Table 5 in Appendix J2 shows all calculations in detail. Included in the table is the calculated number of households leaving or not relocating to the 3-county region because of the water deficiency. The results are summarized in Table 14:

Table 14

Year	2010	2020	2030	2040	2050	2060
Disposable income lost if project is not realized	77,282,215	203,651,424	430,649,327	836,561,209	1,592,418,002	2,983,496,076
Disposable income not spent locally	(49,077,298)	(129,326,800)	(273,479,548)	(531,249,830)	(1,011,249,128)	(1,894,639,348)
Indirect effects	4,753,629	12,526,599	26,489,240	51,456,880	97,949,631	183,514,844
Induced effects	3,318,498	8,744,792	18,492,082	35,921,938	68,378,429	128,111,321
Total disposable income lost if project is not realized	**36,277,045**	**95,596,015**	**202,151,100**	**392,690,197**	**747,496,934**	**1,400,482,893**

all figures in $

Midway Group Area Economic Effects

The Cost-Benefit Analysis calculation for the population growth scenario forecasted by F&N is shown in table 15. It is assumed, that the project will be constructed in 2009 and is operating in 2010. Future cash flows have been discounted to the year 2009. For comparison purposes results based upon the growth scenario forecasted by the Texas State Data center have been included in table 15.

Table 15

	Midway Group Interconnection Average Annual Pop. Growth Rate: 0.92% *F&N Forecast*	**Midway Group Interconnection** Average Annual Pop. Growth Rate: 0.049% *TSDC Forecast*
Total discounted project benefits [22]	$ 3,321,739,264	$ 119,261,449
Total discounted project costs [23]	$ 35,850,356	$ 35,850,356
Total discounted project cash flows [24]	**$ 3,285,888,907**	**$ 83,411,092**
Cost-Benefit Ratio[25]	**92.66**	**3.33**

[22] Benefits resulting from higher household spending due to higher population growth are calculated for each year, discounted to the year 2009 and added up.
[23] Debt payments, water purchase costs and other costs are calculated for each year, discounted to the year 2009 and added up.
[24] Difference between project benefits and project costs
[25] Total discounted project benefits divided by total discounted project costs

New Groundwater Development for the City of Sweetwater

F&N estimated capital cost for a well field and a transmission system to convey water to the City of Sweetwater as described in Table 16:

Table 16

Total Capital Project Cost in 2003:	**$ 16,972,419**
Annual Cost	
Debt Service	$ 1,233,000
Water Purchase	$ 141,260
Other Cost	$ 1,317,240
Total Annual Cost	**$ 2,691,500**
Acre-feet / year	5,100
Cost of treated water	
per acre-foot	$ 528
per 1,000 gallons	$ 1.62

F&N estimated an increasing water demand for the City of Sweetwater from 4,847 acre-feet in 2000 to 5,613 acre-feet in 2060. Supply was assumed to drop from 4,324 acre-feet in 2000 to 1,832 acre-feet in 2060. This leads to shortages of 3,781 acre-feet in 2060.

The total population of the City of Sweetwater was 11,415 in 2000. The Texas Water development Board forecasts a significant increase in population until 2030, thereafter a decline to 11,525 in the year 2060. For the purpose of this study, it was assumed that the population would continue to decrease at the historic rate of -0.48%[26] if no new water supply would be made available to the City. Should the project be operational by 2010, the growth is assumed to be equal to the projections made by the Texas Water Development Board.

To estimate the economic impact for the region, RS&Y made the assumption that population growth is directly affected by the water deficiency. Reduced population growth leads to less disposable personal income and less spending in the region, which finally results in reduced output of the local industries.

Table 6 in Attachment B shows all calculations in detail. Included in the table is the estimated number of households leaving or not relocating to the region because of the water deficiency. The results are summarized in Table 17:

[26] City of Sweetwater growth rate 1990-2000, Source: Texas State Data Center

Table 17

Year	2010	2020	2030	2040	2050	2060
Disposable income lost if project is not realized	29,148,578	82,667,290	165,559,431	286,125,738	422,432,277	600,809,483
Disposable income not spent locally	(16,900,054)	(47,929,668)	(95,989,703)	(165,892,842)	(244,922,010)	(348,343,330)
Indirect effects	2,057,890	5,836,311	11,688,496	20,200,477	29,823,719	42,417,149
Induced effects	1,854,724	5,260,120	10,534,547	18,206,181	26,879,366	38,229,507
Total disposable income lost if project is not realized	**16,161,138**	**45,834,052**	**91,792,771**	**158,639,554**	**234,213,352**	**333,112,809**

all figures in $

City of Sweetwater Economic Effects

The Cost-Benefit Analysis calculation is shown in Table 18. It is assumed, that the project will be constructed in 2009 and is operating in 2010. Future cash flows have been discounted to the year 2009.

Table 18

	New Groundwater Development
Total discounted project benefits [27]	$ 1,273,615,389
Total discounted project costs [28]	$ 57,059,654
Total discounted project cash flows [29]	**$ 1,216,555,735**
Cost-Benefit Ratio[30]	**22.32**

[27] Benefits resulting from higher household spending due to higher population growth are calculated for each year, discounted to the year 2009 and added up.
[28] Debt payments, water purchase costs and other costs are calculated for each year, discounted to the year 2009 and added up.
[29] Difference between project benefits and project costs
[30] Total discounted project benefits divided by total discounted project costs

West Central Texas Municipal Water District – Contract with BRA

WCTMWD is the raw water supplier for Jones, Taylor, Shackelford and Stephens Counties. For the years after 2040 F&N forecasted a raw water shortage for WCTMWD increasing to 724 acre-feet in the year 2060. A strategy to compensate for these shortages is to enter into an agreement with BRA for water that may be called for under Possum Kingdom Lake's senior water right permit. This agreement could provide an additional 19,000 acre-feet per year to WCTMWD.

The total population of the four counties was 160,317 in 2000. The Texas Water Development Board forecasts an increase in population to 181,306 in 2040, thereafter a decline to 171,079 in the year 2060.

To estimate the economic impact for the region, RS&Y made the assumption that population growth is directly affected by the water deficiency. Reduced population growth leads to less disposable personal income and less spending in the region, which finally results in reduced output of the local industries. The calculations are based on the following assumptions:

- Population growth continues until 2040 as forecasted by the Texas Water Development Board.
- Without BRA contract: The population declines as forecasted by the TWDB in the years after 2040.
- With BRA contract: The population stays at a constant level in the years after 2040.

Table 7 in Attachment B shows all calculations in detail. Included in the table is the estimated number of households leaving the region because of the water deficiency. The results are summarized in Table 19:

Table 19

Year	2010	2020	2030	2040	2050	2060
Disposable income lost if project is not realized	-	-	-	-	854,009,167	3,310,442,258
Disposable income not spent locally	-	-	-	-	(373,295,947)	(1,447,027,415)
Indirect effects	-	-	-	-	114,095,625	442,275,086
Induced effects	-	-	-	-	121,243,681	469,983,487
Total disposable income lost if project is not realized	**-**	**-**	**-**	**-**	**716,052,526**	**2,775,673,415**

all figures in $

WCTMWD Economic Effects

The calculation of economic benefits is shown in Table 20. Future cash flows have been discounted to the year 2009. Because no specific costs of the agreement between WCTMWD and BRA are available to RS&Y, the table does not include any costs associated with the contract.

Table 20

	Contract with BRA
Total discounted project benefits [31]	$ 1,702,023,229
Total discounted project costs	to be estimated
Total discounted project cash flows [32]	**$ 1,702,023,229**
Cost-Benefit Ratio[33]	**-**

[31] Benefits resulting from higher household spending due to higher population growth are calculated for each year, discounted to the year 2009 and added up.
[32] Difference between project benefits and project costs.
[33] Total discounted project benefits divided by total discounted project costs.

Summary and Conclusion

The results of the economic impact analysis for areas with water shortages and/or water quality problems are summarized in Table 21.

Table 21

Beneficiary	Total discounted project cash flows[34] (million $)	Cost-Benefit Ratio
Eastland County WSD to the City of Strawn	66.7	15.7
Lake Stamford to City of Throckmorton	70.8	7.2
Abilene to the City of Lawn (direct pipeline from Abilene)	11.0	3.2
Abilene to the City of Lawn (Steamboat Mountain WSC)	10.9	3.08
Westbound WSC to the City of Rising Star (Upgrade WSC System)	27.8	7.9
Westbound WSC to the City of Rising Star (Nitrate treatment)	30.0	17.8
Midway Group Interconnections / Regional WTP	3,285.9[35] 83.4[36]	92.66 3.33
New Groundwater development for the City of Sweetwater	1,273.6	22.32
WCTMWD contract with BRA	1,702.0[37]	---

Based on the general and project specific assumptions, the Midway Group Interconnections project is expected to receive the largest benefits with total discounted project cash flows estimated at more than $ 3.3 billion for the years through 2060. The

[34] Future cash flows discounted to the year 2009, the assumed year of construction.
[35] Based on an average annual forecasted population growth rate of 0.92% as estimated by F&N.
[36] Based on an average annual forecasted population growth rate of 0.049% as estimated by TSDC.
[37] These are only project benefits, no costs considered.

relatively high population growth rate for the water suppliers and the large number of people affected are the primary reasons for the large project cash flows. Population for the Midway Group participants is projected to increase from 12,526 in 2000 to more than 20,000 in 2060. If the growth rate was reduced to 0.049%, as estimated by the Texas State Data Center for the respective counties (Stephens, Shackelford and Throckmorton), the total discounted project cash flow decreases to $ 83.4 million.

The situation is similar for the City of Sweetwater. The population is forecasted to increase significantly from 11,415 in the year 2000 to 12,408 in 2020. The economic benefits of developing the new groundwater supply are significant assuming that a large number of people would leave the City if no new water supply was made available. The project results in a project cash flow of $ 1.3 billion.

For the contract between WCTMWD and BRA, economic benefits have been calculated, totaling $ 1.7 billion. No project costs are included in this calculation. The high project benefits are primary due to the large number of people affected by the proposed project.

All other projects generate positive cash flows in the range of $ 10 to $ 70 million with cost-benefit ratios ranging from 3 to 18. These projects only affect populations of less than 1,000 each and therefore have smaller impacts than projects that benefit a larger population.

In summary, the main drivers of project cash flows are the number of people affected both initially and over the long-term of the project, as measured by the population growth rate.

III. WATER RESERVIORS RESEARCH AND CASE STUDIES

Introduction to Water Reservoir Case Studies and Economic Research

Per discussions on August 26, 2003 with BRA, F&N, and West Central Texas Council Of Governments (WCTCOG), RS&Y has developed an alternative project approach to Scenario 3 (Additional Supplies). RS&Y explained during the meeting that in order for RS&Y to conduct a quantitative economic analysis for Scenario 3, we would have to make a series of assumptions regarding population growth. Population growth for the areas potentially impacted by additional supplies from Scenario 3 would need to be increased to have sufficient demand for water that makes the reservoirs economically feasible. There was discussion during the meeting that the construction of reservoirs in other areas of Texas has increased the viability of the area and impacted the population of those areas.

Based on this information, RS&Y suggested conducting a qualitative analysis of reservoirs and their economic impact on the surrounding areas. The meeting participants agreed to the pursuit of this qualitative economic analysis. The participants in the meeting identified three reservoirs to be included in this analysis: Lake Weatherford, Lake Mineral Wells, and Lake Pat Mayse.

RS&Y researched these three reservoir sites built between 1922 and 1965. Lake Weatherford was completed in 1957 and is the water source for municipal and industrial customers of the City of Weatherford. Lake Mineral Wells was completed in 1922 and became the water source for the City of Mineral Wells and Fort Wolters until 1963. Lake Pat Mayse was constructed in 1966 and became the water source for the City of Paris and attracted other business to the area. The qualitative analysis includes research on the changes that occurred after construction of the reservoirs was completed.

More specific information and analysis may be needed for the water supply planners in West Central Brazos study area to make decisions regarding the potential construction of a water reservoir. Therefore, RS&Y also conducted supplementary research to find other studies that analyzed the economic impact of water reservoirs. RS&Y found two papers that detailed this type of research:

- A Study of the Economic Impact of Water Impoundment through the Development of a Comparative-Projection Model.[38]
- The Local Economic Effects of Large Dam Reservoirs: U.S. Experience, 1975-95.[39]

[38] John E. Pearson. "Technical Report No. 8. A Study of the Economic Impact of Water Impoundment Through the Development of a Comparative-Projection Model." Water Resources Institute. Texas A&M Universtiy. August, 1967.

[39] Mostafa Aleseyed and Terance Rephann and et al., "The Local Economic Effects of Large Dam Reservoirs: U.S. Experience 1975-95." Review of Urban and Regional Development Studies. 1998.

This analysis provides the project participants with greater understanding of the potential beneficial impacts of the water reservoir projects. In comparison to the previous analysis conducted by RS&Y, this analysis does not provide any direct comparisons between the cost of the project and the potential economic gain.

Research

1. A Study of the Economic Impact of Water Impoundment through the Development of a Comparative-Projection Model

This paper focuses on the development of a model that has the ability to project the economic impact of a water impoundment project. The researchers used two existing and established reservoir projects, Lake Whitney and Lake Belton, to develop and test the accuracy of the prediction model. The model evaluated three stages of economic activity: construction, fill-up and post fill-up. It uses inputs of construction money, operations and maintenance, recreation and investments in each of these three stages to determine the potential economic impact of the reservoir. Once the model was built and tested on the existing reservoirs, the researchers also tested the model on a reservoir under construction, Somerville Dam and Reservoir. They found that the model's predictions on the economic impact were supported by field observations and secondary data.

The technical paper also discusses the economic impact of the reservoirs as observed during the research.

> *Specific benefits are realized for the overall even at the expense of individuals [people who may have to move due to the location of the reservoir]. The reservoir provides social and economic benefits such as water conservation, flood control, water for irrigation purposes, hydro-electric power, and an additional recreation facility. And, the reservoir provides definite support to the local economy.*

The support to the local economy includes: (1) new jobs are created during the construction phase and if materials, supplies, etc. are available locally, these too will add income to the region; (2) Additional inputs of recreational and investment expenditures help sustain the economy at a higher level; and (3) prices of near-lake land may increase as much as fifteen times pre-construction prices.

2. The Local Economic Effects of Large Dam Reservoirs: U.S. Experience, 1975-95

This technical paper examines the effects of large reservoirs on county income, earnings population and employment growth for dams opened in the U.S. during the period 1975-1984. The authors of the paper researched other works and found that most empirical studies determined that increasing water supply has been found to be a poor mechanism for stimulating local economic growth and when there was a positive impact it was connected to recreational uses of the reservoir rather than the luring of industries to the area. However, the research conducted by the authors of this paper focused on identifying

the effect that the nature of the dam and the regional characteristics have on the potential for positive economic impact.

Nature of Dam

Rationale for this variable was that "different types of dams (and reservoirs) would be expected to affect different sectors of the regional economy". For example;

- Hydroelectric dams may influence public utility employment
- Navigation dam may influence trade and transportation
- Irrigation dam may influence employment in agriculture
- Water supply dam may influence industrial and residential location
- Recreation dam may influence residential location and tourism

Regional Characteristics

Rationale for this variable was that the economic effect is "shaped by regional surroundings- both physical and socioeconomic". For example;

- Rural areas may not see as much positive economic effect because of other limiting economic factors of a rural area including weak inter-industry linkages, poor infrastructure and potential of limited human resources.
- Arid west and plains states may have more impact because historically limited water supply may have affected residential, industrial and agricultural development. The influx of new water supplies may provide employment generation.

The results of the regression analysis supported three conclusions made by the authors. The following list summarizes the conclusions as stated in the technical paper.

- Counties with more people in the nearby vicinity are more likely to experience growth as a result of the dam.
- The nearer a larger city, the more likely the dam will generate growth.
- The purpose of the dam matters (a flood control dam is less likely to have a positive effect on the economy).
- The larger the water storage, the more positive the effect, but the more other surface water is available, the smaller the effect.

These two papers provide information that assist in evaluating the potential impact that a reservoir may have on the local economy. The following sections provide an overview of three reservoirs and the findings on their impact on the local economy.

Case Studies

City of Weatherford (Parker County)

Location: The City is approximately 30 miles west of Fort Worth.

Reservoir: Lake Weatherford started construction in 1956 and was completed by March 15, 1957. The storage capacity is 19,600 acre feet. Water use is municipal and industrial and is the water source for City of Weatherford.

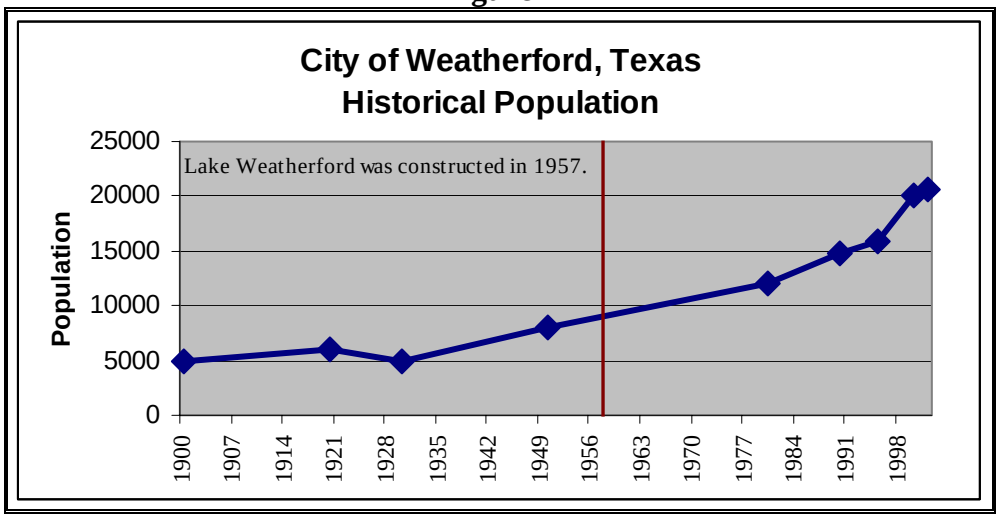
Research of interest:

- Real estate developments began to be planned soon after the construction of Lake Weatherford.
- 85 percent of the wages for the City are in Fort Worth.

Population and Water Demand:

Figure 1 provides a graphical description of the population increases since the 1900s. In addition the graph depicts when Lake Weatherford was constructed and available for use.[40]

Figure 1



[40] Historical population counts were found in multiple documents.

City of Mineral Wells (Palo Pinto & Parker County)

Location: The City is approximately 40 miles west of Fort Worth.

Reservoir: The City of Mineral Wells became too large for Lake Pinto, the town water supply, so in the late 1910's plans were laid for another lake east of town. In 1922, Lake Mineral Wells was completed.

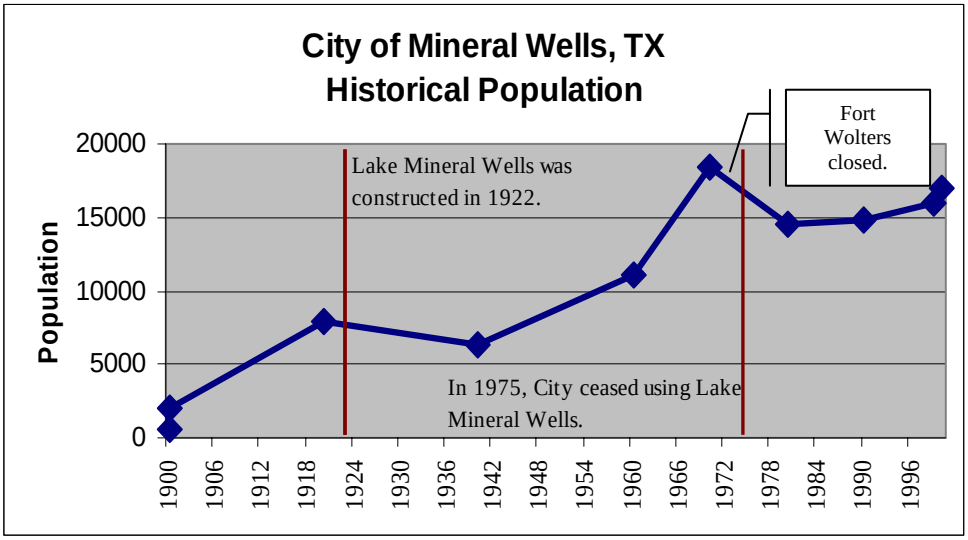
World War II demanded an increase in activities at Fort Wolters, a military base located adjacent to the lake. This demand and an increase in population growth required the city to raise the height of the dam, which increased the water supply in the lake. In 1963 the City of Mineral Wells found a "better" water supply (*based on TCEQ records – Lake Palo Pinto)* and ceased using Lake Mineral Wells as the main city water supply.

In 1974, Fort Camp Wolters was deactivated. In 1975, the City of Mineral Wells and Fort Wolters donated the lake and land around the lake to the Texas Parks and Wildlife Department. In 1981, Lake Mineral Wells was opened as Lake Mineral Wells State Park.[41] Lake Mineral Wells attracts approximately 300,000 visitors annually.

Population and Water Demand:

Figure 2 provides a graphical description of the population increases since the 1900s. In addition, the graph depicts when Lake Mineral Wells was constructed and available for use.[42]

Figure 2



[41] Source: http://www.tpwd.state.tx.us/park/lakemine/lakemine.htm

[42] Historical population counts were found in multiple documents.

City of Paris (Lamar County)

Location: The City is approximately 100 miles northeast of Dallas. It is on U.S. Highways 271 and 82 in the central part of the county in the upland separating the tributaries of the Red and Sulphur Rivers.

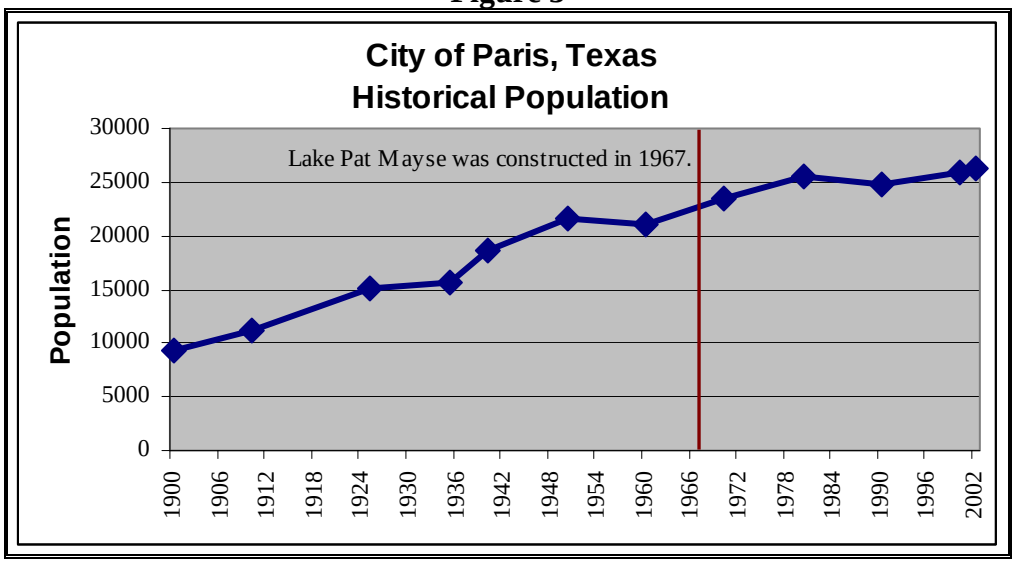
Reservoir: Before Lake Pat Mayse was constructed the City of Paris relied upon Lake Crook for water supply. Lake Pat Mayse began construction in March 1965. The project was placed in full flood control operation in September 1967. The top of conservation pool was reached in April 1968.[43]

Primary uses for the lake include use as a municipal and domestic water supply, flood control and recreation area. Normal capacity is 124,000 acre-feet (AF), with a maximum capacity of 517,000 AF.[44]

Population and Water Demand:

Figure 3 provides a graphical description of the population increases since the 1900s. In addition, the graph depicts when Lake Pat Mayse was constructed and available for use.[45] Figure 4 illustrates the difference in capacity (not water supply) of Lake Pat Mayse and Lake Crook. The main result of the City acquiring water rights from Lake Pat Mayse is that they are able to provide quality water service to both their retail and wholesale customers. The City's major wholesale water customer is Campbell's Soup, which uses nearly 50 percent of the total water produced by the City.

Figure 3

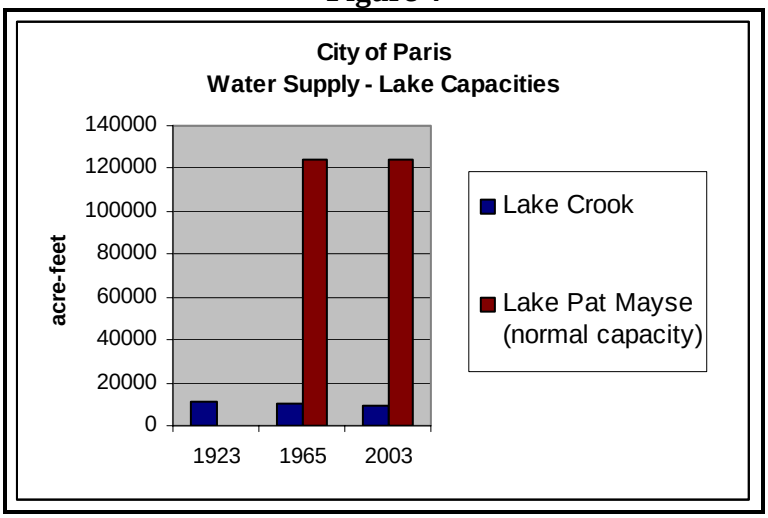


[43] Source: http://www.swt.usace.army.mil/projects/civil/civil_projects.cfm?number=26

[44] source: http://www.rra.dst.tx.us/surface_w/lamar/pat_mayse_lake.cfm

[45] Historical population counts were found in multiple documents.

Figure 4



Research of interest:

The number of visitors in 1998 was 189,913. The regional planning report also stated that "the 1990s have seen an increase in persons coming to North East Texas to retire around area lakes".[46]

Conclusion to Water Reservoirs Research and Case Studies

RS&Y has found that the water supply planners in the West Central Brazos study area must take into consideration many factors (use of water, capacity of reservoir, ability to attract visitors to recreation sites, proximity to large populations, and the socioeconomics of the region) before deciding on the potential construction of a water reservoir. The cities in the case studies used the reservoirs to meet their specific needs, which included attracting industries, providing quality and affordable water supplies to their customers, providing water supply to meet demands from outside entities (i.e. Fort Wolters), and securing water rights to meet their future water needs. The research conducted does not show a direct correlation between population growth and the construction of a water reservoir. However, the research does provide conclusions that depending upon the current and historical water demands of an area, the nature of that water demand, and the population potentially affected by the construction of a water reservoir, the water reservoir may prove to be economically beneficial to a specific region.

[46] source: www.sulphurriverbasinauthority.org/Regionalplanning/plan_documents/Chapter_01.pdf

APPENDIX J1: IMPLAN SOFTWARE METHODOLOGY [47]

The IMPLAN software uses *Input-Output-Analysis* as a means of examining relationships within an economy, both between businesses and between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period using actual data from local economies.

There are two phases in the input-output analysis:

1. Descriptive modeling
2. Predictive modeling

Description Model

A descriptive model includes information about local economic interactions known as regional economic accounts. These tables describe a local economy in terms of the flow of dollars from purchasers to producers within the region.

Trade flows are also part of the descriptive model. They describe the movements of goods and services within a region and the outside world. Non-industrial transactions such as payment of taxes by businesses and households are estimated by creating social accounting data.

Predictive Model

The regional economic accounts are used to construct local level multipliers. Multipliers describe the response of the economy to a stimulus (change in demand or production). The multipliers represent the predictive model.

Purchases for final demand (final use) drive an input-output model. Industries producing goods and services for consumption purchase goods and services from other producers. These other producers in turn purchase goods and services. The indirect purchases *(indirect effects)* continue until leakages from the region (imports, wages, profits) stop the cycle. The indirect effects and the effects of increased household spending *(induced effects)* are calculated as a set of multipliers. The multipliers describe the change of output for each industry caused by a one dollar change in final demand for any given industry.

The underlying multipliers used are the *Type SAM multipliers*. Type SAM multipliers are the direct, indirect and induced effects where the induced effect is based on information in the social account matrix. This relationship accounts for social security tax and income tax leakage, institution savings, and commuting. It also accounts for inter-institutional transfers.

[47] Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

Appendix J2

General Inputs for all Projects

Cost Base for Capital Projects		**2003**
Construction of Projects		2009
Yearly Escalation of Project Cost	(1)	1.9%
Total Escalation 2003-2009		12.0%
Interest Rate on Project Debt	(2)	6.0%
Repayment Period of Debt (years)	(2)	30
First Year of Operation		**2010**
Yearly Escalation of		
Water purchase cost	(3)	1.9%
Other cost	(3)	1.9%
Disposable income (% of household income)	(4)	89.00%
Discount rate for Cost Benefit Analysis	(5)	5.350%

(1) For the escalation of project capital costs the average yearly increase in producer prices (excluding food and energy) for the period 1983-2002 of 1.9% has been used. It is assumed that construction of the projects will be in 2009, first year of operation is 2010.
Source: US Department of Labor, Bureau of Labor Statistics
http://data.bls.gov/servlet/SurveyOutputServlet

(2) As determined by Freese and Nichols.

(3) For the escalation of project water purchase costs and other costs the average yearly increase in producer prices (excluding food and energy) for the period 1983-2002 of 1.9% has been used.
Source: US Department of Labor, Bureau of Labor Statistics
http://data.bls.gov/servlet/SurveyOutputServlet

(4) Average per capita disposable income in Texas as a percentage of personal income for the period 1983-2002 has been 89.00% (Other periods: 1950 through 2002: 88.98%; 1973 through 2002: 88.52%; 1993 through 2002: 88.76%).
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) The discount rate for the Cost-Benefit Analysis is chosen as the Risk-Free Interest rate (30-year Treasury Bond rate) as per October 10/14/2003: 5.35%.
Source: US Department of the Treasury
http://www.ustreas.gov/offices/domestic-finance/debt-management/interest-rate/ltcompositeindex.html

Eastland County WSD to the City of Strawn **Table 1**

Project Data									
Acre-feet / year			200						
Total Capital Project Cost 2003:			$ 1,462,853						
escalated to the year 2009	(1)	1.90%	$ 1,637,743						
Annual Costs (without escalation):									
Debt Service			$ 106,270						
Water Purchase			$ 97,760						
Other			$ 13,280						
			$ 217,310						
$ per acre-foot			$ 1,087						
$ per 1,000 gallons			$ 3.33						
			2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Strawn									
Water demand		acre-feet/year	156	162	169	175	181	188	196
Water supply		acre-feet/year	160	160	160	160	160	160	160
Supply-Demand		acre-feet/year		(2)	(9)	(15)	(21)	(28)	(36)
Strategy									
New Pipeline from Eastland County WSC		acre-feet/year		200	200	200	200	200	200
Remaining surplus		acre-feet/year		198	191	185	179	172	164

Project Cost			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Debt Service				$ 118,980	$ 118,980	$ 118,980			
		Escalation/yr:							
Water purchase cost	(1)	1.90%		$ 111,527	$ 134,624	$ 162,504	$ 196,158	$ 236,782	$ 285,818
Other cost	(1)	1.90%		$ 15,150	$ 18,288	$ 22,075	$ 26,647	$ 32,165	$ 38,826
Total project cost				**$ 245,658**	**$ 271,892**	**$ 303,559**	**$ 222,805**	**$ 268,947**	**$ 324,644**

Eastland County WSD to the City of Strawn **Table 1**

Economic Impact of not realizing the project			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Strawn									
Population	(2)		739	767	801	830	858	891	929
Persons per household	(3)		2.55						
Income per Household (escalated yearly)	(4)	**4.4%**	**$ 55,548**	**$ 85,442**	**$ 131,425**	**$ 202,154**	**$ 310,948**	**$ 478,292**	**$ 735,696**
Yearly change in number of households:									
With new water supply	(5)		290	301	314	325	336	349	364
Without new water supply	(6)	0.00%	290	290	290	290	290	290	290
Unrealized growth (No. of households)				**11**	**24**	**36**	**47**	**60**	**75**
Total household income lost				$ 939,866	$ 3,154,203	$ 7,277,562	$ 14,614,576	$ 28,697,536	$ 55,177,194
Disposable income (% of household income)	(1)	89.00%		$ 836,481	$ 2,807,241	$ 6,477,030	$ 13,006,973	$ 25,540,807	$ 49,107,703
Disposable income not spent locally	(7)	52.25%		$ (437,061)	$(1,466,783)	$(3,384,248)	$ (6,796,143)	$(13,345,072)	$(25,658,775)
From IMPLAN Software:		Multilplier							
Indirect effects	(8)	0.09		$ 77,132	$ 258,856	$ 597,247	$ 1,199,373	$ 2,355,118	$ 4,528,221
Induced effects	(8)	0.10		$ 79,600	$ 267,137	$ 616,354	$ 1,237,744	$ 2,430,463	$ 4,673,089
Total disposable household income lost for the County (including multiplier effects)				**$ 556,151**	**$ 1,866,450**	**$ 4,306,383**	**$ 8,647,946**	**$ 16,981,316**	**$ 32,650,238**

			2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Benefit/Cost Ratio				**2.26**	**6.86**	**14.19**	**38.81**	**63.14**	**100.57**
Project Benefits				$ 556,151	$ 1,866,450	$ 4,306,383	$ 8,647,946	$ 16,981,316	$ 32,650,238
Project Costs				$ 245,658	$ 271,892	$ 303,559	$ 222,805	$ 268,947	$ 324,644
Project Cash Flows				$ 310,494	$ 1,594,558	$ 4,002,823	$ 8,425,141	$ 16,712,370	$ 32,325,594
Cost Benefit Analysis	(1)	5.350%							
Project Benefits (discounted)		$71,215,505		$ 526,397	$ 1,019,397	$ 1,357,206	$ 1,572,723	$ 1,782,037	$ 1,977,142
Project Costs (discounted)		$ 4,542,545		$ 232,515	$ 148,499	$ 95,670	$ 40,519	$ 28,224	$ 19,659
Total Discounted Project Cashflows	(9)	$66,672,960		$ 293,882	$ 870,898	$ 1,261,535	$ 1,532,203	$ 1,753,813	$ 1,957,483
Discounted Benefits / Discounted Costs		**15.68**							

Eastland County WSD to the City of Strawn **Table 1**

(1) See Input Page

(2) Forecasted population for the City of Strawn for the Period 2000 to 2060.
Source: Texas Water Development Board
http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/CountyProjections.htm

(3) Average number of people per household inPalo Pinto County in the year 2000: 2.55.
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower
Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(4) Yearly income per household in the year 2000 from Implan Software. This is the personal income as defined by BEA. Besides wages and salaries it also includes proprietor's income, rental income, personal dividend, interest income, transfer payments to persons less personal contributions for social security. Average yearly increase in personal income in Palo Pinto County for the period 1980-2000 used to project futu income growth.
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) Growth assumed to be the same as population growth in (2).

(6) RS&Y made the assumtion that there will be no population growth, if the project is not realized.

(7) Income spent on foreign and domestic trade, State and Local Government (non-education), Federal Government (non defense) and Capital does not contribute to increase local industry output. Numbers obtain from IMPLAN Software.

(8) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly effected industries. Induced effects reflect changes in spending from households as income increases or decreases due to the changes in production. The multipliers used are the Type SAM multipliers (refer to methodology).
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower
Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(9) The Cost Benefit Analysis sums up annual discounted differences between project costs and benefits. Only selected years are shown but all years are included in the calculation.

Lake Stamford to Throckmorton — **Table 2a**

Project Data													
Acre-feet / year				340									
Total Capital Project Cost 2003:			$	5,197,300									
escalated to the year 2009	(1)	1.90%	$	5,818,659									
Annual Costs (without escalation):													
Debt Service			$	377,580									
Water Purchase			$	110,790									
Other			$	101,555									
			$	589,925									
$ per acre-foot			$	1,735									
$ per 1,000 gallons			$	5.32									

			2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Throckmorton									
Water demand		acre-feet/year	236	278	288	298	310	322	338
Water supply		acre-feet/year	100	-	-	-	-	-	-
Supply-Demand		acre-feet/year		(278)	(288)	(298)	(310)	(322)	(338)
Strategy									
New Pipeline from Lake Throckmorton		acre-feet/year		340	340	340	340	340	340
Remaining surplus		acre-feet/year		62	52	42	30	18	2

Project Cost			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Debt Service				$ 422,719	$ 422,719	$ 422,719			
		Escalation/yr:							
Water purchase cost	(1)	1.90%		$ 126,392	$ 152,567	$ 184,163	$ 222,303	$ 268,341	$ 323,914
Other cost	(1)	1.90%		$ 115,857	$ 139,850	$ 168,812	$ 203,773	$ 245,973	$ 296,913
Total project cost				**$ 664,968**	**$ 715,137**	**$ 775,695**	**$ 426,076**	**$ 514,314**	**$ 620,827**

Lake Stamford to Throckmorton									Table 2a
Economic Impact of not realizing the project			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Throckmorton									
Population	(2)		905	905	877	838	775	725	688
Persons per household	(3)		2.42						
Income per Household (escalated yearly)	(4)	**4.8%**	**$ 53,421**	**$ 85,537**	**$ 136,960**	**$ 219,299**	**$ 351,138**	**$ 562,237**	**$ 900,246**
Yearly change in number of households:									
With new water supply	(5)		374	374	362	346	320	300	284
Without new water supply	(6)	-1.36%	374	326	284	248	216	189	164
Unrealized growth (No. of households)				**48**	**78**	**98**	**104**	**111**	**120**
Total household income lost				$ 4,105,772	$ 10,682,914	$ 21,491,303	$ 36,518,385	$ 62,408,359	$ 108,029,554
Disposable income (% of household income)	(1)	89.00%		$ 3,654,137	$ 9,507,793	$ 19,127,260	$ 32,501,363	$ 55,543,439	$ 96,146,303
Disposable income not spent locally	(7)	76.42%		$ (2,792,491)	$ (7,265,856)	$ (14,617,052)	$ (24,837,542)	$ (42,446,296)	$ (73,475,005)
From IMPLAN Software:		Multilplier							
Indirect effects	(8)	0.04		$ 139,953	$ 364,148	$ 732,574	$ 1,244,802	$ 2,127,314	$ 3,682,403
Induced effects	(8)	0.02		$ 63,070	$ 164,105	$ 330,137	$ 560,974	$ 958,680	$ 1,659,485
Total disposable household income lost for the County (including multiplier effects)				**$ 1,064,669**	**$ 2,770,191**	**$ 5,572,918**	**$ 9,469,597**	**$ 16,183,136**	**$ 28,013,187**

			2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Benefit/Cost Ratio				**1.60**	**3.87**	**7.18**	**22.23**	**31.47**	**45.12**
Project Benefits				$ 1,064,669	$ 2,770,191	$ 5,572,918	$ 9,469,597	$ 16,183,136	$ 28,013,187
Project Costs				$ 664,968	$ 715,137	$ 775,695	$ 426,076	$ 514,314	$ 620,827
Project Cash Flows				$ 399,701	$ 2,055,054	$ 4,797,223	$ 9,043,521	$ 15,668,822	$ 27,392,360
Cost Benefit Analysis	(1)	5.350%							
Project Benefits (discounted)		$ 82,293,160		$ 1,007,710	$ 1,512,991	$ 1,756,369	$ 1,722,149	$ 1,698,275	$ 1,696,344
Project Costs (discounted)		$ 11,476,556		$ 629,392	$ 390,585	$ 244,469	$ 77,486	$ 53,973	$ 37,594
Total Discounted Project Cashflows	(9)	$ 70,816,604		$ 378,317	$ 1,122,406	$ 1,511,899	$ 1,644,662	$ 1,644,302	$ 1,658,750
Discounted Benefits / Discounted Costs		**7.17**							

Lake Stamford to Throckmorton **Table 2a**

(1) See Input Page

(2) Forecasted population for the City of Throckmorton for the Period 2000 to 2060.
Source: Texas Water Development Board
http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/CountyProjections.htm

(3) Average number of people per household in Throckmorton County in the year 2000: 2.42.
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(4) Yearly income per household in the year 2000 from Implan Software. This is the personal income as defined by BEA. Besides wages and salaries it also includes proprietor's income, rental income, personal dividend, interest income, transfer payments to persons less personal contributions for social security. Average yearly increase in personal income in Palo Pinto County for the period 1980-2000 used to project future income growth.
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) Growth assumed to be the same as population growth in (2).

(6) RS&Y made the assumtion that the historic population decline for the City of Throckmorton of -1.36% annually will continue, if the project is not realized.
Source Texas State Data Center, average annual population growth 1990-2000
http://txsdc.tamu.edu/data/census/2000/redistrict/pl94-171/desctab/re_tab49.txt

(7) Income spent on foreign and domestic trade, State and Local Government (non-education), Federal Government (non defense) and Capital does not contribute to increase local industry output. Numbers obtained from IMPLAN Software.

(8) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly effected industries. Induced effects reflect changes in spending from households as income increases or decreases due to the changes in production. The multipliers used are the Type SAM multipliers (refer to methodology).
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(9) The Cost Benefit Analysis sums up annual discounted differences between project costs and benefits. Only selected years are shown but all years are included in the calculation.

Abilene to Lawn **Table 3a**

Project Data									
Acre-feet / year			150						
Total Capital Project Cost 2003:			$ 2,390,353						
escalated to the year 2009	(1)	1.90%	$ 2,676,130						
Annual Costs (without escalation):									
Debt Service			$ 173,700						
Water Purchase			$ 68,400						
Other			$ 22,500						
			$ 264,600						
$ per acre-foot			$ 1,764						
$ per 1,000 gallons			$ 5.41						
			2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Lawn									
Water demand		acre-feet/year	97	97	97	97	97	97	97
Water supply		acre-feet/year		Current Supply has water quality issues					
Supply-Demand		acre-feet/year		-97	-97	-97	-97	-97	-97
Strategy									
Pipeline from Abilene to Lawn		acre-feet/year		150	150	150	150	150	150
Remaining surplus		acre-feet/year		53	53	53	53	53	53

Project Cost			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Debt Service				$ 194,418	$ 194,418	$ 194,418			
		Escalation/yr:							
Water purchase cost	(1)	1.90%		$ 78,032	$ 94,193	$ 113,700	$ 137,246	$ 165,670	$ 199,979
Other cost	(1)	1.90%		$ 25,669	$ 30,984	$ 37,401	$ 45,147	$ 54,497	$ 65,783
Total project cost				**$ 298,119**	**$ 319,595**	**$ 345,519**	**$ 182,393**	**$ 220,166**	**$ 265,762**

Abilene to Lawn **Table 3a**

Economic Impact of not realizing the project			2000	2010	2020	2030	2040	2050	2060
City of Lawn									
Population	(2)		353						
Persons per household	(3)		2.68						
Income per Household (escalated yearly)	(4)	**4.7%**	**$ 65,500**	**$ 103,584**	**$ 163,812**	**$ 259,058**	**$ 409,684**	**$ 647,890**	**$ 1,024,597**
Yearly change in number of households:									
With new water supply	(5)	0.16%		132	134	136	139	141	143
Without new water supply	(6)	0.00%	132	132	132	132	132	132	132
Unrealized growth (No. of households)				**0**	**2**	**5**	**7**	**9**	**11**
Total household income lost				$ -	$ 327,624	$ 1,295,291	$ 2,867,790	$ 5,831,010	$11,270,572
Disposable income (% of household income)	(1)	89.00%		$ -	$ 291,585	$ 1,152,809	$ 2,552,333	$ 5,189,599	$10,030,809
Disposable income not spent locally	(7)	42.33%		$ -	$ (123,428)	$ (487,984)	$(1,080,403)	$(2,196,757)	$ (4,246,042)
From IMPLAN Software:		Multilplier							
Indirect effects	(8)	0.14		$ -	$ 40,161	$ 158,780	$ 351,541	$ 714,781	$ 1,381,577
Induced effects	(8)	0.15		$ -	$ 44,847	$ 177,308	$ 392,563	$ 798,188	$ 1,542,792
Total disposable household income lost for the County (including multiplier effects)				**$ -**	**$ 253,165**	**$ 1,000,913**	**$ 2,216,034**	**$ 4,505,811**	**$ 8,709,137**

			2000	2010	2020	2030	2040	2050	2060
Benefit/Cost Ratio				**0.00**	**0.79**	**2.90**	**12.15**	**20.47**	**32.77**
Project Benefits				$ -	$ 253,165	$ 1,000,913	$ 2,216,034	$ 4,505,811	$ 8,709,137
Project Costs				$ 298,119	$ 319,595	$ 345,519	$ 182,393	$ 220,166	$ 265,762
Project Cash Flows				$ (298,119)	$ (66,430)	$ 655,395	$ 2,033,641	$ 4,285,645	$ 8,443,375
Cost Benefit Analysis	(1)	5.350%							
Project Benefits (discounted)		$ 16,100,749		$ -	$ 138,271	$ 315,449	$ 403,010	$ 472,844	$ 527,384
Project Costs (discounted)		$ 5,105,246		$ 282,170	$ 174,553	$ 108,894	$ 33,170	$ 23,104	$ 16,093
Total Discounted Project Cashflows	(9)	$ 10,995,503		$ (282,170)	$ (36,282)	$ 206,555	$ 369,840	$ 449,740	$ 511,290
Discounted Benefits / Discounted Costs		**3.15**							

Abilene to Lawn **Table 3a**

(1) See Input Page

(2) City of Lawn population in 2000: 353.
Source: US Census Bureau
http://www.tsl.state.tx.us/ref/abouttx/popcity12000.html
Population 358 (1990), 390 (1980), 344 (1970), 310 (1960), 311 (1950), 306 (1940) (data not published yet, received per phone from Texas State Data Center)

(3) Average number of people per household in Taylor County in the year 2000: 2.68.
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower
Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(4) Yearly income per household in the year 2000 from Implan Software. This is the personal income as defined by BEA. Besides wages and salaries it also includes proprietor's income, rental income, personal dividend, interest income, transfer payments to persons less personal contributions for social security. Average yearly increase in personal income in Palo Pinto County for the period 1980-2000 used to project future income growth.
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) Average forecasted annual population growth rate for Taylor County for the Period 2000 to 2060: 0.16%.
Source: Texas Water Development Board
http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/CountyProjections.htm

(6) RS&Y made the assumtion that there will be no population growth, if the project is not realized.

(7) Income spent on foreign and domestic trade, State and Local Government (non-education), Federal Government (non defense) and Capital does not contribute to increase local industry output. Numbers obtained from IMPLAN Software.

(8) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly effected industries. Induced effects reflect changes in spending from households as income increases or decreases due to the changes in production. The multipliers used are the Type SAM multipliers (refer to methodology).
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower
Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(9) The Cost Benefit Analysis sums up annual discounted differences between project costs and benefits. Only selected years are shown but all years are included in the calculation.

Steamboat Mountain WSC to Lawn **Table 3b**

Project Data														
Acre-feet / year			150											
Total Capital Project Cost 2003:			$ 1,873,737											
escalated to the year 2009	(1)	1.90%	$ 2,097,750											
Annual Costs (without escalation):														
Debt Service			$ 136,100											
Water Purchase			$ 97,800											
Other			$ 21,525											
			$ 255,425											
$ per acre-foot			$ 1,703											
$ per 1,000 gallons			$ 5.23											
			2000		**2010**		**2020**		**2030**		**2040**		**2050**	**2060**
City of Lawn														
Water demand		acre-feet/year	97		97		97		97		97		97	97
Water supply		acre-feet/year					Current Supply has water quality issues							
Supply-Demand		acre-feet/year			-97		-97		-97		-97		-97	-97
Strategy														
Steamboat Mountain WSC to Lawn		acre-feet/year			150		150		150		150		150	150
Remaining surplus		acre-feet/year			53		53		53		53		53	53

Project Cost			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Debt Service				$ 152,399	$ 152,399	$ 152,399			
		Escalation/yr:							
Water purchase cost	(1)	1.90%		$ 111,573	$ 134,679	$ 162,571	$ 196,238	$ 236,878	$ 285,935
Other cost	(1)	1.90%		$ 24,556	$ 29,642	$ 35,780	$ 43,190	$ 52,135	$ 62,932
Total project cost				**$ 288,528**	**$ 316,720**	**$ 350,750**	**$ 239,429**	**$ 289,013**	**$ 348,867**

Steamboat Mountain WSC to Lawn									Table 3b
Economic Impact of not realizing the project			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Lawn									
Population	(2)		353						
Persons per household	(3)		2.68						
Income per Household (escalated yearly)	(4)	**4.7%**	**$ 65,500**	**$ 103,584**	**$ 163,812**	**$ 259,058**	**$ 409,684**	**$ 647,890**	**$ 1,024,597**
Yearly change in number of households:									
With new water supply	(5)	0.16%		132	134	136	139	141	143
Without new water supply	(6)	0.00%	132	132	132	132	132	132	132
Unrealized growth (No. of households)				**0**	**2**	**5**	**7**	**9**	**11**
Total household income lost				$ -	$ 327,624	$ 1,295,291	$ 2,867,790	$ 5,831,010	$ 11,270,572
Disposable income (% of household income)	(1)	89.00%		$ -	$ 291,585	$ 1,152,809	$ 2,552,333	$ 5,189,599	$ 10,030,809
Disposable income not spent locally	(7)	42.33%		$ -	$ (123,428)	$ (487,984)	$ (1,080,403)	$ (2,196,757)	$ (4,246,042)
From IMPLAN Software:		Multilplier							
Indirect effects	(8)	0.14		$ -	$ 40,161	$ 158,780	$ 351,541	$ 714,781	$ 1,381,577
Induced effects	(8)	0.15		$ -	$ 44,847	$ 177,308	$ 392,563	$ 798,188	$ 1,542,792
Total disposable household income lost for the County (including multiplier effects)				**$ -**	**$ 253,165**	**$ 1,000,913**	**$ 2,216,034**	**$ 4,505,811**	**$ 8,709,137**

			2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Benefit/Cost Ratio				**0.00**	**0.80**	**2.85**	**9.26**	**15.59**	**24.96**
Project Benefits				$ -	$ 253,165	$ 1,000,913	$ 2,216,034	$ 4,505,811	$ 8,709,137
Project Costs				$ 288,528	$ 316,720	$ 350,750	$ 239,429	$ 289,013	$ 348,867
Project Cash Flows				$ (288,528)	$ (63,555)	$ 650,163	$ 1,976,606	$ 4,216,797	$ 8,360,270
Cost Benefit Analysis	(1)	5.350%							
Project Benefits (discounted)		$16,100,749		$ -	$ 138,271	$ 315,449	$ 403,010	$ 472,844	$ 527,384
Project Costs (discounted)		$ 5,232,233		$ 273,092	$ 172,983	$ 110,543	$ 43,543	$ 30,329	$ 21,126
Total Discounted Project Cashflows	(9)	$10,868,516		$ (273,092)	$ (34,712)	$ 204,906	$ 359,467	$ 442,515	$ 506,258
Discounted Benefits / Discounted Costs		**3.08**							

Steamboat Mountain WSC to Lawn **Table 3b**

(1) See Input Page

(2) City of Lawn population in 2000: 353.
Source: US Census Bureau
http://www.tsl.state.tx.us/ref/abouttx/popcity12000.html
Population 358 (1990), 390 (1980), 344 (1970), 310 (1960), 311 (1950), 306 (1940) (data not published yet, received per phone from Texas State Data Center)

(3) Average number of people per household in Taylor County in the year 2000: 2.68.
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(4) Yearly income per household in the year 2000 from Implan Software. This is the personal income as defined by BEA. Besides wages and salaries it also includes proprietor's income, rental income, personal dividend, interest income, transfer payments to persons less personal contributions for social security. Average yearly increase in personal income in Palo Pinto County for the period 1980-2000 used to project future income growth.
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) Average forecasted annual population growth rate for Taylor County for the Period 2000 to 2060: 0.16%.
Source: Texas Water Development Board
http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/CountyProjections.htm

(6) RS&Y made the assumtion that there will be no population growth, if the project is not realized.

(7) Income spent on foreign and domestic trade, State and Local Government (non-education), Federal Government (non defense) and Capital does not contribute to increase local industry output. Numbers obtained from IMPLAN Software.

(8) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly effected industries. Induced effects reflect changes in spending from households as income increases or decreases due to the changes in production. The multipliers used are the Type SAM multipliers (refer to methodology).
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(9) The Cost Benefit Analysis sums up annual discounted differences between project costs and benefits. Only selected years are shown but all years are included in the calculation.

Westbound WSC to Rising Star **Table 4a**

Project Data													
Acre-feet / year			150										
Total Capital Project Cost 2003:			$ 1,306,999										
escalated to the year 2009	(1)	1.90%	$ 1,463,256										
Annual Costs (without escalation):													
Debt Service			$ 95,000										
Water Purchase			$ 73,300										
Other			$ 25,198										
			$ 193,498										
$ per acre-foot			$ 1,290										
$ per 1,000 gallons			$ 3.96										
			2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**				
City of Rising Star													
Water demand		acre-feet/year	118	118	119	116	113	109	105				
Water supply		acre-feet/year	100	-	-	-	-	-	-				
Supply-Demand		acre-feet/year		(118)	(119)	(116)	(113)	(109)	(105)				
Strategy													
Upgrade WSC system		acre-feet/year		150	150	150	150	150	150				
Remaining surplus		acre-feet/year		32	31	34	37	41	45				

Project Cost			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Debt Service				$ 106,304	$ 106,304	$ 106,304			
		Escalation/yr:							
Water purchase cost	(1)	1.90%		$ 83,623	$ 100,940	$ 121,845	$ 147,078	$ 177,538	$ 214,305
Other cost	(1)	1.90%		$ 28,747	$ 34,700	$ 41,886	$ 50,560	$ 61,031	$ 73,671
Total project cost				**$ 218,673**	**$ 241,944**	**$ 270,035**	**$ 197,639**	**$ 238,569**	**$ 287,976**

Westbound WSC to Rising Star									Table 4a
Economic Impact of not realizing the project			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Rising Star									
Population	(2)		835	837	839	824	802	775	740
Persons per household	(3)		2.50						
Income per Household (escalated yearly)	(4)	**5.1%**	**$ 52,210**	**$ 85,858**	**$ 141,191**	**$ 232,186**	**$ 381,823**	**$ 627,899**	**$ 1,032,563**
Yearly change in number of households:									
With new water supply	(5)		334	335	336	330	321	310	296
Without new water supply	(6)	-0.28%	334	325	316	307	299	290	282
Unrealized growth (No. of households)				**10**	**20**	**23**	**22**	**20**	**14**
Total household income lost				$ 858,580	$ 2,823,826	$ 5,340,267	$ 8,400,111	$ 12,557,971	$ 14,455,885
Disposable income (% of household income)	(1)	89.00%		$ 764,136	$ 2,513,206	$ 4,752,838	$ 7,476,099	$ 11,176,595	$ 12,865,738
Disposable income not spent locally	(7)	60.30%		$ (460,774)	$(1,515,463)	$(2,865,961)	$(4,508,087)	$ (6,739,487)	$ (7,758,040)
From IMPLAN Software:		Multilplier							
Indirect effects	(8)	0.07		$ 52,267	$ 171,903	$ 325,094	$ 511,365	$ 764,479	$ 880,016
Induced effects	(8)	0.05		$ 37,978	$ 124,906	$ 236,216	$ 371,562	$ 555,477	$ 639,427
Total disposable household income lost for the County (including multiplier effects)				**$ 393,607**	**$ 1,294,552**	**$ 2,448,187**	**$ 3,850,938**	**$ 5,757,064**	**$ 6,627,142**

			2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Benefit/Cost Ratio				**1.80**	**5.35**	**9.07**	**19.48**	**24.13**	**23.01**
Project Benefits				$ 393,607	$ 1,294,552	$ 2,448,187	$ 3,850,938	$ 5,757,064	$ 6,627,142
Project Costs				$ 218,673	$ 241,944	$ 270,035	$ 197,639	$ 238,569	$ 287,976
Project Cash Flows				$ 174,934	$ 1,052,608	$ 2,178,152	$ 3,653,300	$ 5,518,495	$ 6,339,166
Cost Benefit Analysis	(1)	5.350%							
Project Benefits (discounted)		$ 31,806,159		$ 372,549	$ 707,044	$ 771,574	$ 700,335	$ 604,152	$ 401,308
Project Costs (discounted)		$ 4,040,362		$ 206,974	$ 132,142	$ 85,105	$ 35,943	$ 25,036	$ 17,438
Total Discounted Project Cashflows	(9)	$ 27,765,797		$ 165,575	$ 574,902	$ 686,469	$ 664,392	$ 579,117	$ 383,870
Discounted Benefits / Discounted Costs		**7.87**							

Westbound WSC to Rising Star **Table 4a**

(1) See Input Page

(2) Forecasted population for the City of Rising Star for the Period 2000 to 2060.
Source: Texas Water Development Board
http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/CountyProjections.htm

(3) Average number of people per household in Eastland County in the year 2000: 2.5.
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(4) Yearly income per household in the year 2000 from Implan Software. This is the personal income as defined by BEA. Besides wages and salaries it also includes proprietor's income, rental income, personal dividend, interest income, transfer payments to persons less personal contributions for social security. Average yearly increase in personal income in Palo Pinto County for the period 1980-2000 used to project future income growth.
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) Growth assumed to be the same as population growth in (2).

(6) RS&Y made the assumtion that the historic population decline for the City of Rising Star of -0.28% annually will continue, if the project is not realized.
Source Texas State Data Center, average annual population growth 1990-2000
http://txsdc.tamu.edu/data/census/2000/redistrict/pl94-171/desctab/re_tab49.txt

(7) Income spent on foreign and domestic trade, State and Local Government (non-education), Federal Government (non defense) and Capital does not contribute to increase local industry output. Numbers obtained from IMPLAN Software.

(8) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly effected industries. Induced effects reflect changes in spending from households as income increases or decreases due to the changes in production. The multipliers used are the Type SAM multipliers (refer to methodology).
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(9) The Cost Benefit Analysis sums up annual discounted differences between project costs and benefits. Only selected years are shown but all years are included in the calculation.

Westbound WSC to Rising Star **Table 4b**

Project Data				
Acre-feet / year				150
Total Capital Project Cost 2003:			$	734,718
escalated to the year 2009	(1)	1.90%	$	822,557
Annual Costs (without escalation):				
Debt Service			$	53,400
Water Purchase			$	24,400
Other			$	12,280
			$	90,080
$ per acre-foot			$	601
$ per 1,000 gallons			$	1.84

		2000	2010	2020	2030	2040	2050	2060
City of Rising Star								
Water demand	acre-feet/year	118	118	119	116	113	109	105
Water supply	acre-feet/year	100	-	-	-	-	-	-
Supply-Demand	acre-feet/year		(118)	(119)	(116)	(113)	(109)	(105)
Strategy								
Nitrate Treatment with backup to Westbound WSC	acre-feet/year		150	150	150	150	150	150
Remaining surplus	acre-feet/year		32	31	34	37	41	45

Project Cost			2000	2010	2020	2030	2040	2050	2060
Debt Service				$ 59,758	$ 59,758	$ 59,758			
		Escalation/yr:							
Water purchase cost	(1)	1.90%		$ 27,836	$ 33,601	$ 40,560	$ 48,959	$ 59,099	$ 71,338
Other cost	(1)	1.90%		$ 14,009	$ 16,911	$ 20,413	$ 24,640	$ 29,743	$ 35,903
Total project cost				**$ 101,603**	**$ 110,269**	**$ 120,730**	**$ 73,599**	**$ 88,842**	**$ 107,240**

Westbound WSC to Rising Star											Table 4b
Economic Impact of not realizing the project			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Rising Star									
Population	(2)		835	837	839	824	802	775	740
Persons per household	(3)		2.50						
Income per Household (escalated yearly)	(4)	**5.1%**	**$ 52,210**	**$ 85,858**	**$ 141,191**	**$ 232,186**	**$ 381,823**	**$ 627,899**	**$ 1,032,563**
Yearly change in number of households:									
With new water supply	(5)		334	335	336	330	321	310	296
Without new water supply	(6)	-0.28%	334	325	316	307	299	290	282
Unrealized growth (No. of households)				**10**	**20**	**23**	**22**	**20**	**14**
Total household income lost				$ 858,580	$ 2,823,826	$ 5,340,267	$ 8,400,111	$ 12,557,971	$ 14,455,885
Disposable income (% of household income)	(1)	89.00%		$ 764,136	$ 2,513,206	$ 4,752,838	$ 7,476,099	$ 11,176,595	$ 12,865,738
Disposable income not spent locally	(7)	60.30%		$ (460,774)	$ (1,515,463)	$ (2,865,961)	$ (4,508,087)	$ (6,739,487)	$ (7,758,040)
From IMPLAN Software:		Multilplier							
Indirect effects	(8)	0.07		$ 52,267	$ 171,903	$ 325,094	$ 511,365	$ 764,479	$ 880,016
Induced effects	(8)	0.05		$ 37,978	$ 124,906	$ 236,216	$ 371,562	$ 555,477	$ 639,427
Total disposable household income lost for the County (including multiplier effects)				**$ 393,607**	**$ 1,294,552**	**$ 2,448,187**	**$ 3,850,938**	**$ 5,757,064**	**$ 6,627,142**

			2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Benefit/Cost Ratio				**3.87**	**11.74**	**20.28**	**52.32**	**64.80**	**61.80**
Project Benefits				$ 393,607	$ 1,294,552	$ 2,448,187	$ 3,850,938	$ 5,757,064	$ 6,627,142
Project Costs				$ 101,603	$ 110,269	$ 120,730	$ 73,599	$ 88,842	$ 107,240
Project Cash Flows				$ 292,003	$ 1,184,283	$ 2,327,457	$ 3,777,339	$ 5,668,222	$ 6,519,901
Cost Benefit Analysis	(1)	5.350%							
Project Benefits (discounted)		$ 31,806,159		$ 372,549	$ 707,044	$ 771,574	$ 700,335	$ 604,152	$ 401,308
Project Costs (discounted)		$ 1,792,894		$ 96,168	$ 60,226	$ 38,049	$ 13,385	$ 9,323	$ 6,494
Total Discounted Project Cashflows	(9)	$ 30,013,266		$ 276,381	$ 646,818	$ 733,524	$ 686,950	$ 594,829	$ 394,814
Discounted Benefits / Discounted Costs		**17.74**							

Westbound WSC to Rising Star **Table 4b**

(1) See Input Page

(2) Forecasted population for the City of Rising Star for the Period 2000 to 2060.
Source: Texas Water Development Board
http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/CountyProjections.htm

(3) Average number of people per household in Eastland County in the year 2000: 2.5.
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(4) Yearly income per household in the year 2000 from Implan Software. This is the personal income as defined by BEA. Besides wages and salaries it also includes proprietor's income, rental income, personal dividend, interest income, transfer payments to persons less personal contributions for social security. Average yearly increase in personal income in Palo Pinto County for the period 1980-2000 used to project future income growth.
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) Growth assumed to be the same as population growth in (2).

(6) RS&Y made the assumtion that the historic population decline for the City of Rising Star of -0.28% annually will continue, if the project is not realized.
Source Texas State Data Center, average annual population growth 1990-2000
http://txsdc.tamu.edu/data/census/2000/redistrict/pl94-171/desctab/re_tab49.txt

(7) Income spent on foreign and domestic trade, State and Local Government (non-education), Federal Government (non defense) and Capital does not contribute to increase local industry output. Numbers obtained from IMPLAN Software.

(8) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly effected industries. Induced effects reflect changes in spending from households as income increases or decreases due to the changes in production. The multipliers used are the Type SAM multipliers (refer to methodology).
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(9) The Cost Benefit Analysis sums up annual discounted differences between project costs and benefits. Only selected years are shown but all years are included in the calculation.

Midway Group Interconnections / Regional WTP **Table 5**

Project Data			
Acre-feet / year			1,400
Total Capital Project Cost 2003:			$16,892,976
escalated to the year 2009	(1)	1.90%	$18,912,601
Annual Costs (without escalation):			
Debt Service			$ 1,227,260
Water Purchase			$ 79,500
Other			$ 553,950
			$ 1,860,710
$ per acre-foot			$ 1,329
$ per 1,000 gallons			$ 4.08

			2000	2010	2020	2030	2040	2050	2060
Shackelford									
Water demand	(a)	acre-feet/year	223	310	341	370	401	430	452
Water supply		acre-feet/year	230	230	230	230	230	230	230
Supply-Demand		acre-feet/year		(80)	(111)	(140)	(171)	(200)	(222)
Stephens County RWSC									
Water demand	(a)	acre-feet/year	299	417	517	585	655	735	808
Water supply		acre-feet/year	442	442	442	442	442	442	442
Supply-Demand		acre-feet/year		25	(75)	(143)	(213)	(293)	(366)
Throckmorton									
Water demand	(a)	acre-feet/year	236	278	288	298	310	322	338
Water supply		acre-feet/year	100	-	-	-	-	-	-
Supply-Demand		acre-feet/year		(278)	(288)	(298)	(310)	(322)	(338)
Breckenridge									
Water demand	(a)	acre-feet/year	1,655	1,862	1,989	2,098	2,163	2,241	2,333
Water supply		acre-feet/year	2,853	2,797	2,740	2,683	2,626	2,570	2,512
Supply-Demand		acre-feet/year		935	751	585	463	329	179
Total deficit	(b)	acre-feet/year	-	(358)	(474)	(581)	(694)	(815)	(926)
Strategy									
WTP with supply from Possum Kingdom Lake		acre-feet/year		1,400	1,400	1,400	1,400	1,400	1,400
Remaining surplus from new WTP		acre-feet/year		1,042	926	819	706	585	474

Project Cost			2000	2010	2020	2030	2040	2050	2060
Debt Service				$ 1,373,980	$ 1,373,980	$ 1,373,980			
		Escalation/yr:							
Water purchase cost	(1)	1.90%		$ 90,696	$ 109,478	$ 132,151	$ 159,519	$ 192,555	$ 232,432
Other cost	(1)	1.90%		$ 631,960	$ 762,837	$ 920,817	$ 1,111,515	$ 1,341,706	$ 1,619,568
Total project cost				**$ 2,096,636**	**$ 2,246,295**	**$ 2,426,948**	**$ 1,271,034**	**$ 1,534,260**	**$ 1,851,999**

Midway Group Interconnections / Regional WTP									Table 5
Economic Impact of not realizing the project			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Throckmorton, Shackelford and Stephens County									
Population	(2)		12,526	15,005	16,613	17,934	19,100	20,356	21,706
Persons per household	(3)		2.59						
Income per Household (escalated yearly)	(4)	**4.8%**	**$ 56,776**	**$ 90,736**	**$ 145,007**	**$ 231,741**	**$ 370,353**	**$ 591,874**	**$ 945,892**
Yearly change in number of households:									
With new water supply	(5)		4,836	5,793	6,414	6,924	7,375	7,859	8,381
Without new water supply	(6)	0.00%	4,836	4,836	4,836	4,836	4,836	4,836	4,836
Unrealized growth (No. of households)				**957**	**1578**	**2088**	**2538**	**3023**	**3544**
Total household income lost				$ 86,833,950	$ 228,821,824	$ 483,875,648	$ 939,956,414	$ 1,789,233,710	$ 3,352,242,782
Disposable income (% of household income)	(1)	89.00%		$ 77,282,215	$ 203,651,424	$ 430,649,327	$ 836,561,209	$ 1,592,418,002	$ 2,983,496,076
Disposable income not spent locally	(7)	63.50%		$ (49,077,298)	$ (129,326,800)	$ (273,479,548)	$ (531,249,830)	$ (1,011,249,128)	$ (1,894,639,348)
From IMPLAN Software:		Multilplier							
Indirect effects	(8)	0.06		$ 4,753,629	$ 12,526,599	$ 26,489,240	$ 51,456,880	$ 97,949,631	$ 183,514,844
Induced effects	(8)	0.04		$ 3,318,498	$ 8,744,792	$ 18,492,082	$ 35,921,938	$ 68,378,429	$ 128,111,321
Total disposable household income lost for the County (including multiplier effects)				**$ 36,277,045**	**$ 95,596,015**	**$ 202,151,100**	**$ 392,690,197**	**$ 747,496,934**	**$ 1,400,482,893**

			2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Benefit/Cost Ratio				**17.30**	**42.56**	**83.29**	**308.95**	**487.20**	**756.20**
Project Benefits				$ 36,277,045	$ 95,596,015	$ 202,151,100	$ 392,690,197	$ 747,496,934	$ 1,400,482,893
Project Costs				$ 2,096,636	$ 2,246,295	$ 2,426,948	$ 1,271,034	$ 1,534,260	$ 1,851,999
Project Cash Flows				$ 34,180,409	$ 93,349,720	$ 199,724,152	$ 391,419,163	$ 745,962,674	$ 1,398,630,894
Cost Benefit Analysis	(1)	5.350%							
Project Benefits (discounted)		$3,321,739,264		$ 34,336,223	$ 52,211,550	$ 63,710,218	$ 71,414,965	$ 78,443,103	$ 84,806,539
Project Costs (discounted)		$ 35,850,356		$ 1,984,466	$ 1,226,856	$ 764,880	$ 231,151	$ 161,007	$ 112,148
Total Discounted Project Cashflows	(9)	$3,285,888,907		$ 32,351,757	$ 50,984,694	$ 62,945,338	$ 71,183,814	$ 78,282,096	$ 84,694,391
Discounted Benefits / Discounted Costs		**92.66**							

Midway Group Interconnections / Regional WTP **Table 5**

(a) Demand and supply data retrieved from Freese and Nichols (Excel-file cost_shortages.xls, received 8/28/2003) .

(b) Only shortages are added up. It is assumed that shortages cannot be made up by surplusses from other locations.

(1) See Input Page

(2) Combined Population of Stephens Co RWSC, Shackelford WSC, City of Breckenridge, City of Throckmorton: 12,526 (inside and outside city).
Source: "Most likely scenario" from Freese and Nichols projection (Excel-file Proj_Demand.xls, received 8/28/2003)

(3) Average number of people per household in Shackelford, Stephens and Throckmorton County area in the year 2000: 2.59.
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(4) Yearly income per household in the year 2000 from Implan Software. This is the personal income as defined by BEA. Besides wages and salaries it also includes proprietor's income, rental income, personal dividend, interest income, transfer payments to persons less personal contributions for social security. Average yearly increase in personal income in Palo Pinto County for the period 1980-2000 used to project future income growth.
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) Number of households for the years 2000, 2010, 2020, 2030, 2040, 2050, and 2060 calculated using the assumption under Note (3). Other years calculated using linear extrapolation. Average annual growth shown.

(6) RS&Y made the assumtion that there will be no population growth, if the project is not realized.

(7) Income spent on foreign and domestic trade, State and Local Government (non-education), Federal Government (non defense) and Capital does not contribute to increase local industry output. Numbers obtained from IMPLAN Software.

(8) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly effected industries. Induced effects reflect changes in spending from households as income increases or decreases due to the changes in production. The multipliers used are the Type SAM multipliers (refer to methodology).
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(9) The Cost Benefit Analysis sums up annual discounted differences between project costs and benefits. Only selected years are shown but all years are included in the calculation.

Midway Group Interconnections / Regional WTP — 2000 population as per F&N, growth rate from TSDC. This worksheet used for comparison of TSDC growth rate to F&N growth rate — **Table 5**

Project Data				
Acre-feet / year				1,400
Total Capital Project Cost 2003:			$	16,892,976
escalated to the year 2009	(1)	1.90%	$	18,912,601
Annual Costs (without escalation):				
Debt Service			$	1,227,260
Water Purchase			$	79,500
Other			$	553,950
			$	1,860,710
$ per acre-foot			$	1,329
$ per 1,000 gallons			$	4.08

			2000	2010	2020	2030	2040	2050	2060
Shackelford									
Water demand	(a)	acre-feet/year	223	310	341	370	401	430	452
Water supply		acre-feet/year	230	230	230	230	230	230	230
Supply-Demand		acre-feet/year		(80)	(111)	(140)	(171)	(200)	(222)
Stephens County RWSC									
Water demand	(a)	acre-feet/year	299	417	517	585	655	735	808
Water supply		acre-feet/year	442	442	442	442	442	442	442
Supply-Demand		acre-feet/year		25	(75)	(143)	(213)	(293)	(366)
Throckmorton									
Water demand	(a)	acre-feet/year	236	278	288	298	310	322	338
Water supply		acre-feet/year	100	-	-	-	-	-	-
Supply-Demand		acre-feet/year		(278)	(288)	(298)	(310)	(322)	(338)
Breckenridge									
Water demand	(a)	acre-feet/year	1,655	1,862	1,989	2,098	2,163	2,241	2,333
Water supply		acre-feet/year	2,853	2,797	2,740	2,683	2,626	2,570	2,512
Supply-Demand		acre-feet/year		935	751	585	463	329	179
Total deficit	(b)	acre-feet/year	-	(358)	(474)	(581)	(694)	(815)	(926)
Strategy									
WTP with supply from Possum Kingdom Lake		acre-feet/year		1,400	1,400	1,400	1,400	1,400	1,400
Remaining surplus from new WTP		acre-feet/year		1,042	926	819	706	585	474

Project Cost			2000	2010	2020	2030	2040	2050	2060
Debt Service				$ 1,373,980	$ 1,373,980	$ 1,373,980			
		Escalation/yr:							
Water purchase cost	(1)	1.90%		$ 90,696	$ 109,478	$ 132,151	$ 159,519	$ 192,555	$ 232,432
Other cost	(1)	1.90%		$ 631,960	$ 762,837	$ 920,817	$ 1,111,515	$ 1,341,706	$ 1,619,568
Total project cost				**$ 2,096,636**	**$ 2,246,295**	**$ 2,426,948**	**$ 1,271,034**	**$ 1,534,260**	**$ 1,851,999**

Economic Impact of not realizing the project			2000	2010	2020	2030	2040	2050	2060
Throckmorton, Shackelford and Stephens County									
Population	(2)		12,526	12,587	12,649	12,710	12,773	12,835	12,900
Persons per household	(3)		2.59						
Income per Household (escalated yearly)	(4)	**4.8%**	**$ 56,776**	**$ 90,736**	**$ 145,007**	**$ 231,741**	**$ 370,353**	**$ 591,874**	**$ 945,892**
Yearly change in number of households:									
With new water supply	(5)	0.0490%	4,836	4,860	4,884	4,907	4,932	4,956	4,981
Without new water supply	(6)	0.00%	4,836	4,836	4,836	4,836	4,836	4,836	4,836
Unrealized growth (No. of households)				**24**	**47**	**71**	**95**	**119**	**144**
Total household income lost				$ 2,177,654	$ 6,815,352	$ 16,453,626	$ 35,183,554	$ 70,432,951	$ 136,208,510
Disposable income (% of household income)	(1)	89.00%		$ 1,938,112	$ 6,065,663	$ 14,643,727	$ 31,313,363	$ 62,685,327	$ 121,225,574
Disposable income not spent locally	(7)	63.50%		$ (1,230,779)	$ (3,851,939)	$ (9,299,352)	$ (19,885,238)	$ (39,807,690)	$ (76,983,089)
From IMPLAN Software:		Multilplier							
Indirect effects	(8)	0.06		$ 119,213	$ 373,099	$ 900,736	$ 1,926,085	$ 3,855,774	$ 7,456,585
Induced effects	(8)	0.04		$ 83,223	$ 260,460	$ 628,802	$ 1,344,596	$ 2,691,708	$ 5,205,426
Total disposable household income lost for the County (including multiplier effects)				**$ 909,769**	**$ 2,847,283**	**$ 6,873,912**	**$ 14,698,806**	**$ 29,425,119**	**$ 56,904,497**

			2000	2010	2020	2030	2040	2050	2060
Benefit/Cost Ratio				**0.43**	**1.27**	**2.83**	**11.56**	**19.18**	**30.73**
Project Benefits				$ 909,769	$ 2,847,283	$ 6,873,912	$ 14,698,806	$ 29,425,119	$ 56,904,497
Project Costs				$ 2,096,636	$ 2,246,295	$ 2,426,948	$ 1,271,034	$ 1,534,260	$ 1,851,999
Project Cash Flows				$ (1,186,867)	$ 600,988	$ 4,446,964	$ 13,427,772	$ 27,890,859	$ 55,052,497
Cost Benefit Analysis	(1)	5.350%							
Project Benefits (discounted)		$ 119,261,449		$ 861,096	$ 1,555,097	$ 2,166,392	$ 2,673,137	$ 3,087,903	$ 3,445,864
Project Costs (discounted)		$ 35,850,356		$ 1,984,466	$ 1,226,856	$ 764,880	$ 231,151	$ 161,007	$ 112,148
Total Discounted Project Cashflows	(9)	$ 83,411,092		$ (1,123,369)	$ 328,241	$ 1,401,511	$ 2,441,986	$ 2,926,896	$ 3,333,716
Discounted Benefits / Discounted Costs		**3.33**							

(a) Demand and supply data retrieved from Freese and Nichols (Excel-file cost_shortages.xls, received 8/28/2003).

(b) Only shortages are added up. It is assumed that shortages cannot be made up by surplusses from other locations.

(1) See Input Page

(2) Combined Population of Stephens Co RWSC, Shackelford WSC, City of Breckenridge, City of Throckmorton: 12,526 (inside and outside city).
Source: "Most likely scenario" from Freese and Nichols projection (Excel-file Proj_Demand.xls, received 8/28/2003)

(3) Average number of people per household in Shackelford, Stephens and Throckmorton County area in the year 2000: 2.59.
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(4) Yearly income per household in the year 2000 from Implan Software. This is the personal income as defined by BEA. Besides wages and salaries it also includes proprietor's income, rental income, personal dividend, interest income, transfer payments to persons less personal contributions for social security. Average yearly increase in personal income in Palo Pinto County for the period 1980-2000 used to project future income growth.
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) Average forecasted population growth rate forShackelford, Stephens and Throckmorton Counties County area for the Period 2000 to 2040: 0.049%.
Source: Texas State Data Center, Scenario 0.5
http://txsdc.tamu.edu/cgi-bin/prj2001totnum.cgi

(6) RS&Y made the assumtion that there will be no population growth, if the project is not realized.

(7) Income spent on foreign and domestic trade, State and Local Government (non-education), Federal Government (non defense) and Capital does not contribute to increase local industry output. Numbers obtained from IMPLAN Software.

(8) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly effected industries. Induced effects reflect changes in spending from households as income increases or decreases due to the changes in production. The multipliers used are the Type SAM multipliers (refer to methodology).
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(9) The Cost Benefit Analysis sums up annual discounted differences between project costs and benefits. Only selected years are shown but all years are included in the calculation.

New Groundwater Development for the City of Sweetwater

Table 6

Project Data														
Acre-feet / year				5,100										
Total Capital Project Cost 2003:			$	16,972,419										
escalated to the year 2009	(1)	1.90%	$	19,001,542										
Annual Costs (without escalation):														
Debt Service			$	1,233,000										
Water Purchase			$	141,260										
Other			$	1,317,240										
			$	2,691,500										
$ per acre-foot			$	528										
$ per 1,000 gallons			$	1.62										
			2000		**2010**		**2020**		**2030**		**2040**		**2050**	**2060**
City of Sweetwater														
Water demand (w/o steam electric demand)		acre-feet/year	4,847		5,162		5,450		5,640		5,748		5,700	5,613
Water supply		acre-feet/year	4,324		3,909		3,494		3,079		2,664		2,249	1,832
Supply-Demand		acre-feet/year			(1,253)		(1,956)		(2,561)		(3,084)		(3,451)	(3,781)
Strategy														
New Groundwater Supply		acre-feet/year			5,100		5,100		5,100		5,100		5,100	5,100
Remaining surplus		acre-feet/year			3,847		3,144		2,539		2,016		1,649	1,319

Project Cost			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Debt Service				$ 1,380,441	$ 1,380,441	$ 1,380,441			
		Escalation/yr:							
Water purchase cost	(1)	1.90%		$ 161,153	$ 194,527	$ 234,813	$ 283,442	$ 342,142	$ 412,998
Other cost	(1)	1.90%		$ 1,502,741	$ 1,813,953	$ 2,189,616	$ 2,643,076	$ 3,190,447	$ 3,851,176
Total project cost				**$ 3,044,336**	**$ 3,388,922**	**$ 3,804,870**	**$ 2,926,518**	**$ 3,532,589**	**$ 4,264,174**

New Groundwater Development for the City of Sweetwater **Table 6**

Economic Impact of not realizing the project			2000	2010	2020	2030	2040	2050	2060
City of Sweetwater									
Population	(2)		11,415	11,955	12,408	12,616	12,578	12,098	11,525
Persons per household	(3)		2.56						
Income per Household (escalated yearly)	(4)	**4.1%**	**$ 52,176**	**$ 77,979**	**$ 116,543**	**$ 174,178**	**$ 260,315**	**$ 389,052**	**$ 581,453**
Yearly change in number of households:									
With new water supply	(5)		4,459	4,670	4,847	4,928	4,913	4,726	4,502
Without new water supply	(6)	-0.48%	4,459	4,250	4,050	3,860	3,678	3,506	3,341
Unrealized growth (No. of households)				**420**	**797**	**1068**	**1235**	**1220**	**1161**
Total household income lost				$ 32,751,211	$ 92,884,595	$ 186,021,833	$ 321,489,593	$ 474,643,008	$ 675,066,834
Disposable income (% of household income)	(1)	89.00%		$ 29,148,578	$ 82,667,290	$ 165,559,431	$ 286,125,738	$ 422,432,277	$ 600,809,483
Disposable income not spent locally	(7)	57.98%		$ (16,900,054)	$ (47,929,668)	$ (95,989,703)	$ (165,892,842)	$ (244,922,010)	$ (348,343,330)
From IMPLAN Software:		Multilplier							
Indirect effects	(8)	0.07		$ 2,057,890	$ 5,836,311	$ 11,688,496	$ 20,200,477	$ 29,823,719	$ 42,417,149
Induced effects	(8)	0.06		$ 1,854,724	$ 5,260,120	$ 10,534,547	$ 18,206,181	$ 26,879,366	$ 38,229,507
Total disposable household income lost for the County (including multiplier effects)				**$ 16,161,138**	**$ 45,834,052**	**$ 91,792,771**	**$ 158,639,554**	**$ 234,213,352**	**$ 333,112,809**

			2000	2010	2020	2030	2040	2050	2060
Benefit/Cost Ratio				**5.31**	**13.52**	**24.13**	**54.21**	**66.30**	**78.12**
Project Benefits				$ 16,161,138	$ 45,834,052	$ 91,792,771	$ 158,639,554	$ 234,213,352	$ 333,112,809
Project Costs				$ 3,044,336	$ 3,388,922	$ 3,804,870	$ 2,926,518	$ 3,532,589	$ 4,264,174
Project Cash Flows				$ 13,116,802	$ 42,445,131	$ 87,987,901	$ 155,713,036	$ 230,680,763	$ 328,848,635
Cost Benefit Analysis	(1)	5.350%							
Project Benefits (discounted)		$ 1,273,615,389		$ 15,296,517	$ 25,033,124	$ 28,929,536	$ 28,850,321	$ 24,578,592	$ 20,171,717
Project Costs (discounted)		$ 57,059,654		$ 2,881,464	$ 1,850,923	$ 1,199,148	$ 532,219	$ 370,714	$ 258,218
Total Discounted Project Cashflows	(9)	$ 1,216,555,735		$ 12,415,053	$ 23,182,201	$ 27,730,388	$ 28,318,102	$ 24,207,878	$ 19,913,499
Discounted Benefits / Discounted Costs		**22.32**							

New Groundwater Development for the City of Sweetwater

Table 6

(1) See Input Page

(2) Forecasted population for the City of Sweetwater for the Period 2000 to 2060.
Source: Texas Water Development Board
http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/CountyProjections.htm

(3) Average number of people per household in Nolan County in the year 2000: 2.56.
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(4) Yearly income per household in the year 2000 from Implan Software. This is the personal income as defined by BEA. Besides wages and salaries it also includes proprietor's income, rental income, personal dividend, interest income, transfer payments to persons less personal contributions for social security. Average yearly increase in personal income in Palo Pinto County for the period 1980-2000 used to project future income growth.
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) Growth assumed to be the same as population growth in (2).

(6) RS&Y made the assumtion that the historic population decline for the City of Sweetwater of -0.48% annually will continue, if the project is not realized.
Source Texas State Data Center, average annual population growth 1990-2000
http://txsdc.tamu.edu/data/census/2000/redistrict/pl94-171/desctab/re_tab49.txt

(7) Income spent on foreign and domestic trade, State and Local Government (non-education), Federal Government (non defense) and Capital does not contribute to increase local industry output. Numbers obtained from IMPLAN Software.

(8) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly effected industries. Induced effects reflect changes in spending from households as income increases or decreases due to the changes in production. The multipliers used are the Type SAM multipliers (refer to methodology).
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(9) The Cost Benefit Analysis sums up annual discounted differences between project costs and benefits. Only selected years are shown but all years are included in the calculation.

WCTMWD - Contract Agreement with BRA

Table 7

Project Data			
Acre-feet / year			19,000
Total Capital Project Cost 2003:			
escalated to the year 2009	1.90%	$	-
Annual Costs (without escalation):			
Debt Service			
Water Purchase			
Other		$	50,000,000
		$	50,000,000
$ per acre-foot		$	2,632
$ per 1,000 gallons		$	8.08

		2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
WCTMWD								
Water demand (w/o steam electric demand)	acre-feet/year	20,608	20,942	21,218	21,410	21,526	21,613	21,686
Water supply	acre-feet/year	22,014	21,839	21,664	21,489	21,314	21,139	20,962
Supply-Demand	acre-feet/year		897	446	79	(212)	(474)	(724)
Strategy								
Contract Agreement with BRA	acre-feet/year		19,000	19,000	19,000	19,000	19,000	19,000
Remaining surplus	acre-feet/year		19,897	19,446	19,079	18,788	18,526	18,276

Project Cost			**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Debt Service				$ -	$ -	$ -			
		Escalation/yr:							
Water purchase cost	(1)	1.90%		$ -	$ -	$ -	$ -	$ -	$ -
Other cost	(1)	1.90%		$ 57,041,284	$ 68,854,310	$ 83,113,768	$ 100,326,304	$ 121,103,488	$ 146,183,546
Total project cost				**$ 57,041,284**	**$ 68,854,310**	**$ 83,113,768**	**$ 100,326,304**	**$ 121,103,488**	**$ 146,183,546**

WCTMWD - Contract Agreement with BRA **Table 7**

Economic Impact of not realizing the project			2000	2010	2020	2030	2040	2050	2060
WCTMWD									
Population	(2)		160,312	170,910	178,042	181,034	181,306	177,131	171,079
Persons per household	(3)		2.74						
Income per Household (escalated yearly)	(4)	**4.7%**	**$ 63,351**	**$ 100,281**	**$ 158,740**	**$ 251,278**	**$ 397,760**	**$ 629,633**	**$ 996,677**
Yearly change in number of households:		after 2040							
With new water supply	(5)	0.00%	58,508	62,376	64,979	66,071	66,170	66,170	66,170
Without new water supply	(6)		58,508	62,376	64,979	66,071	66,170	64,646	62,438
Unrealized growth (No. of households)				**0**	**0**	**0**	**0**	**1524**	**3732**
Total household income lost				$ -	$ -	$ -	$ -	$ 959,560,861	$ 3,719,598,042
Disposable income (% of household income)	(1)	89.00%		$ -	$ -	$ -	$ -	$ 854,009,167	$ 3,310,442,258
Disposable income not spent locally	(7)	43.71%		$ -	$ -	$ -	$ -	$ (373,295,947)	$ (1,447,027,415)
From IMPLAN Software:		Multilplier							
Indirect effects	(8)	0.13		$ -	$ -	$ -	$ -	$ 114,095,625	$ 442,275,086
Induced effects	(8)	0.14		$ -	$ -	$ -	$ -	$ 121,243,681	$ 469,983,487
Total disposable household income lost for the County (including multiplier effects)				**$ -**	**$ -**	**$ -**	**$ -**	**$ 716,052,526**	**$ 2,775,673,415**

			2000	2010	2020	2030	2040	2050	2060
Project Benefits				$ -	$ -	$ -	$ -	$ 716,052,526	$ 2,775,673,415
Cost Benefit Analysis	(1)	5.350%							
Project Benefits (discounted)		$ 1,702,023,229		$ -	$ -	$ -	$ -	$ 75,143,294	$ 168,081,494

WCTMWD - Contract Agreement with BRA **Table 7**

(1) See Input Page

(2) Forecasted growth for Jones, Taylor, Shackelford and Stephens Counties for the Period 2000 to 2060.
Source: Texas Water Development Board
http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/CountyProjections.htm

(3) Average number of people per household in Taylor, Jones, Shackelford and Stephens Counties in the year 2000: 2.74.

Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower
Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(4) Yearly income per household in the year 2000 from Implan Software. This is the personal income as defined by BEA. Besides wages and salaries it also includes proprietor's income, rental income, personal dividend, interest income, transfer payments to persons less personal contributions for social security. Average yearly increase in personal income in Palo Pinto County for the period 1980-2000 used to project future income growth.
Source: US Department of Commerce, Bureau for Economic Analysis
http://www.bea.doc.gov/bea/regional/spi/

(5) TWDB forecasts a decrease in population for the years 2040 and thereafter. For this scenario, it is assumed that if the contract is entered into, the population would not decline after 2040 but n stable.

(6) Growth assumed to be the same as population growth in (2).

(7) Income spent on foreign and domestic trade, State and Local Government (non-education), Federal Government (non defense) and Capital does not contribute to increase local industry output. Numbers obtained from IMPLAN Software.

(8) Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly effected industries. Induced effects reflect changes in spending from households as income increases decreases due to the changes in production. The multipliers used are the Type SAM multipliers (refer to methodology).
Source: Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower
Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

(9) Only project benefits have been calculated. Only selected years are shown but all years are included in the calculation.