APPENDIX D
COST ESTIMATES

Region F Cost Estimates

As part of the 2016 Region F Water Plan, cost estimates were developed for each of the recommended water management strategies in Region F. As appropriate, these cost estimates have been updated for the 2021 regional water plan. In accordance with the Texas Water Development Board guidance the costs for water management strategies are to be updated from September 2013 dollars to September 2018 dollars. The methodology used to develop the 2021 s is described in the following sections. Where updated unit costs were not available, the Engineering News Record (ENR) Index for construction was used to increase the costs from September 2013 dollars to September 2018 dollars. An increase of 16.9% from September 2013 to September 2018 was determined using the ENR Index method.

D.1 Introduction

1. The evaluation of water management strategies requires developing cost estimates. Guidance for cost estimates may be found in the TWDB's "Second Amended General Guidelines for Fifth Cycle of Regional Water Plan Development (Exhibit C)", Section 5.5. Costs are to be reported in September 2018 dollars.
2. Standard unit costs for installed pipe, pump stations, standard treatment facilities, and well fields were developed and/or updated using the costing tool provided by the TWDB. The unit costs do not include engineering, contingency, financial and legal services, costs for land and rights-of-way, permits, environmental and archeological studies, or mitigation. The costs for these items are determined separately in the cost tables.
3. The information presented in this section is intended to be 'rule-of-thumb' guidance. Specific situations may call for alteration of the procedures and costs. Note that the costs in this memorandum provide a planning level estimate for comparison purposes.
4. It is important that when comparing alternatives that the cost estimates be similar and include similar items. If an existing reliable cost estimate is available for a project it should be used where appropriate. All cost estimates must meet the requirements set forth in the TWDB's "Second Amended General Guidelines for Fifth Cycle of Regional Water Plan Development (Exhibit C)".
5. The cost estimates have two components:
    - Initial Capital Costs: Including total construction cost of facilities, engineering and legal contingencies, environmental and archaeology studies and mitigation, land acquisition and surveying, and interest incurred during construction (3% annual interest rate less a 0.5% rate of return on investment of unspent funds).
    - Average Annual Costs: Including annual operation and maintenance costs, pumping energy costs, purchase of water and debt service.

TWDB does not require the consultant to determine life cycle or present value analysis. For most situations annual costs are sufficient for comparison purposes and a life-cycle analysis is not required.

D.2 Assumptions for Capital Costs

The unit cost and factors show in the Tables D-1 through D-7 were developed directly from the TWDB Costing Tool. These costs are the basis of the capital costs developed for this plan. If applicable, other capital costs should include:

- Engineering, contingencies, financial, and legal services
- Permitting and mitigation activities, including, but not limited to archeological/historic resources, environmental and biological analyses, mitigation activities (evaluation, land acquisition, implementation, monitoring), and other activities.
- Land purchase costs not associated with mitigation.
- Easement costs. For pipelines, this includes a permanent easement plus a temporary construction easement as well as rights to enter easements for maintenance
- Purchases of water rights.

Conveyance Systems

Standard pipeline costs used for these cost estimates are shown in Table D-1. Pump station costs are based on required Horsepower capacity of capacity (MGD) and are listed in Table D-2. The power capacity is to be determined from the hydraulic analyses included in the TWDB costing tool (or detailed analysis if available). Pipelines and pump stations are to be sized for peak pumping capacity.

- Pump efficiency is assumed to be 70 percent.
- Peaking factor of 2 times the average demand is to be used for strategies when the water is pumped directly to a water treatment plant. (or historical peaking factor, if available)
- Peaking factor of 1.2 to 1.5 can be used if there are additional water sources and/or the water is transported to a terminal storage facility.
- The target flow velocity in pipes is 5 fps and the Hazen-Williams Factor is assumed to be 120.
- Ground storage is to be provided at each booster pump station along the transmission line unless there is a more detailed design.
- Ground storage tanks should provide sufficient storage for 2.5 to 4 hours of pumping at peak capacity. Costs for ground storage are shown in Table D-3. Covered storage tanks are used for all strategies transporting treated water.

Water Treatment Plants

Water treatment plants are to be sized for peak day capacity (assume peaking factor of 2 if no specific data is available). Costs estimated include six different treatment levels of varying degree. These levels are groundwater chlorine disinfection, iron and manganese removal, simple filtration, construction of a new conventional treatment plant, expansion of a conventional treatment plant, brackish desalination, and seawater desalination. Costs are also based upon a TDS factor that will increase or decrease the cost of treatment accordingly. These costs are summarized in Table D-4. All treatment plants are to be sized for finished water capacity.

Direct Reuse

Direct reuse refers to the introduction of reclaimed water directly from a water reclamation plant to a distribution system. The following assumptions were made for direct potable and non-potable reuse strategies.

Direct Potable Reuse

Direct potable reuse (DRP) is the use of reclaimed water that is transported directly from a wastewater treatment plant to a drinking water system. In the most recent version of the TWDB costing tool, cost estimation tables for advanced water treatment facilities (AWTF) were added for direct potable reuse strategies. These costs were adapted from TWDB DPR Resource Document Table 5-1 and are summarized in Table D-5. There are two AWTF schemes listed for direct potable reuse. The primary difference between the two is the use of RO, which is included in Scheme 1, but not in Scheme 2. In order to utilize Scheme 2, nitrogen must be removed at the WWTP.

Direct Non-Potable Reuse

Non-potable reuse is the use of reclaimed water that is used directly for non-potable beneficial uses such as landscape irrigation. The TWDB costing tool currently does not have a direct non-potable reuse treatment plant improvements option, therefore the following assumptions were made.

- It was assumed that the cost of an iron and manganese removal plant would be an appropriate approximation of the improvements that would be needed at the Wastewater Treatment Plant. This cost was further refined by assuming that only upgrades to an existing facility would be required, and not construction of an entirely new plant.
- Approximately two miles of 6-inch pipeline was also included in the cost estimates for transport of the treated water to the destination. Since reuse is still relatively new, there is a lack of piping infrastructure for reuse water. It was also assumed that the pump station was included in the WWTP improvements.

New Groundwater Wells

Cost estimates required for water management strategies that include additional wells or well fields were determined through the TWDB costing tool (unless a more detailed design was available). The associated costs are shown in Table D-6. The costing tool differentiated the wells based upon purpose. The categories were Public Supply, Irrigation, and Aquifer Storage and Recovery (ASR). These cost relationships are “rule-of-thumb” in nature and are only appropriate in the broad context of the cost evaluations for the RWP process.

The cost relationships assume construction methods required for public water supply wells, including carbon steel surface casing and pipe-based, stainless steel, and wire-wrap screen. The cost estimates assume that wells would be gravel-packed in the screen sections and the surface casing cemented to their total depth. Estimates include the cost of drilling, completion, well development, well testing, pump, motor, motor controls, column pipe, installation and mobilization. The cost relationships do not include engineering, contingency, financial and legal services, land costs, or permits. A more detailed cost analysis should be completed prior to developing a project.

The costs associated with conveyance systems for multi-well systems can vary widely based on the distance between wells, terrain characteristics, well production, and distance to the treatment facility. These costs should be estimated using standard engineering approaches and site-specific information. For planning purposes, these costs were estimated using the TWDB costing tool’s assumptions for conveyance. It is important to note that conveyance costs were not included for point of use water user groups such as mining.

Other Costs

- Engineering, contingency, construction management, financial and legal costs are to be estimated at 30 percent of construction cost for pipelines and 35 percent of construction costs for pump stations, treatment facilities and reservoir projects. (This is in accordance with TWDB guidance.)
- Permitting and mitigation for transmission and treatment projects are to be estimated at $25,000 per mile. For reservoirs, mitigation and permitting costs are assumed equal to the land purchase cost, unless site specific data is available.
- Right-of-way (ROW) costs for transmission lines are estimated through costs provided by the Texas A&M University Real Estate Center (https://www.recenter.tamu.edu/data/rural-land/) which gives current land costs based on county. The ROW width is assumed to be 20 ft. If a small pipeline follows existing right-of-ways (such as highways), no additional right-of-way cost may be assumed. Large pipelines will require ROW costs regardless of routing.

Interest during construction is the total of interest accrued at the end of the construction period using a 3 percent annual interest rate on total borrowed funds, less a 0.5 percent rate of return on investment of unspent funds. This is calculated assuming that the total estimated project cost (excluding interest during construction) would be drawn down at a constant rate per month during the construction period. Factors were determined for different lengths of time for project construction.

D.3 Assumptions for Annual Costs

Annual costs are to be estimated using the following assumptions:

- Debt service for all non-reservoir infrastructure (transmission and treatment facilities) is to be annualized over 20 years unless otherwise justified. For reservoirs, this period is 40 years, but not longer than the life of the project. [Note: uniform amortization periods should be used when evaluating similar projects for an entity.]
- Annual interest rate for debt service is 3.5 percent for both reservoir and non-reservoir projects.
- Water purchase costs are to be based on wholesale rates reported by the selling entity when possible. In lieu of known rates, a typical regional cost for treated water and raw water will be developed.
- Operation and Maintenance costs are to be calculated based on the construction cost of the capital improvement. Engineering, permitting, etc. should not be included as a basis for this calculation. Per the "Second Amended General Guidelines for Fifth Cycle of Regional Water Plan Development (Exhibit C)", O&M should be calculated at:
    - 1 percent of the construction costs for pipelines
    - 1.5 percent for dams
    - 2.5 percent of the construction costs for pump stations
    - O&M Costs for the varying levels of water treatment plant and AWTF improvements were developed by the TWDB and are shown in Table D-7 and Table D-8.
- Pumping costs are to be estimated using an electricity rate of $0.08 per Kilowatt Hour. If local data is available, this can be used.
- Power connection costs for pump stations are estimated to be $150 per HP.

Table D-1
Pipeline Costs

Diameter	Soil		Rock	
	Rural	Urban	Rural	Urban
(Inches)	($/Foot)	($/Foot)	($/Foot)	(Feet)
6	25	31	35	49
8	40	50	56	77
10	54	69	77	106
12	68	87	97	134
14	83	106	118	163
16	97	125	138	191
18	111	144	159	220
20	125	163	180	248
24	154	200	221	305
30	197	257	283	390
36	240	313	345	476
42	283	370	407	561
48	325	426	469	647
54	368	482	531	732
60	411	539	592	817
66	454	595	654	903
72	497	652	716	988
78	606	778	867	1159
84	715	904	1018	1330
90	824	1031	1169	1500
96	933	1157	1321	1671
102	1043	1284	1472	1841
108	1152	1410	1623	2012
114	1261	1536	1774	2183
120	1370	1663	1925	2353
132	1588	1915	2227	2694
144	1806	2168	2529	3036

Table D-2
Pump Station Costs

Horsepower	Booster PS Cost ($-million)	Intake PS cost ($-millions)
0	$0.00	$0.00
5	$2.75	$0.73
10	$2.84	$0.80
20	$3.00	$0.84
25	$3.08	$0.88
50	$3.49	$0.92
100	$4.31	$0.97
200	$5.96	$1.28
300	$7.60	$1.90
400	$9.25	$2.51
500	$10.89	$3.12
600	$12.53	$3.72
700	$14.18	$4.32
800	$15.82	$4.92
900	$17.46	$5.51
1,000	$19.11	$6.10
2,000	$35.55	$11.75
3,000	$37.09	$16.99
4,000	$38.31	$23.78
5,000	$39.53	$30.56
6,000	$41.09	$31.92
7,000	$42.31	$32.94
8,000	$43.52	$34.13
9,000	$44.73	$35.32
10,000	$45.94	$36.51
20,000	$58.06	$48.40
30,000	$70.18	$60.30
40,000	$82.30	$72.19
50,000	$94.42	$84.08
60,000	$106.54	$95.98
70,000	$118.66	$107.87

Note:
1. Intake PS costs include intake and pump station.
2. Adjust pump station costs upward if the pump station is designed to move large quantities of water at a low head (i.e. low horsepower).
3. Assumed multiple pump setup for all pump stations.

Table D-3
Ground Storage Tanks

Tank Volume (MG)	With Roof ($)	Without Roof ($)
0.05	833,996	413,402
0.1	901,492	432,305
0.5	1,077,270	583,324
1	1,296,813	772,047
1.5	1,516,458	960,769
2	1,736,104	1,149,595
2.5	1,955,647	1,338,317
3	2,175,292	1,527,143
3.5	2,394,938	1,715,865
4	2,614,480	1,904,588
5	3,053,771	2,282,136
6	3,492,960	2,659,683
7	3,932,251	3,037,231
8	4,371,439	3,414,779
10	5,376,487	4,444,586
12	6,603,646	5,474,393
14	7,815,600	6,504,302

Note: Costs assume steel tanks smaller than 1 MG, concrete tanks 1 MG and larger.

Table D-4
Conventional Water Treatment Plant Costs

	Level 0	Level 1	Level 2	Level 3 (new)	Level 3 (exp)	Level 4	Level 5
	Chlorine Disinfection (GW)	Iron & Manganese Removal	Simple Filtration	Conventional Treatment	Conventional Treatment	Brackish Desalination	Seawater Desalination
Capacity (MGD)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)
0	0	0	0	0	0	0	0
0.1	23,087	288,588	1,325,778	1,767,123	1,767,123	1,178,589	2,833,393
1	88,885	1,158,201	4,640,222	6,231,155	6,231,155	4,714,357	18,958,622
10	566,903	4,820,001	24,526,888	42,424,887	23,863,999	31,872,968	126,854,757
50	2,834,513	13,998,840	92,804,441	174,438,444	86,175,552	121,218,137	478,967,996
75	4,251,769	20,197,138	135,671,254	256,406,422	137,000,217	169,716,220	669,375,527
100	5,669,026	24,745,097	178,538,068	336,992,859	166,063,345	215,487,708	848,802,709
150	8,503,538	37,868,167	264,271,694	495,344,555	249,090,998	301,702,040	1,186,233,245
200	11,338,051	43,605,494	350,005,321	651,027,289	307,211,963	383,069,344	1,504,204,967

Note: Plant is sized for finished peak day capacity.

Table D-5
Advanced Water Treatment Facility Costs

Capacity (MGD)	Scheme 1 (includes RO)	Scheme 2
0	$0	$0
1	$9,918,242	$9,444,692
5	$35,384,711	$26,571,419
10	$61,298,421	$42,224,878
25	$152,259,491	$95,038,861

Table D-6
Cost Elements for Water Wells

Public Supply Well Costs						
	Well Capacity (MGD)					
Well Depth (ft)	100	175	350	700	1000	1800
150	$88,218	$112,093	$144,629			
300	$145,169	$220,377	$376,039	$425,012	$529,953	$774,816
500	$195,890	$279,843	$447,749	$512,463	$633,146	$897,247
700	$253,608	$349,804	$531,702	$612,157	$753,828	$1,044,164
1000	$306,079	$412,769	$606,910	$703,106	$862,267	$1,173,592
1500	$402,275	$528,204	$746,831	$869,263	$1,063,404	$1,414,957
2000	$563,184	$722,345	$977,702	$1,147,357	$1,395,717	$1,813,734
Irrigation Well Costs						
150	$80,455	$124,181	$211,631	$243,114	$307,828	$444,251
300	$106,690	$159,161	$258,854	$306,079	$388,283	$542,196
500	$132,926	$199,389	$309,576	$374,290	$475,734	$655,883
700	$153,913	$229,122	$353,302	$432,008	$552,690	$753,828
1000	$201,137	$295,585	$444,251	$550,941	$704,855	$946,220
1500	$281,593	$409,271	$594,667	$748,580	$956,714	$1,264,541
2000	$360,298	$519,459	$745,082	$944,471	$1,210,322	$1,584,612
ASR Well Costs						
150	$160,910	$248,360	$432,008	$487,977	$608,659	$897,247
300	$211,631	$307,828	$503,717	$575,427	$711,851	$1,021,427
500	$269,349	$379,538	$587,670	$675,122	$834,283	$1,166,596
700	$323,568	$442,502	$664,628	$766,071	$940,973	$1,297,772
1000	$418,015	$557,938	$802,801	$932,228	$1,142,111	$1,537,389
1500	$580,675	$750,330	$1,033,670	$1,210,322	$1,474,424	$1,936,165
2000	$739,836	$942,722	$1,264,541	$1,488,416	$1,808,486	$2,336,690

Table D-7
Annual Water Treatment Plant O&M Costs

	Level 0	Level 1	Level 2	Level 3 (New)	Level (Exp)	Level 4	Level 5
Capacity (MGD)	Chlorine Disinfection (GW)	Iron & Manganese Removal	Simple Filtration	Conventional Treatment	Conventional Treatment	Brackish Desalination	Seawater Desalination
0	0	0	0	0	0	0	0
0.1	5,384	37,017	103,064	68,687	68,687	83,293	374,449
1	20,729	148,561	360,725	242,201	242,201	333,171	2,505,493
10	132,211	618,256	1,906,690	1,649,029	927,579	2,252,513	16,764,602
50	661,054	1,795,616	7,214,502	6,780,314	3,349,590	8,566,679	63,298,437
75	991,582	2,590,666	10,546,914	9,966,358	5,325,113	11,994,116	88,461,912
100	1,322,109	3,174,027	13,879,327	13,098,702	6,454,779	15,228,860	112,174,269
150	1,983,163	4,857,310	20,544,152	19,253,734	9,682,012	21,321,764	156,767,698
200	2,644,218	5,593,231	27,208,977	25,305,025	11,941,137	27,072,121	198,789,531

Table D-8
Advanced Water Treatment Facility O&M Costs

Capacity (MGD)	Scheme 1 (includes RO)	Scheme 2
0	$0	$0
1	$1,186,267	$642,163
5	$4,609,938	$2,379,709
10	$8,287,126	$4,185,417
25	$18,027,189	$8,879,063

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
City of Andrews - Develop Edwards-Trinity Plateau Aquifer Supplies (Antlers Formation)

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Transmission Pipeline (18 in dia., 15 miles)	$10,186,000
Primary Pump Stations (4.6 MGD)	$3,495,000
Well Fields (Wells, Pumps, and Piping)	$4,261,000
TOTAL COST OF FACILITIES	**$17,942,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$5,771,000
Environmental & Archaeology Studies and Mitigation	$469,000
Land Acquisition and Surveying (66 acres)	$77,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$668,000
TOTAL COST OF PROJECT	**$24,927,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,754,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$144,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$87,000
Pumping Energy Costs (4144130 kW-hr @ 0.08 $/kW-hr)	$332,000
TOTAL ANNUAL COST	**$2,317,000**
Available Project Yield (acft/yr)	2,600
Annual Cost of Water ($ per acft), based on PF=2	$891
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$217
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$2.73
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.66

HK *8/12/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
City of Andrews - Develop Ogallala Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Transmission Pipeline (18 in dia., 8 miles)	$4,683,000
Primary Pump Stations (5 MGD)	$2,495,000
Well Fields (Wells, Pumps, and Piping)	$3,140,000
Storage Tanks (Other Than at Booster Pump Stations)	$945,000
TOTAL COST OF FACILITIES	**$11,263,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$3,708,000
Environmental & Archaeology Studies and Mitigation	$232,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$420,000
TOTAL COST OF PROJECT	**$15,663,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,102,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$88,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$62,000
Pumping Energy Costs (1777583 kW-hr @ 0.08 $/kW-hr)	$142,000
TOTAL ANNUAL COST	**$1,394,000**
Available Project Yield (acft/yr)	2,810
Annual Cost of Water ($ per acft), based on PF=2	$496
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$104
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$1.52
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.32

HK *9/20/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Andrews Co Livestock - Develop Edwards-Trinity Plateau Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$228,000
TOTAL COST OF FACILITIES	**$228,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$80,000
Environmental & Archaeology Studies and Mitigation	$8,000
Land Acquisition and Surveying (2 acres)	$2,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$9,000
TOTAL COST OF PROJECT	**$327,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$23,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$2,000
Pumping Energy Costs (16772 kW-hr @ 0.08 $/kW-hr)	$1,000
TOTAL ANNUAL COST	**$26,000**
Available Project Yield (acft/yr)	60
Annual Cost of Water ($ per acft), based on PF=1	$433
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$50
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$1.33
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.15

HK *8/12/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Andrews Co Manufacturing - Develop Edwards-Trinity-Plateau Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$417,000
TOTAL COST OF FACILITIES	**$417,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$146,000
Environmental & Archaeology Studies and Mitigation	$9,000
Land Acquisition and Surveying (3 acres)	$3,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$16,000
TOTAL COST OF PROJECT	**$591,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$42,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$4,000
Pumping Energy Costs (56947 kW-hr @ 0.08 $/kW-hr)	$5,000
TOTAL ANNUAL COST	**$51,000**
Available Project Yield (acft/yr)	210
Annual Cost of Water ($ per acft), based on PF=1	$243
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$43
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.75
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.13

HK *8/12/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Andrews County - Other - Develop Edwards-Trinity Plateau Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$528,000
TOTAL COST OF FACILITIES	**$528,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$185,000
Environmental & Archaeology Studies and Mitigation	$13,000
Land Acquisition and Surveying (3 acres)	$4,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$21,000
TOTAL COST OF PROJECT	**$751,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$53,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,000
Pumping Energy Costs (68557 kW-hr @ 0.08 $/kW-hr)	$5,000
TOTAL ANNUAL COST	**$63,000**
Available Project Yield (acft/yr)	250
Annual Cost of Water ($ per acft), based on PF=1	$252
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$40
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.77
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.12

HK *8/12/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Balmorhea - Develop Edwards-Trinity-Plateau Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Transmission Pipeline (6 in dia., 5 miles)	$669,000
Well Fields (Wells, Pumps, and Piping)	$652,000
TOTAL COST OF FACILITIES	**$1,321,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$429,000
Environmental & Archaeology Studies and Mitigation	$130,000
Land Acquisition and Surveying (13 acres)	$15,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$53,000
TOTAL COST OF PROJECT	**$1,948,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$137,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$13,000
Pumping Energy Costs (94048 kW-hr @ 0.08 $/kW-hr)	$8,000
TOTAL ANNUAL COST	**$158,000**
Available Project Yield (acft/yr)	150
Annual Cost of Water ($ per acft), based on PF=2	$1,053
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$140
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$3.23
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.43

HK *9/23/2019*

WUGNAME:	Bangs					
STRATEGY:	Direct Non-Potable Reuse For Public Parks Irrigation (Type					
AMOUNT (ac-ft/yr):	25					
CAPITAL COSTS						
Wastewater Treatment Plant Improvements	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**
Wastewater Treatment Plant Improvements	0.04 MGD	1	LS	$ 64,360	$	64,000
Engineering and Contingencies (35%)					$	22,000
Subtotal WWTP Improvements					$	86,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission pipeline	6 in.	10,560	LF	$ 30	$	321,000
Right-of-way easements		5	AC	$ 3,792	$	20,000
Engineering and Contingencies (30%)					$	96,000
Subtotal Pipeline					$	437,000
CONSTRUCTION TOTAL					$	523,000
Permitting and Mitigation					$	50,000
Interest During Construction	6 months				$	8,000
TOTAL CAPITAL COST					**$**	**581,000**
ANNUAL COSTS						**Cost**
Debt Service (3.5% for 20 years)					$	41,000
O&M					$	4,000
Electricity					$	400
Total Annual Cost					**$**	**45,400**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	1,816
Per 1,000 gallons					$	5.57
UNIT COSTS (After Amortization)						
Per Acre-Foot of treated water					$	176
Per 1,000 gallons					$	0.54

WUGNAME:	Big Spring
STRATEGY:	New Water Treatment Plant
AMOUNT (ac-ft/yr):	11,210

CONSTRUCTION COSTS

Water Treatment Plant	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water Treatment Plant	20.0 MGD	1	LS	$ 75,428,276	$ 75,428,000
Land Acquisition		10	AC	$ 1,104	$ 11,000
Engineering and Contingencies (35%)					$ 26,400,000
Subtotal Water Treatment Plant					$ 101,839,000
CONSTRUCTION TOTAL					$ 101,839,000
Permitting and Mitigation					$ 11,000
Interest During Construction	12 months				$ 2,801,000
TOTAL COST					**$ 104,651,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$ 7,363,000
Operation & Maintenance					$ 5,280,000
Total Annual Costs					**$ 12,643,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,128
Per 1,000 Gallons					$ 3.46
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 471
Per 1,000 Gallons					$ 1.45

WUGNAME:	Brady
STRATEGY:	Advanced Groundwater Treatment
AMOUNT (ac-ft/yr):	1,200

CONSTRUCTION COSTS

Water Treatment Plant Expansion	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water Treatment Plant Expansion	1.1 MGD	1	LS	$ 21,425,494	$ 21,425,000
Engineering and Contingencies					$ 7,499,000
Subtotal Water Treatment Plant Expansion					$ 28,924,000
CONSTRUCTION TOTAL					$ 28,924,000
Interest During Construction	12 months				$ 795,000
TOTAL COST					**$ 29,719,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$ 2,091,000
Operation & Maintenance	$ 392,000
Total Annual Costs	**$ 2,483,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$ 2,069
Per 1,000 Gallons	$ 6.35

UNIT COSTS (After Amortization)

Per Acre-Foot	$ 327
Per 1,000 Gallons	$ 1.00

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Bronte - Develop Groundwater from Other Aquifer in Runnels County

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Transmission Pipeline (6 in dia., 9.5 miles)	$1,268,000
Primary Pump Stations (0.1 MGD)	$233,000
Well Fields (Wells, Pumps, and Piping)	$241,000
TOTAL COST OF FACILITIES	**$1,742,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$546,000
Environmental & Archaeology Studies and Mitigation	$257,000
Land Acquisition and Surveying (30 acres)	$49,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$72,000
TOTAL COST OF PROJECT	**$2,666,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$188,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$15,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$6,000
TOTAL ANNUAL COST	**$209,000**
Available Project Yield (acft/yr)	75
Annual Cost of Water ($ per acft), based on PF=2	$2,787
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$280
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$8.55
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.86

HK *9/20/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Bronte - Develop Groundwater from Other Aquifer in Southwest Coke County

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Transmission Pipeline (10 in dia., 31 miles)	$11,637,000
Primary Pump Stations (1.4 MGD)	$1,628,000
Well Fields (Wells, Pumps, and Piping)	$1,002,000
TOTAL COST OF FACILITIES	**$16,815,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$5,303,000
Environmental & Archaeology Studies and Mitigation	$797,000
Land Acquisition and Surveying (88 acres)	$144,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$635,000
TOTAL COST OF PROJECT	**$23,694,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,667,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$136,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$81,000
Pumping Energy Costs (682269 kW-hr @ 0.08 $/kW-hr)	$55,000
TOTAL ANNUAL COST	**$1,939,000**
Available Project Yield (acft/yr)	800
Annual Cost of Water ($ per acft), based on PF=2	$2,424
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$340
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$7.44
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.04

HK *9/20/2019*

WUGNAME:	Bronte
STRATEGY:	Rehabilitation of Oak Creek Pipeline
AMOUNT (ac-ft/yr):	450

CONSTRUCTION COSTS

Pipeline Rehabilitation	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
New Pipe	14 in.	68,640	LF	$ 100	$ 6,878,000
Replace Storage Tank	0.05 MG	1	LS	$ 413,402	$ 413,000
Pump Station Rehabilitaiton and Upgrades	1.5 MGD	1	LS	$ 217,500	$ 218,000
Engineering and Contingencies (30%)					$ 2,253,000
Subtotal Pipeline					$ 9,762,000
CONSTRUCTION TOTAL					**$ 9,762,000**
Interest During Construction	6 months				$ 134,000
TOTAL CAPITAL COST					**$ 9,896,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$ 696,000
Electricity ($0.08/kwh)	$ 12,300
O&M	$ 78,400
Total Annual Cost	$ 786,700

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$ 1,748
Per 1,000 gallons	$ 5.37

UNIT COSTS (After Amortization)

Per Acre-Foot of treated water	$ 202
Per 1,000 gallons	$ 0.62

WUGNAME:	Bronte
STRATEGY:	Water Treatment Plant Expansion
AMOUNT (ac-ft/yr):	800

CONSTRUCTION COSTS

Water Treatment Plant Expansion	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water Treatment Plant Expansion	1.5 MGD	1	LS	$7,210,758	$7,211,000
Engineering and Contingencies (35%)					$2,524,000
Subtotal Water Treatment Plant Expansion					$9,735,000
CONSTRUCTION TOTAL					$9,735,000
Interest During Construction	12 months				$ 535,000
TOTAL COST					**$10,270,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$ 723,000
Operation & Maintenance	$ 653,000
Total Annual Costs	**$ 1,376,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$ 1,720
Per 1,000 Gallons	$ 5.28

UNIT COSTS (After Amortization)

Per Acre-Foot	$ 816
Per 1,000 Gallons	$ 2.50

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Brown Co. Mining - Develop Cross Timber Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$1,601,000
TOTAL COST OF FACILITIES	**$1,601,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$560,000
Environmental & Archaeology Studies and Mitigation	$129,000
Land Acquisition and Surveying (21 acres)	$84,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$66,000
TOTAL COST OF PROJECT	**$2,440,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$172,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$16,000
Pumping Energy Costs (132508 kW-hr @ 0.08 $/kW-hr)	$11,000
TOTAL ANNUAL COST	**$199,000**
Available Project Yield (acft/yr)	210
Annual Cost of Water ($ per acft), based on PF=1	$948
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$129
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$2.91
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.39

HK *9/18/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Colorado City - Dockum Well Field Expansion

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Transmission Pipeline (6 in dia., 8 miles)	$1,160,000
Primary Pump Stations (0.3 MGD)	$944,000
Well Fields (Wells, Pumps, and Piping)	$449,000
TOTAL COST OF FACILITIES	**$2,553,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$835,000
Environmental & Archaeology Studies and Mitigation	$213,000
Land Acquisition and Surveying (26 acres)	$42,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$101,000
TOTAL COST OF PROJECT	**$3,744,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$263,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$16,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$24,000
Pumping Energy Costs (85732 kW-hr @ 0.08 $/kW-hr)	$7,000
TOTAL ANNUAL COST	**$310,000**
Available Project Yield (acft/yr)	170
Annual Cost of Water ($ per acft), based on PF=2	$1,824
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$276
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$5.60
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.85

HK *9/23/2019*

WUGNAME:	CRMWD					
STRATEGY:	Develop Additional Groundwater Supplies from Pecos, Reeves, Ward and Winkler Counties					
AMOUNT (ac-ft/yr):	10,000					
CONSTRUCTION COSTS						
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Purchase Groundwater Rights		10,000	AC	$ 500	$	5,000,000
Water wells	1000 gpm	10	EA	$ 564,351	$	5,644,000
Well field collection		10	per well	$ 200,000	$	2,000,000
Engineering and contingencies (35%)					$	2,675,000
Subtotal Well field					$	10,319,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission pipeline	36 in.	211,200	LF	$ 345	$	72,824,000
Right-of-way easements		97	AC	$ 788	$	84,000
Engineering and Contingencies (30%)					$	21,847,000
Subtotal Pipeline					$	94,755,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Pump Stations	1100 HP	3	EA	$ 6,662,300	$	19,987,000
Storage tank	1.25 MG	2	EA	$ 1,406,635	$	2,813,000
Power Connection		2	LS	$ 495,000	$	990,000
Engineering and Contingencies (35%)					$	8,327,000
Subtotal of Pump Station(s)					$	32,117,000
CONSTRUCTION TOTAL					$	137,191,000
Permitting and Mitigation					$	1,000,000
Interest During Construction	24 months				$	9,367,000
TOTAL COST					**$**	**147,558,000**
ANNUAL COSTS						
Debt Service (3.5% for 20 years)					$	10,382,000
Electricity ($0.08 kWh)					$	1,725,000
Operation & Maintenance					$	1,375,000
Total Annual Costs					**$**	**13,482,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	1,348
Per 1,000 Gallons					$	4.14
UNIT COSTS (After Amortization)						
Per Acre-Foot					$	310
Per 1,000 Gallons					$	0.95

WUGNAME:	CRMWD
STRATEGY:	Ward County Well Field Expansion and Development of Winkler County Well Field
AMOUNT (ac-ft/yr):	22,400

CONSTRUCTION COSTS						
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Water wells		50	EA	$ 490,892	$	24,545,000
Well field pipeline	10 in.	37,000	LF	$ 107	$	3,972,000
Well field pipeline	16 in.	34,000	LF	$ 162	$	5,515,000
Well field pipeline	20 in.	2,500	LF	$ 203	$	507,000
Well field pipeline	24 in.	2,600	LF	$ 229	$	595,000
Well field pipeline	30 in.	2,500	LF	$ 286	$	716,000
Well field pipeline	36 in.	2,500	LF	$ 301	$	751,000
Power Connection Costs			LS	$ 453,000	$	453,000
Engineering and contingencies (35%)					$	12,969,000
Subtotal Well field					$	50,023,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission pipeline	36 in.	162,000	LF	$ 301	$	48,693,000
Terminal Reservoir Piping and Valves		1	LS	$ 514,000	$	514,000
Right-of-way easements		74	AC	$ 788	$	64,000
Engineering and Contingencies (30%)					$	14,762,000
Subtotal Pipeline					$	64,033,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
North Well Field PS Improvements		1	LS	$ 1,938,000	$	1,938,000
Transmission Pump Station Expansion	20 MGD	1	LS	$ 4,308,000	$	4,308,000
New Transmission Booster Pump Station	50 MGD	1	EA	$ 12,792,000	$	12,792,000
New Pump Station in Odessa	20 MGD	1	EA	$ 6,904,000	$	6,904,000
Terminal Pump Station	20 MGD	1	EA	$ 6,904,000	$	6,904,000
Engineering and Contingencies (35%)					$	11,496,000
Subtotal of Pump Station(s)					$	44,342,000
CONSTRUCTION TOTAL					$	158,398,000
Permitting and Mitigation					$	1,151,000
Interest During Construction	24 months				$	8,775,000
TOTAL COST					**$**	**168,324,000**
ANNUAL COSTS						
Debt Service (3.5% for 20 years)					$	11,843,000
Electricity ($0.08 kWh)					$	5,502,000
Operation & Maintenance					$	1,679,000
Total Annual Costs					**$**	**19,024,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	849
Per 1,000 Gallons					$	2.61
UNIT COSTS (After Amortization)						
Per Acre-Foot					$	321
Per 1,000 Gallons					$	0.99

WUGNAME:	CRMWD
STRATEGY:	Ward County Well Field Well Replacement
AMOUNT (ac-ft/yr):	755 - 10,500

CONSTRUCTION COSTS

Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells		10	EA	$ 552,690	$ 5,527,000
Well field collection		10	per well	$ 200,000	$ 2,000,000
Engineering and contingencies (35%)					$ 2,634,000
Subtotal Well field					$ 10,161,000
CONSTRUCTION TOTAL					$ 10,161,000
Interest During Construction		12 months			$ 279,000
TOTAL COST					**$ 10,440,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$ 735,000
Electricity ($0.08 kWh)	$ 2,124,000
Operation & Maintenance	$ 75,270
Total Annual Costs	**$ 2,934,270**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$ 102
Per 1,000 Gallons	$ 0.31

UNIT COSTS (After Amortization)

Per Acre-Foot	$ 76
Per 1,000 Gallons	$ 0.23

WUGNAME:	Greater Gardendale WSC
STRATEGY:	Purchase Water from Midland County FWSD No. 1
AMOUNT (ac-ft/yr):	445

CAPITAL COSTS						
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission Pipeline	12 in.	2,600	LF	$ 83	$	215,000
Right-of-way easements		1	AC	$ 1,104	$	1,000
Engineering and Contingencies (30%)					$	65,000
Subtotal Pipeline					$	281,000
Water Treatment						
Chlorination Facilities	1.0 MGD	1	LS	$ 88,331	$	88,331
Engineering and Contingencies (35%)					$	31,000
Subtotal Water Treatment					$	119,331
Pump Station & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Pump Stations	40 HP	1	EA	$ 905,800	$	906,000
Storage tank	0.1 MGD	1	EA	$ 900,468	$	900,000
Power Connection		1	LS	$ 50,000	$	50,000
Engineering and Contingencies (35%)					$	650,000
Subtotal of Pump Station(s)					$	2,506,000
CONSTRUCTION TOTAL					$	2,906,331
Interest During Construction	6 months				$	40,000
TOTAL CAPITAL COST					**$**	**2,946,000**

ANNUAL COSTS		**Cost**
Debt Service (3.5% for 20 years)	$	207,000
O&M	$	35,000
Electricity ($0.08 kWh)	$	8,000
Water Purchase Price per 1,000 gal	$	798,000
Total Annual Cost	**$**	**1,048,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water	$	2,355
Per 1,000 gallons	$	7.23
UNIT COSTS (After Amortization)		
Per Acre-Foot of treated water	$	1,890
Per 1,000 gallons	$	5.80

WUGNAME:	Greater Gardendale WSC
STRATEGY:	Purchase Treated Water from City of Odessa
AMOUNT (ac-ft/yr):	445

CAPITAL COSTS							
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**	
Transmission Pipeline	12 in.	23,700	LF	$	54	$	1,280,000
Transmission Pipeline	18 in.	6,100	LF	$	84	$	512,000
Other Transmission Infrastructure						$	395,800
Easement Acquisition		24,000	LS	$	5	$	130,000
Engineering and Contingencies (30%)						$	656,000
Subtotal Pipeline						$	2,973,800
Odessa Pump Station Improvements							
Ground Storage Tank	0.15 MG	2	EA	$	225,000	$	450,000
Booster Pump	1000 gpm	2	EA	$	60,000	$	120,000
Other Pump Station Infrastructure						$	550,800
Electrical Power		1	LS	$	72,000	$	72,000
Land Acquisition		1	LS	$	48,000	$	48,000
Engineering and Contingencies (35%)						$	417,000
Subtotal Pump Station						$	1,657,800
GCWSC Booster Pump Station							
Ground Storage Tank	0.26 MG	1	EA	$	480,000	$	480,000
Chlorination System Improvements				$	60,000	$	60,000
Other Pump Station Infrastructure						$	129,600
Engineering and Contingencies (35%)						$	234,000
Subtotal Pump Station						$	903,600
CONSTRUCTION TOTAL						$	5,535,200
Professional Services						$	502,000
Interest During Construction	6 months					$	41,000
TOTAL CAPITAL COST						**$**	**6,078,000**

ANNUAL COSTS	**Cost**
Debt Service (3.5% for 20 years)	$ 428,000
O&M	$ 42,000
Electricity ($0.08 kWh)	$ 20,000
Water Purchase Price per 1,000 gal	$ 1,170,000
Total Annual Cost	**$ 1,660,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$ 3,730
Per 1,000 gallons	$ 11.45
UNIT COSTS (After Amortization)	
Per Acre-Foot of treated water	$ 2,769
Per 1,000 gallons	$ 8.50

WUGNAME:	Junction
STRATEGY:	Dredge River Intake
AMOUNT (ac-ft/yr):	250

CONSTRUCTION COSTS

Dredging and disposal	**Quantity**	**Unit**	**Unit Price**		**Cost**
Bathymetric survey	15	AC	$ 5,000	$	75,000
Sediment Testing (Geotech & Lab)	25	EA	$ 2,500	$	63,000
Dredging and Disposal	75,000	CY	$ 60	$	4,500,000
Construction Phase Services (5%)				$	231,900
Additional Contingency (10%)				$	486,990
Engineering and Contingencies (35%)				$	1,704,465
Subtotal of Dredging and Disposal				$	7,061,355
CONSTRUCTION TOTAL				$	7,061,355
Interest During Construction	12 months			$	194,000
Permitting				$	250,000
TOTAL COST				**$**	**7,505,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)				$	528,000
Total Annual Costs				**$**	**528,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water				$	2,112
Per 1,000 Gallons				$	6.48
UNIT COSTS (After Amortization)					
Per Acre-Foot				$	-
Per 1,000 Gallons				$	-

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Junction - Develop Edwards-Trinity Plateau Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Transmission Pipeline (8 in dia., 3 miles)	$627,000
Primary Pump Stations (0.7 MGD)	$863,000
Well Fields (Wells, Pumps, and Piping)	$1,017,000
TOTAL COST OF FACILITIES	**$2,507,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$846,000
Environmental & Archaeology Studies and Mitigation	$117,000
Land Acquisition and Surveying (17 acres)	$66,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$98,000
TOTAL COST OF PROJECT	**$3,634,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$256,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$16,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$22,000
Pumping Energy Costs (125946 kW-hr @ 0.08 $/kW-hr)	$10,000
TOTAL ANNUAL COST	**$304,000**
Available Project Yield (acft/yr)	370
Annual Cost of Water ($ per acft), based on PF=2	$822
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$130
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$2.52
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.40

HK *9/19/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Kimble Co. Manufacturing - Develop Edwards-Trinity Plateau Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$1,113,000
TOTAL COST OF FACILITIES	**$1,113,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$389,000
Environmental & Archaeology Studies and Mitigation	$47,000
Land Acquisition and Surveying (7 acres)	$28,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$44,000
TOTAL COST OF PROJECT	**$1,621,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$114,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$11,000
Pumping Energy Costs (149933 kW-hr @ 0.08 $/kW-hr)	$12,000
TOTAL ANNUAL COST	**$137,000**
Available Project Yield (acft/yr)	500
Annual Cost of Water ($ per acft), based on PF=1	$274
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$46
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.84
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.14

HK *9/19/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Menard - Develop Hickory Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$2,364,000
TOTAL COST OF FACILITIES	**$2,364,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$827,000
Environmental & Archaeology Studies and Mitigation	$5,000
Land Acquisition and Surveying (1 acres)	$3,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$88,000
TOTAL COST OF PROJECT	**$3,287,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$231,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$24,000
Pumping Energy Costs (117208 kW-hr @ 0.08 $/kW-hr)	$9,000
TOTAL ANNUAL COST	**$264,000**
Available Project Yield (acft/yr)	200
Annual Cost of Water ($ per acft), based on PF=2	$1,320
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$165
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$4.05
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.51

HK *8/13/2019*

WUGNAME:	City of Menard
STRATEGY:	Direct Non-potable Reuse For Irrigation of City Farms (Type I)
AMOUNT (ac-ft/yr):	67

CAPITAL COSTS

Wastewater Treatment Plant Improvements	**Quantity**	**Units**	**Unit Price**	**Cost**
Wastewater Treatment Plant Improvements	1	LS	$ 154,000	$ 154,000
Engineering and Contingencies (30%)				$ 46,200
Subtotal WWTP Improvements				$ 200,200

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	6 in	10,560	LF	$ 30	$ 321,000
Right-of-way easements		5	AC	$ 3,792	$ 20,000
Engineering and Contingencies (30%)					$ 96,300
Subtotal Pipeline					$ 437,300

CONSTRUCTION TOTAL		$ 637,500
Permitting and Mitigation		$ 50,000
Interest During Construction	6 months	$ 9,000
TOTAL CAPITAL COST		**$ 696,500**

ANNUAL COSTS	**Cost**
Debt Service (3.5% for 20 years)	$ 49,000
O&M	$ 4,738
Electricity	$ 1,190
Total Annual Cost	**$ 54,928**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$ 820
Per 1,000 gallons	$ 2.52

UNIT COSTS (After Amortization)	
Per Acre-Foot of treated water	$ 88
Per 1,000 gallons	$ 0.27

WUGNAME:	Midland
STRATEGY:	RO Treatment of Existing Supplies
AMOUNT (ac-ft/yr):	8,500

CONSTRUCTION COSTS

Water Treatment Plant	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Land Acquistion		4.5	AC	$ 2,208	$ 10,000
RO Facility	9 MGD	1	LS	$ 30,214,296	$ 30,214,000
Engineering and contingencies (35%)					$ 10,575,000
Treatment Subtotal					$ 40,799,000

Brine Effluent Transmission Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	14 in.	52,800	LF	$ 135	$ 7,102,000
Right-of-way easements		24	AC	$ 2,208	$ 54,000
Engineering and Contingencies (30%)					$ 2,131,000
Subtotal of Disposal Facilities					$ 9,287,000

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	300 HP	2	EA	$ 1,897,500	$ 3,795,000
Storage tank	0.4 MG	2	EA	$ 1,033,325	$ 2,067,000
Power Connection		2	LS	$ 50,000	$ 100,000
Engineering and Contingencies (35%)					$ 2,087,000
Subtotal of Pump Station(s)					$ 8,049,000

CONSTRUCTION TOTAL		$ 58,135,000
Permitting and Mitigation		$ 260,000
Interest During Construction (3%)	18 months	$ 2,409,000
TOTAL COST		**$ 60,804,000**

ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$ 4,278,000
Electricity ($0.08 kWh)	$ 85,000
Operation & Maintenance	$ 6,402,000
Total Annual Costs	**$ 10,765,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$ 1,266
Per 1,000 Gallons	$ 3.89
UNIT COSTS (After Amortization)	
Per Acre-Foot	$ 763
Per 1,000 Gallons	$ 2.34

WUGNAME:	Midland County-Other
STRATEGY:	Develop Groundwater from Winkler County
AMOUNT (ac-ft/yr):	2,800

CONSTRUCTION COSTS						
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Water wells	300 gpm	15	EA	$ 479,731	$	7,196,000
Well field collection	6 in.	17,000	LF	$ 30	$	516,000
Well field collection	8 in.	5,000	LF	$ 48	$	239,000
Well field collection	10 in.	2,800	LF	$ 65	$	183,000
Well field collection	12 in.	4,500	LF	$ 83	$	372,000
Well field collection	18 in.	4,000	LF	$ 135	$	541,000
Engineering and contingencies (35%)					$	3,166,000
Subtotal Well field					$	12,000,000
Transmission Infrastructure	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission Pipeline	18 in.	26,400	LF	$ 220	$	5,799,000
Engineering and Contingencies (30%)					$	2,000,000
Subtotal Transmission Infrastructure					$	7,799,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Pump Stations	325 HP	1	EA	$ 2,050,600	$	2,051,000
Storage tank	0.3 MG	1	EA	$ 967,409	$	967,000
Power Connection		1	LS	$ 50,000	$	50,000
Engineering and Contingencies (35%)					$	1,074,000
Subtotal of Pump Station(s)					$	4,142,000
CONSTRUCTION TOTAL					$	23,941,000
Permitting and Mitigation					$	283,000
Interest During Construction	6 months				$	333,000
TOTAL COST					**$**	**24,557,000**
ANNUAL COSTS						
Debt Service (3.5% for 20 years)					$	1,728,000
Electricity ($0.08 kWh)					$	156,000
Operation & Maintenance					$	182,000
Total Annual Costs					**$**	**2,066,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	738
Per 1,000 Gallons					$	2.26
UNIT COSTS (After Amortization)						
Per Acre-Foot					$	121
Per 1,000 Gallons					$	0.37

WUGNAME:	Mitchell County Steam Electric Power
STRATEGY:	Direct Non-Potable Reuse for Sales from Colorado City (Type II)
AMOUNT (ac-ft/yr):	500

CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	10 in.	52,800	LF	$ 65	$ 3,447,000
Right-of-way easements		24	AC	$ 1,544	$ 41,000
Engineering and Contingencies (30%)					$ 1,034,000
Subtotal Pipeline					$ 4,522,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	45 HP	2	EA	$ 914,600	$ 1,829,000
Storage tank	0.1 MG	1	EA	$ 901,492	$ 901,000
Power Connection		1	LS	$ 50,000	$ 50,000
Engineering and Contingencies (35%)					$ 973,000
Subtotal of Pump Station(s)					$ 3,753,000
CONSTRUCTION TOTAL					$ 8,275,000
Permitting and Mitigation					$ 250,000
Interest During Construction		6 months			$ 117,000
TOTAL CAPITAL COST					**$ 8,642,000**
ANNUAL COSTS					**Cost**
Debt Service (3.5% for 20 years)					$ 608,000
O&M					$ 89,000
Electricity ($0.08 kWh)					$ 17,000
Total Annual Cost					**$ 714,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,428
Per 1,000 gallons					$ 4.38
UNIT COSTS (After Amortization)					
Per Acre-Foot of treated water					$ 212
Per 1,000 gallons					$ 0.65

WUGNAME:	Odessa
STRATEGY:	RO Treatment of Existing Supplies
AMOUNT (ac-ft/yr):	15,700

CONSTRUCTION COSTS

Water Treatment Plant	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
RO Facility	20 MGD	1	LS	$ 56,180,506	$ 56,181,000
Engineering and contingencies (35%)					$ 19,663,000
Treatment Subtotal					$ 75,844,000

Effluent Transmission Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	16 in.	5,280	LF	$ 158	$ 835,000
Right-of-way easements		2	AC	$ 1,104	$ 3,000
Engineering and Contingencies (30%)					$ 251,000
Subtotal of Disposal Facilities					$ 1,089,000

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	110 HP	1	EA	$ 1,000,800	$ 1,001,000
Storage tank	0.4 MG	1	EA	$ 1,033,325	$ 1,033,000
Power Connection		1	LS	$ 50,000	$ 50,000
Engineering and Contingencies (35%)					$ 729,000
Subtotal of Pump Station(s)					$ 2,813,000

CONSTRUCTION TOTAL		$ 79,746,000
Permitting and Mitigation		$ 25,000
Interest During Construction (3%)	18 months	$ 3,291,000
TOTAL COST		**$ 83,062,000**

ANNUAL COSTS		
Debt Service (3.5% for 20 years)		$ 5,844,000
Electricity ($0.08 kWh)		$ 36,000
Operation & Maintenance		$ 11,558,000
Total Annual Costs		**$ 17,438,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water		$ 1,111
Per 1,000 Gallons		$ 3.41
UNIT COSTS (After Amortization)		
Per Acre-Foot		$ 738
Per 1,000 Gallons		$ 2.27

WUGNAME:	Odessa
STRATEGY:	Develop Capitan Reef Complex Aquifer Supplies in Ward County
AMOUNT (ac-ft/yr):	8,400

CONSTRUCTION COSTS

Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	950 gpm	15	EA	$ 3,302,735	$ 49,541,000
Ground Storage Tank	2.0 MG	1	EA	$ 1,736,104	$ 1,736,000
Wellfield Piping	30 in.	15,000	LF	$ 240	$ 3,598,000
Wellfield Piping	42 in.	15,000	LF	$ 345	$ 5,170,000
Wellfield Piping	48 in.	15,000	LF	$ 397	$ 5,956,000
Engineering and contingencies (35%)					$ 23,100,000
Well Field Subtotal					$ 89,101,000
Water Treatment Plant					
RO facility	7.5 MGD	1	LS	$ 25,803,389	$ 25,803,000
Engineering and contingencies (35%)					$ 9,031,000
Treatment Subtotal					$ 34,834,000

Disposal Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Injection Wells	1000 gpm	5	EA	$ 3,133,656	$ 15,668,000
Collection Piping	16 in.	10,000	LF	$ 118	$ 1,177,000
Power Connection		1	LS	$ 830,753	$ 831,000
Engineering and Contingencies (35%)					$ 6,187,000
Subtotal of Disposal Facilities					$ 23,863,000

CONSTRUCTION TOTAL		$ 147,798,000
Permitting and Mitigation		$ 260,000
Interest During Construction	18 months	$ 6,107,000
TOTAL COST		**$ 154,165,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$ 10,847,000
Electricity ($0.08 kWh)	$ 1,412,000
Operation & Maintenance	$ 6,015,000
Total Annual Costs	**$ 18,274,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$ 2,175
Per 1,000 Gallons	$ 6.68

UNIT COSTS (After Amortization)

Per Acre-Foot	$ 884
Per 1,000 Gallons	$ 2.71

WUGNAME:	Odessa
STRATEGY:	Develop Edwards Trinity and Capitan Reef Complex Aquifer Supplies in Pecos County Phase I
AMOUNT (ac-ft/yr):	11,200

CONSTRUCTION COSTS

Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	1000 gpm	15	EA	$ 2,397,908	$ 35,969,000
Wellfield Piping	30 in.	21,120	LF	$ 240	$ 5,067,000
Wellfield Piping	42 in.	21,120	LF	$ 345	$ 7,279,000
Wellfield Piping	48 in.	14,780	LF	$ 397	$ 5,869,000
Engineering and contingencies (35%)					$ 18,964,000
Well Field Subtotal					$ 73,148,000

Water Treatment Plant					
RO facility	15 mgd	1	LS	$ 45,649,666	$ 45,650,000
Engineering and contingencies (35%)					$ 15,978,000
Treatment Subtotal					$ 61,628,000

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	54 in.	475,200	LF	$ 449	$ 213,576,000
Right-of-way easements		218	AC	$ 1,258	$ 302,000
Engineering and Contingencies (30%)					$ 64,073,000
Subtotal Pipeline					$ 277,951,000

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	1600 HP	2	EA	$ 9,487,500	$ 18,975,000
Storage tank	1.5 MG	2	EA	$ 1,516,458	$ 3,033,000
Power Connection		2	LS	$ 480,000	$ 960,000
Engineering and Contingencies (35%)					$ 8,039,000
Subtotal of Pump Station(s)					$ 31,007,000

Disposal Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Injection Wells	500 gpm	12	EA	$ 2,350,242	$ 28,203,000
Collection Piping	18 in.	10,000	LF	$ 135	$ 1,351,000
Power Connection		1	LS	$ 996,903	$ 997,000
Engineering and Contingencies (35%)					$ 10,693,000
Subtotal of Disposal Facilities					$ 41,244,000

CONSTRUCTION TOTAL		$ 484,978,000
Permitting and Mitigation		$ 2,567,000
Interest During Construction	18 months	$ 20,111,000
TOTAL COST		**$ 507,656,000**

continued on next page

WUGNAME:	Odessa		
STRATEGY:	Develop Edwards Trinity and Capitan Reef Complex Aquifer Supplies in Pecos County Phase I		
AMOUNT (ac-ft/yr):	11,200		
ANNUAL COSTS			
Debt Service (3.5% for 20 years)		$	35,719,000
Electricity ($0.08 kWh)		$	2,027,000
Operation & Maintenance		$	12,653,000
Total Annual Costs		**$**	**50,399,000**
UNIT COSTS (Until Amortized)			
Per Acre-Foot of treated water		$	4,500
Per 1,000 Gallons		$	13.81
UNIT COSTS (After Amortization)			
Per Acre-Foot		$	1,311
Per 1,000 Gallons		$	4.02

WUGNAME:	Odessa
STRATEGY:	Develop Edwards Trinity and Capitan Reef Complex Aquifer Supplies in Pecos County Phase II
AMOUNT (ac-ft/yr):	16,800

CONSTRUCTION COSTS

Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	1000 gpm	21	EA	$ 2,397,908	$ 50,356,000
Wellfield Piping	30 in.	31,680	LF	$ 240	$ 7,600,000
Wellfield Piping	42 in.	31,680	LF	$ 345	$ 10,919,000
Wellfield Piping	48 in.	22,180	LF	$ 397	$ 8,807,000
Engineering and contingencies (35%)					$ 27,189,000
Well Field Subtotal					$ 104,871,000
Water Treatment Plant					
RO facility	22.5 mgd	1	LS	$ 63,417,171	$ 63,417,000
Engineering and contingencies (35%)					$ 22,196,000
Treatment Subtotal					$ 85,613,000

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	2000 HP	3	EA	$ 11,747,600	$ 35,243,000
Storage tank	3.0 MG	3	EA	$ 2,175,292	$ 6,526,000
Power Connection		2	LS	$ 300,000	$ 600,000
Engineering and Contingencies (35%)					$ 14,829,000
Subtotal of Pump Station(s)					$ 57,198,000

Disposal Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Injection Wells	500 gpm	17	EA	$ 2,350,242	$ 39,954,000
Collection Piping	24 in.	10,000	LF	$ 188	$ 1,875,000
Power Connection		1	LS	$ 1,412,280	$ 1,412,000
Engineering and Contingencies (35%)					$ 15,134,000
Subtotal of Disposal Facilities					$ 58,375,000

CONSTRUCTION TOTAL		$ 306,057,000
Permitting and Mitigation		$ 452,000
Interest During Construction	18 months	$ 12,643,000
TOTAL COST		**$ 319,152,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$ 22,456,000
Electricity ($0.08 kWh)	$ 3,206,000
Operation & Maintenance	$ 14,923,000
Total Annual Costs	**$ 40,585,000**

continued on next page

WUGNAME:	Odessa		
STRATEGY:	Develop Edwards Trinity and Capitan Reef Complex Aquifer Supplies in Pecos County Phase II		
AMOUNT (ac-ft/yr):	16,800		
UNIT COSTS (Until Amortized)			
Per Acre-Foot of treated water		$	2,416
Per 1,000 Gallons		$	7.41
UNIT COSTS (After Amortization)			
Per Acre-Foot		$	1,079
Per 1,000 Gallons		$	3.31

WUGNAME:	Pecos
STRATEGY:	Advanced Water Treatment Plant
AMOUNT (ac-ft/yr):	3,360

CONSTRUCTION COSTS

Advanced Water Treatment Plant	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Advanced Water Treatment Plant	8.0 MGD	1	LS	$ 19,945,589	$ 19,946,000
Land Acquisition		4	AC	$ 1,544	$ 6,000
Engineering and Contingencies (35%)					$ 6,981,000
Subtotal Water Treatment Plant					$ 26,933,000
CONSTRUCTION TOTAL					$ 26,933,000
Permitting and Mitigation					$ 6,000
Interest During Construction	12 months				$ 741,000
TOTAL COST					**$ 27,680,000**

ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$ 1,948,000
Operation & Maintenance	$ 1,438,000
Total Annual Costs	**$ 3,386,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$ 1,008
Per 1,000 Gallons	$ 3.09
UNIT COSTS (After Amortization)	
Per Acre-Foot	$ 428
Per 1,000 Gallons	$ 1.31

WUGNAME:	Pecos
STRATEGY:	Direct Non-Potable Reuse (Type I)
AMOUNT (ac-ft/yr):	560

CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	10 in.	52,800	LF	$ 65	$ 3,447,000
Right-of-way easements		24	AC	$ 1,544	$ 41,000
Engineering and Contingencies (30%)					$ 1,034,000
Subtotal Pipeline					$ 4,522,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	50 HP	2	EA	$ 923,400	$ 1,847,000
Storage tank	0.1 MG	1	EA	$ 901,492	$ 901,000
Power Connection		1	LS	$ 50,000	$ 50,000
Land Acquisition		12	AC	$ 1,544	$ 20,000
Engineering and Contingencies (35%)					$ 979,000
Subtotal of Pump Station(s)					$ 3,797,000
CONSTRUCTION TOTAL					$ 8,319,000
Permitting and Mitigation					$ 270,000
Interest During Construction		6 months			$ 118,000
TOTAL CAPITAL COST					**$ 8,707,000**

ANNUAL COSTS	**Cost**
Debt Service (3.5% for 20 years)	$ 613,000
O&M	$ 90,000
Electricity ($0.08 kWh)	$ 17,000
Total Annual Cost	**$ 720,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$ 1,286
Per 1,000 gallons	$ 3.95
UNIT COSTS (After Amortization)	
Per Acre-Foot of treated water	$ 191
Per 1,000 gallons	$ 0.59

WUGNAME:	Pecos						
STRATEGY:	Direct Potable Reuse						
AMOUNT (ac-ft/yr):	925						
CAPITAL COSTS							
Advanced Water Treatment Plant	**Size**	**Quantity**	**Units**		**Unit Price**		**Cost**
Advanced Water Treatment Plant	2.20 MGD	1	LS	$	17,558,000	$	17,558,000
Land Acquisition		1.1	AC	$	1,544	$	2,000
Engineering and Contingencies (35%)						$	6,145,000
Subtotal WWTP Expansion						$	23,705,000
Pipeline	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Transmission pipeline	12 in.	10,560	LF	$	83	$	874,000
Right-of-way easements		5	AC	$	1,544	$	8,000
Engineering and Contingencies (30%)						$	262,000
Subtotal Pipeline						$	1,144,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Pump Stations	150 HP	1	EA	$	1,125,300	$	1,125,000
Storage tank	0.2 MG	1	EA	$	954,225	$	954,000
Power Connection		1	LS	$	50,000	$	50,000
Land Acquisition		7	AC	$	1,544	$	12,000
Engineering and Contingencies (35%)						$	745,000
Subtotal of Pump Station(s)						$	2,886,000
Disposal Facilities							
RO Disposal Pipeline	8 in.	10,560	LF	$	48	$	505,000
Right-of-way easements		5	AC	$	1,544	$	8,000
Engineering and Contingencies (30%)						$	152,000
Subtotal Pipeline						$	665,000
CONSTRUCTION TOTAL						$	28,400,000
Permitting and Mitigation						$	350,000
Interest During Construction	12 months					$	791,000
TOTAL CAPITAL COST						**$**	**29,541,000**
ANNUAL COSTS							**Cost**
Debt Service (3.5% for 20 years)						$	2,079,000
O&M						$	2,259,000
Electricity ($0.08 kWh)						$	35,000
Total Annual Cost						**$**	**4,338,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	4,691
Per 1,000 gallons						$	14.39
UNIT COSTS (After Amortization)							
Per Acre-Foot of treated water						$	2,443
Per 1,000 gallons						$	7.50

WUGNAME:	Pecos						
STRATEGY:	Indirect Potable Reuse with Aquifer Storage and Recovery						
AMOUNT (ac-ft/yr):	695						
CAPITAL COSTS							
Advanced Water Treatment Plant	**Size**	**Quantity**	**Units**		**Unit Price**		**Cost**
Advanced Water Treatment Plant	2.20 MGD	1	LS	$	17,558,000	$	17,558,000
Land Acquisition		1.1	AC	$	1,544	$	2,000
Engineering and Contingencies (35%)						$	6,145,000
Subtotal WWTP Expansion						$	23,705,000
Pipeline	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Transmission pipeline	12 in.	10,560	LF	$	83	$	874,000
Right-of-way easements		5	AC	$	1,544	$	8,000
Engineering and Contingencies (30%)						$	262,000
Subtotal Pipeline						$	1,144,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Pump Stations	150 HP	1	EA	$	1,125,300	$	1,125,000
Storage tank	0.2 MG	1	EA	$	954,225	$	954,000
Power Connection		1	LS	$	50,000	$	50,000
Land Acquisition		7	AC	$	1,544	$	12,000
Engineering and Contingencies (35%)						$	745,000
Subtotal of Pump Station(s)						$	2,886,000
Disposal Facilities							
RO Disposal Pipeline	8 in.	10,560	LF	$	48	$	505,000
Right-of-way easements		5	AC	$	1,544	$	8,000
Engineering and Contingencies (30%)						$	152,000
Subtotal Pipeline						$	665,000
ASR Wells	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Wells	250 gpm	6	EA	$	411,020	$	2,466,000
Well Piping		10	per well	$	100,000	$	1,000,000
Land Acquisition		3	AC	$	1,544	$	5,000
Engineering and Contingencies (35%)						$	1,213,000
Subtotal of ASR Wells						$	4,684,000
CONSTRUCTION TOTAL						$	33,084,000
Permitting and Mitigation							450,000
Interest During Construction	12 months					$	922,000
TOTAL CAPITAL COST						**$**	**34,456,000**
ANNUAL COSTS							**Cost**
Debt Service (3.5% for 20 years)						$	2,424,000
O&M						$	2,294,000
Electricity ($0.08 kWh)						$	119,000
Total Annual Cost						**$**	**4,718,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	6,788
Per 1,000 gallons						$	20.83
UNIT COSTS (After Amortization)							
Per Acre-Foot of treated water						$	3,301
Per 1,000 gallons						$	10.13

WUGNAME:	Pecos, Madera Valley WSC
STRATEGY:	Partner with Madera Valley WSC & Expand Well Field
AMOUNT (ac-ft/yr):	8,960

CONSTRUCTION COSTS						
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Water wells	650 gpm	10	EA	$ 960,312	$	9,603,000
Well field collection		10	per well	$ 200,000	$	2,000,000
Land/Permit Acquisition		3000	AC	$ 1,544	$	4,632,000
Engineering and contingencies (35%)					$	4,061,000
Subtotal Well field					$	20,296,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission Pipeline	24 in.	52,800	LF	$ 188	$	9,901,000
Right-of-way easements		24	AC	$ 1,544	$	37,000
Engineering and Contingencies (30%)					$	2,970,000
Subtotal Pipeline					$	12,908,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Pump Stations	250 HP	1	EA	$ 1,589,300	$	1,589,000
Storage tank	0.80 MG	1	EA	$ 1,208,682	$	1,209,000
Power Connection		1	LS	$ 50,000	$	50,000
Land Acquisition		7	AC	$ 1,544	$	11,000
Engineering and Contingencies (35%)					$	997,000
Subtotal of Pump Station(s)					$	3,856,000
CONSTRUCTION TOTAL					$	37,060,000
Permitting and Mitigation					$	4,893,000
Interest During Construction	12 months				$	1,154,000
TOTAL COST					**$**	**43,107,000**
ANNUAL COSTS						
Debt Service (3.5% for 20 years)					$	3,033,000
Electricity ($0.08 kWh)					$	250,000
Operation & Maintenance					$	543,000
Total Annual Costs					**$**	**3,826,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	427
Per 1,000 Gallons					$	1.31
UNIT COSTS (After Amortization)						
Per Acre-Foot					$	89
Per 1,000 Gallons					$	0.27

WUGNAME:	Pecos County WCID #1
STRATEGY:	Develop Additional Edwards-Trinity Plateau Supplies
AMOUNT (ac-ft/yr):	250

CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	150 gpm	2	EA	$ 322,241	$ 644,000
Well field collection	6 in.	500	LF	$ 35	$ 18,000
Elevated Storage Tank	0.50 MG	1	EA	$ 1,951,948	$ 1,952,000
Land Acquisition		1	AC	$ 1,544	$ 2,000
Engineering and contingencies (35%)					$ 915,000
Subtotal Well field					$ 3,531,000
CONSTRUCTION TOTAL					$ 3,531,000
Permitting and Mitigation					$ 2,000
Interest During Construction	12 months				$ 97,000
TOTAL COST					**$ 3,630,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$ 255,000
Electricity ($0.08 kWh)					$ 6,000
Operation & Maintenance					$ 45,000
Total Annual Costs					**$ 306,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,224
Per 1,000 Gallons					$ 3.76
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 204
Per 1,000 Gallons					$ 0.63

WUGNAME:	Pecos County WCID #1
STRATEGY:	Transmission Pipeline Replacement
AMOUNT (ac-ft/yr):	750

CONSTRUCTION COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Replacement	18 in.	105,600	LF	$ 153	$ 16,113,000
Engineering and Contingencies (30%)					$ 4,834,000
Subtotal Pipeline					$ 20,947,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	165 HP	2	EA	$ 1,172,100	$ 2,344,000
Storage tank	0.07 MG	1	EA	$ 856,815	$ 857,000
Power Connection		2	LS	$ 50,000	$ 100,000
Engineering and Contingencies (35%)					$ 1,155,000
Subtotal of Pump Station(s)					$ 4,456,000
CONSTRUCTION TOTAL					$ 25,403,000
Interest During Construction	12 months				$ 699,000
TOTAL COST					**$ 26,102,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$ 1,837,000
Electricity ($0.08 kWh)					$ 18,000
Operation & Maintenance					$ 220,000
Total Annual Costs					**$ 2,075,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 2,767
Per 1,000 Gallons					$ 8.49
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 317
Per 1,000 Gallons					$ 0.97

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Reeves County Mining - Develop Additional Groundwater (Pecos Valley Alluvium)

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$12,439,000
TOTAL COST OF FACILITIES	**$12,439,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$4,354,000
Environmental & Archaeology Studies and Mitigation	$162,000
Land Acquisition and Surveying (38 acres)	$42,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$468,000
TOTAL COST OF PROJECT	**$17,465,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,229,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$124,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treamtent Facility	$0
Pumping Energy Costs (5528792 kW-hr @ 0.08 $/kW-hr)	$442,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,795,000**
Available Project Yield (acft/yr)	10,400
Annual Cost of Water ($ per acft), based on PF=1	$173
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$54
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.53
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.17

HK *9/23/2019*

WUGNAME:	Bronte, Ballinger, Winters, and Robert Lee	
STRATEGY:	Regional System from Fort Phantom Hill to Runnels and Coke Counties	
AMOUNT (ac-ft/yr):	Winters	175
	Ballinger	500
	Bronte	350
	Robert Lee	130
	Total	1,155

CONSTRUCTION COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	12 in	237,600	LF	$ 96	$ 22,805,000
Transmission pipeline	10 in	105,600	LF	$ 76	$ 7,996,000
Transmission pipeline	8 in	79,200	LF	$ 55	$ 4,393,000
Right-of-way easements		158	AC	$ 1,266	$ 199,000
Engineering and Contingencies (30%)					$ 10,558,200
Subtotal Pipeline					$ 45,951,200

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Intake Pump Station	875 HP	1	EA	$ 17,053,700	$ 17,054,000
Pump Stations	875 HP	3	EA	$ 5,361,700	$ 16,085,000
Pump Stations	90 HP	2	EA	$ 960,400	$ 1,921,000
Storage tank	1 MGD	6	EA	$ 1,296,813	$ 7,781,000
Power Connection		1	LS	$ 552,000	$ 552,000
Engineering and Contingencies (35%)					$ 9,219,000
Subtotal of Pump Station(s)					$ 52,612,000

CONSTRUCTION TOTAL		$ 98,563,000
Permitting and Mitigation		$ 2,000,000
Interest During Construction	12 months	$ 2,765,000
TOTAL COST		**$ 103,328,000**

ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$ 7,270,000
Electricity ($0.08 kWh)	$ 209,000
Operation & Maintenance	$ 1,306,000
Total Annual Costs	**$ 8,785,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$ 7,606
Per 1,000 Gallons	$ 23.34
UNIT COSTS (After Amortization)	
Per Acre-Foot	$ 1,312
Per 1,000 Gallons	$ 4.03

WUGNAME:	Bronte, Ballinger, Winters, and Robert Lee	
STRATEGY:	Lake Brownwood to Runnels and Coke Counties	
AMOUNT (ac-ft/yr):	Winters	729
	Ballinger	1345
	Bronte	280
	Robert Lee	448
	Total	2,802

CONSTRUCTION COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	20 in.	230,936	LF	$ 153	$ 35,238,000
Transmission pipeline	18 in.	93,471	LF	$ 135	$ 12,630,000
Transmission pipeline	12 in.	61,797	LF	$ 83	$ 5,113,000
Transmission pipeline	10 in.	54,357	LF	$ 65	$ 3,548,000
Right-of-way easements		202	AC	$ 1,724	$ 349,000
Engineering and Contingencies (30%)					$ 16,958,700
Subtotal Pipeline					$ 73,836,700

Pump Station	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Station at Lake Brownwood	700 HP	1	LS	$ 14,177,100	$ 14,177,000
Booster Station #1	700 HP	1	LS	$ 4,322,000	$ 4,322,000
Storage Tank at Booster Station #1	0.75 MG	1	LS	$ 677,686	$ 677,686
Booster Station #2	700 HP	1	LS	$ 4,322,000	$ 4,322,000
Storage Tank at Booster Station #2	0.75 MG	1	LS	$ 677,686	$ 677,686
Storage Tank at High Point	0.75 MG	1	LS	$ 677,686	$ 677,686
Outlet structure at Valley Creek		1	LS	$ 172,000	$ 172,000
Booster Station #3	400 HP	1	LS	$ 2,509,800	$ 2,509,800
Storage Tank at Booster Station #3	0.50 MG	1	LS	$ 583,324	$ 583,324
Engineering and Contingencies (35%)					$ 9,841,713
Subtotal of Pump Station(s)					$ 37,960,894

CONSTRUCTION TOTAL		$ 111,798,000
Permitting and Mitigation		$ 555,000
Interest During Construction	12 months	$ 3,090,000
TOTAL COST		**$ 115,443,000**

ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$ 8,123,000
Electricity ($0.08 kWh)	$ 221,333
Operation & Maintenance	$ 1,226,000
Raw Water Purchase	$ 1,370,000
Total Annual Costs	**$ 10,940,333**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$ 3,904
Per 1,000 Gallons	$ 11.98
UNIT COSTS (After Amortization)	
Per Acre-Foot	$ 1,005
Per 1,000 Gallons	$ 3.09

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Robert Lee - Develop Edwards-Trinity-Plateua Supplies in Nolan Co.

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Transmission Pipeline (6 in dia., 15.1 miles)	$2,181,000
Well Fields (Wells, Pumps, and Piping)	$555,000
TOTAL COST OF FACILITIES	**$2,736,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$849,000
Environmental & Archaeology Studies and Mitigation	$392,000
Land Acquisition and Surveying (40 acres)	$65,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$112,000
TOTAL COST OF PROJECT	**$4,154,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$292,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$27,000
Pumping Energy Costs (39439 kW-hr @ 0.08 $/kW-hr)	$3,000
TOTAL ANNUAL COST	**$322,000**
Available Project Yield (acft/yr)	75
Annual Cost of Water ($ per acft), based on PF=2	$4,293
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$400
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$13.17
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.23

HK *8/13/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Robert Lee - Develop Edwards Trinity Plateau Aquifer Supplies in Tom Green County

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Transmission Pipeline (6 in dia., 15 miles)	$2,008,000
Primary Pump Stations (0.3 MGD)	$892,000
Well Fields (Wells, Pumps, and Piping)	$370,000
TOTAL COST OF FACILITIES	**$4,967,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,638,000
Environmental & Archaeology Studies and Mitigation	$394,000
Land Acquisition and Surveying (48 acres)	$78,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$195,000
TOTAL COST OF PROJECT	**$7,272,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$512,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$32,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$45,000
Pumping Energy Costs (146536 kW-hr @ 0.08 $/kW-hr)	$12,000
TOTAL ANNUAL COST	**$601,000**
Available Project Yield (acft/yr)	160
Annual Cost of Water ($ per acft), based on PF=2	$3,756
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$556
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$11.53
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.71

HK *9/20/2019*

WUGNAME:	Robert Lee
STRATEGY:	Repair and Expand Water Treatment Plant
AMOUNT (ac-ft/yr):	335

CONSTRUCTION COSTS

Infrastructure Improvemens	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water Treatment Plant	0.6 MGD	1	LS	$ 4,247,000	$ 4,247,000
Additional Storage	0.1 MG	1	LS	$ 432,000	$ 432,000
Other Improvements		1	LS	$ 100,000	$ 100,000
Engineering and Contingencies (35%)					$ 1,673,000
Subtotal Infrastructure Improvements					$ 6,452,000
CONSTRUCTION TOTAL					$ 6,452,000
Interest During Construction	6 months				$ 89,000
TOTAL COST					**$ 6,541,000**
ANNUAL COSTS*					
Debt Service (3.5% for 20 years)*					$ 460,000
Operation & Maintenance					$ 430,000
Total Annual Costs					**$ 890,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 2,657
Per 1,000 Gallons					$ 8.15
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 1,284
Per 1,000 Gallons					$ 3.94

WUGNAME:	San Angelo
STRATEGY:	Concho River Water Project
AMOUNT (ac-ft/yr):	8,400

CONSTRUCTION COSTS

Water Reclamation Facility	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water Reclamation Facility Improvements	12 MGD	1	LS	$22,800,000	$22,800,000
Subtotal of Water Reclamation Facility					$22,800,000

Water Treatment Plant	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water Treatment Plant Improvements	7.5 MGD	1	LS	$28,082,000	$28,082,000
Subtotal of Water Treatment Plant					$28,082,000

Conveyance Infrastructure	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Discharge Pipeline from Water Reclamation Facility to Concho River	36 in	6,865	LF	$286	$1,960,000
Concho River Intake	7.5 MGD	1	LS	$300,000	$300,000
Transfer Pump Station to Water Treatment Plant	585 HP	1	LS	$2,500,000	$2,500,000
Pipeline to Water Treatment Plant	30 in	86,590	LF	$250	$21,642,000
Subtotal of Conveyance Infrastructure					$26,402,000

Subtotal	$ 77,284,000
Contingency (30%)	$ 23,185,000
CONSTRUCTION TOTAL	$ 100,469,000
Engineering (15%)	$ 15,070,000
Permitting and Mitigation (1%)	$ 1,000,000
Land Acquisition and Survey - 40 ft Pipeline Easements	$ 322,000
TOTAL COST	**$ 116,861,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$ 8,220,000
Operation & Maintenance	$ 2,261,000
Total Annual Costs	**$ 10,481,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$ 1,250
Per 1,000 Gallons	$ 3.84

UNIT COSTS (After Amortization)

Per Acre-Foot	$ 269
Per 1,000 Gallons	$ 0.83

WUGNAME:	San Angelo
STRATEGY:	Desalination of Brackish Groundwater
AMOUNT (ac-ft/yr):	11,200

CONSTRUCTION COSTS

Treatment Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
RO Treatment	10 MG	1	LS	$ 33,804,663	$ 33,805,000
Engineering and Contingencies (35%)					$ 11,832,000
Subtotal of Treatment					$ 45,637,000

Reject Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Disposal wells	1000 gpm	5	LS	$ 3,133,656	$ 15,668,000
Engineering and Contingencies (35%)					$ 5,484,000
Subtotal of Reject Facilities					$ 21,152,000

CONSTRUCTION TOTAL		$ 66,789,000
Permitting and Mitigation		$ 234,000
Interest During Construction	24 mos.	$ 3,686,000
TOTAL COST		**$ 70,709,000**
ANNUAL COSTS*		
Debt Service (3.5% for 20 years)		$ 4,975,000
Operation & Maintenance		$ 6,918,000
Total Annual Costs		**$ 11,893,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water		$ 1,062
Per 1,000 Gallons		$ 3.26
UNIT COSTS (After Amortization)		
Per Acre-Foot		$ 618
Per 1,000 Gallons		$ 1.90

WUGNAME:	San Angelo
STRATEGY:	Development of Edwards-Trinity Aquifer supplies in Schleicher County
AMOUNT (ac-ft/yr):	4,500

CONSTRUCTION COSTS

Well Field Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Groundwater Wells	250 gpm	18	EA	$ 315,000	$ 5,670,000
Well Field Piping	6 in	38,000	LF	$ 60	$ 2,280,000
Well Field Piping	8 in	1,000	LF	$ 80	$ 80,000
Well Field Piping	10 in	3,780	LF	$ 100	$ 378,000
Well Field Piping	14 in	1,500	LF	$ 140	$ 210,000
Well Field Piping	16 in	3,780	LF	$ 160	$ 605,000
Well Field Piping	20 in	1,500	LF	$ 200	$ 300,000
Well Field Storage Tank	0.25 MGD	1	EA	$ 250,000	$ 250,000
Site Roadways/Improvements					$ 1,239,000
Fencing/SCADA/Electrical					$ 2,196,000
Subtotal Well Field Facilities					$ 13,208,000

Conveyance Infrastructure to Water Treatment Plant	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	20 in	295,680	LF	$ 139	$ 40,952,000
Pump Station	175 HP	1	LS	$ 1,750,000	$ 1,750,000
Subtotal Conveyance Infrastucture					$ 42,702,000

Subtotal	$ 55,910,000
Contingency (30%)	$ 16,770,000
CONSTRUCTION TOTAL	$ 72,680,000
Land Acquisition and Surveying - Fees and 40 ft Pipeline Easements (4,480 Acres)	$ 17,819,000
Engineering (15%)	$ 10,900,000
Permitting and Mitigation (1%)	$ 730,000
TOTAL COST	**$ 102,100,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$ 7,180,000
Operation & Maintenance	$ 941,000
Total Annual Costs	**$ 8,121,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$ 1,800
Per 1,000 Gallons	$ 5.52

UNIT COSTS (After Amortization)

Per Acre-Foot	$ 209
Per 1,000 Gallons	$ 0.64

WUGNAME:	San Angelo
STRATEGY:	Hickory Well Field Expansion in McCulloch County
AMOUNT (ac-ft/yr):	3,040

CONSTRUCTION COSTS

Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Aquifer Development (Wells)	500 gpm	5	EA	$ 3,173,600	$ 15,868,000
Production, Transmission, and Piping (includes Booster Pump Station Upgrades)					$ 7,420,000
Subtotal Well Field					$ 23,288,000
Water Treatment					
Groundwater Treatment Plant Expansion	4 MGD	1	LS	$ 9,808,000	$ 9,808,000
Clearwells		1	EA	$ 7,524,000	$ 7,524,000
Subtotal of Treatment					$ 17,332,000
CONSTRUCTION TOTAL					**$ 40,620,000**
Engineering Fees					$ 3,205,000
Special Services					$ 1,673,000
Fiscal Services					$ 1,765,000
Contingency					$ 8,228,000
TOTAL COST					**$ 55,491,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$ 3,904,000
Operation & Maintenance					$ 3,153,000
Total Annual Costs					**$ 7,057,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 2,321
Per 1,000 Gallons					$ 7.12
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 1,037
Per 1,000 Gallons					$ 3.18

WUGNAME:	San Angelo
STRATEGY:	Development of Pecos Valley - Edwards Trinity Plateau Aquifer supplies in Pecos County
STRATEGY NUMBER:	
AMOUNT (ac-ft/yr):	10,800

CONSTRUCTION COSTS

Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Groundwater rights lease		1,260	AC	$ 500	$ 630,000
Water wells	1000 gpm	15	EA	$ 564,351	$ 8,465,000
Well field piping	12 in	33,000	LF	$ 68	$ 2,253,000
Well Field Storage Tank	0.5 MG	1	EA	$ 1,077,270	$ 1,077,000
Engineering and contingencies (35%)					$ 4,349,000
Subtotal Well Field					$ 16,774,000

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	30 in.	982,080	LF	$ 197	$ 193,360,000
Right-of-way easements		451	AC	$ 1,545	$ 697,000
Engineering and Contingencies (30%)					$ 58,008,000
Subtotal Pipeline					$ 252,065,000

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Station	1070 HP	4	EA	$ 6,492,800	$ 25,971,000
Storage tank	1.0 MG	3	EA	$ 1,296,813	$ 3,890,000
Power Connection		4	LS	$ 642,000	$ 642,000
Engineering and Contingencies (35%)					$ 10,451,000
Subtotal of Pump Station(s)					$ 40,954,000

CONSTRUCTION TOTAL		$ 309,793,000
Permitting and Mitigation		$ 4,806,000
Interest During Construction	18 months	$ 12,977,000
TOTAL COST		**$ 327,576,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$ 23,049,000
Electricity ($0.08 kWh)	$ 1,945,000
Operation & Maintenance	$ 3,129,000
Total Annual Costs	**$ 28,123,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$ 2,604
Per 1,000 Gallons	$ 7.99

UNIT COSTS (After Amortization)

Per Acre-Foot	$ 470
Per 1,000 Gallons	$ 1.44

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Scurry County Manufacturing - Develop Other Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$472,000
TOTAL COST OF FACILITIES	**$472,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$165,000
Environmental & Archaeology Studies and Mitigation	$15,000
Land Acquisition and Surveying (3 acres)	$6,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$19,000
TOTAL COST OF PROJECT	**$677,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$48,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,000
Pumping Energy Costs (48576 kW-hr @ 0.08 $/kW-hr)	$4,000
TOTAL ANNUAL COST	**$57,000**
Available Project Yield (acft/yr)	160
Annual Cost of Water ($ per acft), based on PF=1	$356
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$56
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$1.09
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.17

HK *9/24/2019*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Sonora - Develop Additional Edwards-Trinity-Plateau Aquifer Supplies

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$310,000
TOTAL COST OF FACILITIES	**$310,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$108,000
Environmental & Archaeology Studies and Mitigation	$5,000
Land Acquisition and Surveying (1 acres)	$2,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$12,000
TOTAL COST OF PROJECT	**$437,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$31,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,000
Pumping Energy Costs (17520 kW-hr @ 0.08 $/kW-hr)	$1,000
TOTAL ANNUAL COST	**$35,000**
Available Project Yield (acft/yr)	35
Annual Cost of Water ($ per acft), based on PF=1	$1,000
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$114
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$3.07
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.35

HK *1/10/2020*

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Texland Great Plains - Develop Ogallala Aquifer Supplies from Andrews or Gaines County

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$267,000
TOTAL COST OF FACILITIES	**$267,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$93,000
Environmental & Archaeology Studies and Mitigation	$8,000
Land Acquisition and Surveying (1 acres)	$1,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$11,000
TOTAL COST OF PROJECT	**$380,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$27,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,000
Pumping Energy Costs (96248 kW-hr @ 0.08 $/kW-hr)	$8,000
TOTAL ANNUAL COST	**$38,000**
Available Project Yield (acft/yr)	200
Annual Cost of Water ($ per acft), based on PF=1	$190
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$55
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.58
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.17

HK *8/12/2019*

WUGNAME:	Winters						
STRATEGY:	Purchase from Provider						
AMOUNT (ac-ft/yr):	220						
CONSTRUCTION COSTS							
Transmission Pipeline							
Pipeline	6 in.	21,120	LF	$	30	$	641,000
Right of Way Easements		10	AC	$	1,544	$	15,000
Engineering and contingencies (30%)						$	192,000
Transmission Subtotal						$	848,000
CONSTRUCTION TOTAL						$	848,000
Permitting and Mitigation						$	100,000
Interest During Construction	12 months					$	26,000
TOTAL COST						**$**	**974,000**
ANNUAL COSTS							
Debt Service (3.5% for 20 years)						$	69,000
Electricity ($0.08 kWh)						$	-
Operation & Maintenance						$	6,000
Purchase Water Cost						$	72,000
Total Annual Costs						**$**	**147,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	668
Per 1,000 Gallons						$	2.05
UNIT COSTS (After Amortization)							
Per Acre-Foot						$	355
Per 1,000 Gallons						$	1.09