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# MEMORANDUM

**TO:** File, CMD07215

**FROM:** Simone Kiel, Rachel Ickert

**SUBJECT:** Cost Estimating for SB1 Projects (Region F)

**DATE:** August 6, 2008

## Introduction

1. The evaluation of water management strategies requires developing cost estimates. Guidance for cost estimates may be found in the TWDB's "General Guidelines for Regional Water Plan Development (2007-2012)", Section 4.1.6. Costs are to be reported in second quarter 2007 dollars.

2. All cost estimates should be checked by construction services and discipline leaders in the appropriate areas, including Environmental Science.

3. We have developed standard unit costs for installed pipe, pump stations and standard treatment facilities developed from experience with similar projects throughout the State of Texas. These estimates are to be used for all SB1 projects, unless more detailed costing is available. All unit costs include the contractors' mobilization, overhead and profit. The unit costs **do not** include engineering, contingency, financial and legal services, costs for land and rights-of-way, permits, environmental and archeological studies, or mitigation.

4. The information presented in this memorandum is intended to be 'rule-of-thumb' guidance. Specific situations may call for alteration of the procedures and costs.

5. It is important that when comparing alternatives that the cost estimates be similar and include similar items. If an existing reliable cost estimate is available for a project it should be used where appropriate. All cost estimates must meet the requirements set forth in the TWDB's "General Guidelines for Regional Water Plan Development (2007-2012)".

6. The cost estimates have two components:

   - Initial capital costs, including engineering and construction costs, and
   - Average annual costs, including annual operation and maintenance costs and debt service.



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TWDB does not require the consultant to determine life cycle or present value analysis. In general, unless you are putting together a complex scenario with phased implementation or are planning on using State funding, annual costs are sufficient for comparison purposes and a life-cycle analysis is not required.

***ASSUMPTIONS FOR CAPITAL COSTS:***

**Conveyance Systems**

Standard pipeline costs used for these cost estimates are shown in Table 1. Pump station costs are based on required Horsepower capacity and are listed in Table 2. The power capacity is to be determined from the hydraulic analyses conducted from a planning level hydraulic grade line evaluation (or detailed analysis if available). Pipelines and pump stations are to be sized for peak pumping capacity.

- Pump efficiency is assumed to be 75 percent.
- Peaking factor of 2 times the average demand for strategies when the water is pumped directly to a water treatment plant. (or historical peaking factor, if available)
- Peaking factor of 1.2 to 1.5 is to be used if there are additional water sources and/or the water is transported to a terminal storage facility.
- Ground storage is to be provided at each booster pump station along the transmission line.
- Ground storage tanks should provide sufficient storage for 2.5 to 4 hours of pumping at peak capacity. Costs for ground storage are shown in Table 3. Covered storage tanks are used for all strategies transporting treated water.
- Costs for elevated storage tanks are shown in Table 3A.

**Water Treatment Plants**

Water treatment plants are to be sized for peak day capacity (assume peaking factor of 2 if no specific data is available). Costs estimated for new conventional surface water treatment facilities and expansions of existing facilities are listed in Table 4. Conventional treatment does not include advanced technologies, such as ozone or UV treatment. **All treatment plants are to be sized for finished water capacity**.

- For reverse osmosis plants for surface water, increase construction costs shown on Table 4 by the amount shown on Table 5 for the appropriate size plant that will be used for RO. If groundwater is the raw water source, use only the costs in Table 5. These costs were based on actual cost estimates of similar facilities.
- The amount of reject water generated by reverse osmosis treatment is dependent upon the incoming quality of the raw water. Final treatment goals should be between 600 and 800 mg/l of TDS. (This provides a safety margin in meeting

secondary treatment standards.) For reverse osmosis treatment of brackish water (1,000 – 3,000 mg/l of TDS), assume that 20 percent of the raw water treated with membranes is discharged as reject water, unless project-specific data is available. For brackish water with TDS concentrations between 3,000 and 10,000 mg/l, assume 30% reject water. Desalination of seawater or very high TDS water will have a higher percent of reject water (50 to 60%). Minimal losses are assumed for conventional treatment facilities.

- Costs for ion exchange facilities are shown on Table 6. For these facilities it is assumed that 2 to 3 percent of the raw water would be discharged as reject water.

**New Groundwater Wells**

For the Groundwater Study for Region F, LBG-Guyton Associates prepared a project-specific table of well field costs. Where project-specific information is not available, refer to Table 7. The pumping capacity should be for peak pumpage. Well depth will be estimated by county and aquifer.

For expansion of existing well fields for municipal water providers, an additional $150,000 per expansion for connection to the existing distribution system is assumed. Connection costs and conveyance systems for new well fields will be determined on a case-by-case basis.

**New Reservoirs**

Site-specific cost estimates will be made for reservoir sites. The elements required for reservoir sites are included in Table 8. Lake intake structures for new reservoirs will be determined on a case-by-case basis. Generally, costs for construction of such facilities prior to filling of the reservoir will be less than shown on Table 2.

**Other Costs**

- Engineering, contingency, construction management, financial and legal costs are to be estimated at 30 percent of construction cost for pipelines and 35 percent of construction costs for pump stations, treatment facilities and reservoir projects. (Exhibit B)
- Permitting and mitigation for transmission and treatment projects are to be estimated at 1 percent of the total construction costs. For reservoirs, mitigation and permitting costs are assumed equal to twice the land purchase cost, unless site specific data is available.
- Right-of-way costs for transmission lines are estimated at $2,000 per acre of ROW. If a small pipeline follows existing right-of-ways (such as highways), no

additional right-of-way cost is assumed. Large pipelines will require ROW costs regardless of routing.

Interest during construction is the total of interest accrued at the end of the construction period using a 6 percent annual interest rate on total borrowed funds, less a 4 percent rate of return on investment of unspent funds. This is calculated assuming that the total estimated project cost (excluding interest during construction) would be drawn down at a constant rate per month during the construction period. Factors were determined for different lengths of time for project construction. These factors were used in cost estimating and are presented in Table 9.

***ASSUMPTIONS FOR ANNUAL COSTS:***

Annual costs are to be estimated using the following assumptions:

- Debt service for all transmission and treatment facilities is to be annualized over 20 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 6 percent.
- Water purchase costs are to be based on wholesale rates reported by the selling entity when possible. In lieu of known rates, a typical regional cost for treated water and raw water will be developed.
- Operation and Maintenance costs are to be calculated based on the construction cost of the capital improvement. Engineering, permitting, etc. should not be included as a basis for this calculation. However, a 20% allowance for construction contingencies should be included for all O&M calculations. Per the "General Guidelines for Regional Water Plan Development (2007-2012)", O&M should be calculated at:
    - 1 percent of the construction costs for pipelines
    - 1.5 percent for dams
    - 2.5 percent of the construction costs for pump stations, storage tanks, meters and SCADA systems
    - Assume O&M costs for treatment facilities are included in the treatment cost
- Surface water treatment costs are estimated at $0.65 per 1,000 gallons for conventional plants and $1.15 per 1,000 gallons of finished water for surface water plants with reverse osmosis. Assume cost for treatment of groundwater by reverse osmosis is $0.60 per 1,000 gallons. If only a portion of the water will be treated with RO, apply costs proportionately. Treatment for nitrates is estimated

at $0.35 per 1,000 gallons. Treatment for groundwater (assuming disinfection and labor only) is estimated at $0.25 per 1,000 gallons. These costs include chemicals, labor and electricity for treatment and should be applied to amount of finished water receiving the treatment. Electricity associated with moving raw water to the treatment facility is calculated separately (this includes electricity associated with groundwater well fields).

- Reject water disposal for treatment of brackish water is to be estimated on a case-by-case basis depending on disposal method. If no method is defined, assume a cost of $0.30 per 1,000 gallons of reject water. [This value represents a moderate cost estimate. If the water were returned to a brackish surface water source, the costs would be negligible. If evaporation beds or deep well injection were used, the costs could be much higher.]

- Pumping costs are to be estimated using an electricity rate of $0.09 per Kilowatt Hour. If local data is available, this can be used.

**Table 1**

**Pipeline Costs (does not include ROW)**

| Diameter | Base Installed Cost | Rural Cost with Appurtenances | Urban Cost with Appurtenances | Assumed ROW Width | Assumed Temporary Easement Width |
|---|---|---|---|---|---|
| (Inches) | ($/Foot) | ($/Foot) | ($/Foot) | (Feet) | (Feet) |
| 6 | 22 | 24 | 36 | 15 | 50 |
| 8 | 29 | 32 | 48 | 15 | 50 |
| 10 | 36 | 40 | 60 | 20 | 60 |
| 12 | 44 | 48 | 72 | 20 | 60 |
| 14 | 51 | 56 | 84 | 20 | 60 |
| 16 | 58 | 64 | 96 | 20 | 60 |
| 18 | 65 | 72 | 108 | 20 | 60 |
| 20 | 76 | 84 | 126 | 20 | 60 |
| 24 | 98 | 108 | 162 | 20 | 60 |
| 30 | 123 | 135 | 200 | 20 | 60 |
| 36 | 155 | 171 | 257 | 20 | 60 |
| 42 | 182 | 200 | 300 | 30 | 70 |
| 48 | 227 | 250 | 348 | 30 | 70 |
| 54 | 268 | 295 | 405 | 30 | 70 |
| 60 | 309 | 340 | 460 | 30 | 70 |
| 66 | 373 | 410 | 550 | 30 | 70 |
| 72 | 436 | 480 | 648 | 30 | 70 |
| 78 | 500 | 550 | 743 | 40 | 80 |
| 84 | 573 | 630 | 850 | 40 | 80 |
| 90 | 655 | 720 | 972 | 40 | 80 |
| 96 | 727 | 800 | 1,080 | 40 | 80 |
| 102 | 809 | 890 | 1,200 | 40 | 80 |
| 108 | 909 | 1,000 | 1,350 | 40 | 80 |
| 114 | 1,000 | 1,100 | 1,485 | 50 | 100 |
| 120 | 1,127 | 1,240 | 1,675 | 50 | 100 |
| 132 | 1,364 | 1,500 | 2,025 | 50 | 100 |
| 144 | 1,609 | 1,770 | 2,390 | 50 | 100 |

Notes: a Costs are based on PVC class 150 pipe for the smaller long, rural pipelines.
b Appurtenances assumed to be 10% of installed pipe costs.
c For urban pipelines, costs were increased by 35% for cost with appurtenances. For pipes 42"and smaller, additional costs were added.
d Adjust costs for obstacles (rock, forested areas) and easy conditions (soft soil in flat country).

**Table 2**
**Pump Station Costs for Transmission Systems**

| | Booster PS | Lake PS with Intake |
|---|---|---|
| **Horsepower** | **Costs** | **Costs** |
| 5 | $480,000 | |
| 10 | $500,000 | |
| 20 | $525,000 | |
| 25 | $550,000 | |
| 50 | $600,000 | |
| 100 | $690,000 | |
| 200 | $1,040,000 | $1,380,000 |
| 300 | $1,340,000 | $1,780,000 |
| 400 | $1,670,000 | $2,220,000 |
| 500 | $1,890,000 | $2,510,000 |
| 600 | $2,000,000 | $2,660,000 |
| 700 | $2,110,000 | $2,810,000 |
| 800 | $2,340,000 | $3,110,000 |
| 900 | $2,450,000 | $3,260,000 |
| 1,000 | $2,670,000 | $3,551,000 |
| 2,000 | $3,890,000 | $5,174,000 |
| 3,000 | $4,670,000 | $6,211,000 |
| 4,000 | $5,670,000 | $7,541,000 |
| 5,000 | $6,500,000 | $8,645,000 |
| 6,000 | $7,500,000 | $9,975,000 |
| 7,000 | $8,300,000 | $11,039,000 |
| 8,000 | $9,200,000 | $12,236,000 |
| 9,000 | $10,200,000 | $13,566,000 |
| 10,000 | $11,400,000 | $15,162,000 |
| 20,000 | $19,000,000 | $25,270,000 |
| 30,000 | $25,000,000 | $33,250,000 |
| 40,000 | $31,000,000 | $41,230,000 |
| 50,000 | $36,000,000 | $47,880,000 |
| 60,000 | $41,000,000 | $54,530,000 |
| 70,000 | $46,000,000 | $61,180,000 |

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

**Table 3**
**Ground Storage Tanks**

| Size (MG) | With Roof | Without Roof |
|---|---|---|
| 0.05 | $116,000 | $99,000 |
| 0.1 | $170,000 | $145,000 |
| 0.5 | $407,000 | $310,000 |
| 1.0 | $590,000 | $436,000 |
| 1.5 | $740,000 | $550,000 |
| 2.0 | $890,000 | $664,000 |
| 2.5 | $1,010,000 | $764,000 |
| 3.0 | $1,130,000 | $863,000 |
| 3.5 | $1,260,000 | $952,000 |
| 4.0 | $1,400,000 | $1,040,000 |
| 5.0 | $1,600,000 | $1,212,000 |
| 6.0 | $1,930,000 | $1,400,000 |
| 7.0 | $2,275,000 | $1,619,000 |
| 8.0 | $2,625,000 | $1,925,000 |
| 10.0 | $3,485,000 | $2,560,000 |
| 14.0 | $5,205,000 | $3,800,000 |

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

**Table 3A**
**Elevated Storage Tanks**

| Size (MG) | Cost |
|---|---|
| 0.5 | $1,240,000 |
| 0.75 | $1,430,000 |
| 1.0 | $1,620,000 |
| 1.5 | $2,140,000 |
| 2.0 | $2,670,000 |
| 2.5 | $3,140,000 |

**Table 4**
**Conventional Water Treatment Plant Costs**

| Plant Capacity (MGD) | New Conventional Plants | Conventional Plant Expansions |
|---|---|---|
| 1 | $5,400,000 | $2,700,000 |
| 3 | $9,900,000 | $6,900,000 |
| 7 | $16,300,000 | $12,000,000 |
| 10 | $20,800,000 | $14,900,000 |
| 15 | $27,100,000 | $19,400,000 |
| 20 | $32,900,000 | $24,300,000 |
| 30 | $44,300,000 | $33,200,000 |
| 40 | $55,800,000 | $42,300,000 |
| 50 | $67,500,000 | $50,600,000 |
| 60 | $79,000,000 | $59,100,000 |
| 70 | $89,900,000 | $67,200,000 |
| 80 | $100,400,000 | $75,700,000 |
| 90 | $110,200,000 | $84,200,000 |
| 100 | $121,100,000 | $93,200,000 |

Note: Plant is sized for finished peak day capacity.

**Table 5**
**Additional Cost for Reverse Osmosis Treatment**

| Plant Capacity (MGD) | Reverse Osmosis Facilities Cost |
|---|---|
| 0.5 | $1,200,000 |
| 1 | $1,500,000 |
| 3 | $3,000,000 |
| 7 | $6,700,000 |
| 10 | $9,100,000 |
| 15 | $13,200,000 |
| 20 | $17,000,000 |
| 30 | $23,700,000 |
| 40 | $29,200,000 |
| 50 | $34,000,000 |
| 60 | $37,900,000 |

Note: Plant is sized for finished water capacity.

**Table 6**
**Groundwater Nitrate Treatment**

| Treatment Capacity (MGD) | Ion Exchange Plant Cost |
|---|---|
| 0.25 | $700,000 |
| 1.0 | $1,600,000 |
| 3.0 | $3,600,000 |

Note: Plant is sized for finished water capacity.

**Table 7**
**Cost Elements for Water Wells**

Cost per municipal well = 1.55*(25,500 + (70*a) + (350*b))

Cost per agricultural well = 10,000 + 70*a + 350*b, where:

a = pump rate (gpm), b = well depth (feet)

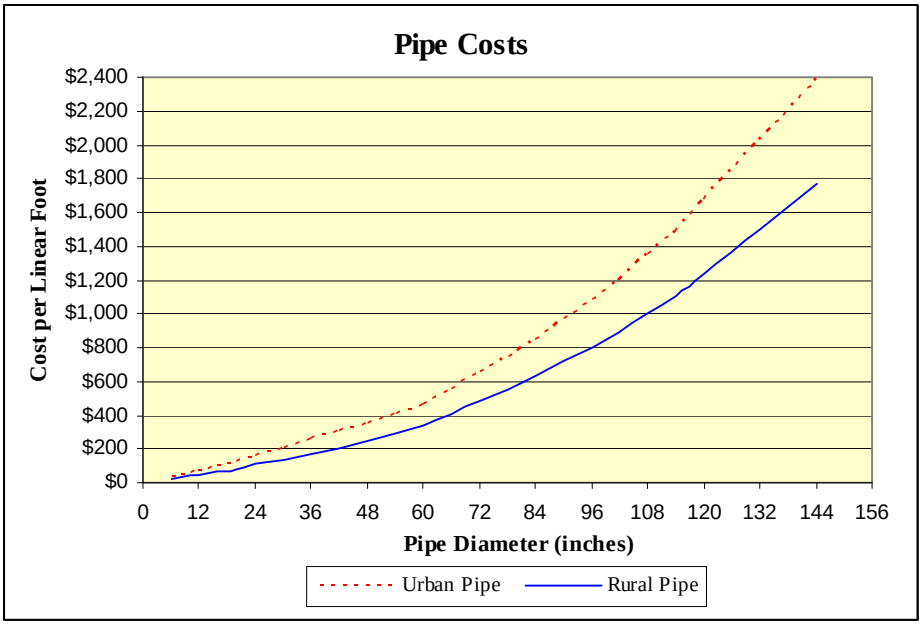
**Table 8**
**Cost Elements for Reservoir Sites**

| Capital Costs | Studies and Permitting |
|---|---|
| Embankment | Environmental and archeological studies |
| Spillway | Permitting |
| Outlet works | Terrestrial mitigation tracts |
| Site work | Engineering and contingencies |
| Land | Construction management |
| Administrative facilities | |
| Supplemental pumping facilities | |
| Flood protection | |

**Table 9**
**Factors for Interest During Construction**

| Construction Period | Factor |
|---|---|
| 6 months | 0.02167 |
| 12 months | 0.04167 |
| 18 months | 0.06167 |
| 24 months | 0.08167 |
| 36 month construction | 0.12167 |

**Figure 1**



## Cost Estimate A-1

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Andrews | | |
| Quantity: | 300 | Ac-Ft/Yr | |
| Peak: | 0.4 | MGD | (1.5:1 peak) |
| Distance: | 20 | miles | |
| Static Head: | 0 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 10 in | 105,600 | LF | $40 | $4,224,000 |
| Right of Way Easements (ROW) | 20 ft | 48 | Ac | $2,000 | $96,000 |
| Engineering and Contingencies (30%) | | | | | $1,267,000 |
| **Subtotal of Pipeline** | | | | | **$5,587,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 10 HP | 1 | LS | $500,000 | $500,000 |
| Ground Storage Tank | 0.1 MG | 1 | LS | $170,000 | $170,000 |
| Engineering and Contingencies (35%) | | | | | $235,000 |
| **Subtotal of Pump Station** | | | | | **$905,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $765,000 | $765,000 |
| Connections to Transmission System | | 5 | EA | $10,000 | $50,000 |
| Engineering and Contingencies (35%) | | | | | $285,000 |
| **Subtotal of Well Field** | | | | | **$1,100,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$7,592,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$437,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$8,029,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $700,000 |
| Electricity ($0.09 kWh) | $11,000 |
| Operation & Maintenance | $96,000 |
| **Total Annual Costs** | **$807,000** |

| **UNIT COSTS (Until Amortized)** | |
|---|---|
| Per Acre-Foot | $2,690 |
| Per 1,000 Gallons | $8.30 |

| **UNIT COSTS (After Amortization)** | |
|---|---|
| Per Acre-Foot | $357 |
| Per 1,000 Gallons | $1.10 |

## Cost Estimate A-2

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Andrews | | |
| Quantity: | 300 | Ac-Ft/Yr | |
| Peak: | 0.4 | MGD | (1.5:1 peak) |
| Distance: | 20 | miles | |
| Static Head: | 100 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 10 in | 105,600 | LF | $40 | $4,224,000 |
| Right of Way Easements (ROW) | 20 ft | 48 | Ac | $2,000 | $96,000 |
| Engineering and Contingencies (30%) | | | | | $1,267,000 |
| **Subtotal of Pipeline** | | | | | **$5,587,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 20 HP | 1 | LS | $525,000 | $525,000 |
| Ground Storage Tank with Roof | 0.1 MG | 1 | LS | $170,000 | $170,000 |
| Engineering and Contingencies (35%) | | | | | $243,000 |
| **Subtotal of Pump Station** | | | | | **$938,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $765,000 | $765,000 |
| Connections to Transmission System | | 5 | EA | $10,000 | $50,000 |
| Engineering and Contingencies (35%) | | | | | $285,000 |
| **Subtotal of Well Field** | | | | | **$1,100,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$7,625,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$439,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$8,064,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $703,000 |
| Electricity ($0.09 kWh) | $15,000 |
| Operation & Maintenance | $96,000 |
| **Total Annual Costs** | **$814,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $2,713 |
| Per 1,000 Gallons | $8.33 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $370 |
| Per 1,000 Gallons | $1.14 |

## Cost Estimate A-3

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Coke-Runnels | | |
| Quantity: | 200 | Ac-Ft/Yr | |
| Peak: | 0.3 | MGD | (1.5:1 peak) |
| Distance: | 10 | miles | |
| Static Head: | 0 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 8 in | 52,800 | LF | $32 | $1,690,000 |
| Right of Way Easements (ROW) | 15 ft | 18 | Ac | $2,000 | $36,000 |
| Engineering and Contingencies (30%) | | | | | $507,000 |
| **Subtotal of Pipeline** | | | | | **$2,233,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 5 HP | 1 | LS | $480,000 | $480,000 |
| Ground Storage Tank with Roof | 0.05 MG | 1 | LS | $116,000 | $116,000 |
| Engineering and Contingencies (35%) | | | | | $209,000 |
| **Subtotal of Pump Station** | | | | | **$805,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $755,000 | $755,000 |
| Connections to Transmission System | | 5 | EA | $10,000 | $50,000 |
| Engineering and Contingencies (35%) | | | | | $282,000 |
| **Subtotal of Well Field** | | | | | **$1,087,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$4,125,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$238,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$4,363,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $380,000 |
| Electricity ($0.09 kWh) | $7,000 |
| Operation & Maintenance | $62,000 |
| **Total Annual Costs** | **$449,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $2,245 |
| Per 1,000 Gallons | $6.89 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $345 |
| Per 1,000 Gallons | $1.06 |

## Cost Estimate A-4

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Coke-Runnels | | |
| Quantity: | 200 | Ac-Ft/Yr | |
| Peak: | 0.3 | MGD | (1.5:1 peak) |
| Distance: | 10 | miles | |
| Static Head: | 50 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 8 in | 52,800 | LF | $32 | $1,690,000 |
| Right of Way Easements (ROW) | 15 ft | 18 | Ac | $2,000 | $36,000 |
| Engineering and Contingencies (30%) | | | | | $507,000 |
| **Subtotal of Pipeline** | | | | | **$2,233,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 10 HP | 1 | LS | $500,000 | $500,000 |
| Ground Storage Tank with Roof | 0.05 MG | 1 | LS | $116,000 | $116,000 |
| Engineering and Contingencies (35%) | | | | | $216,000 |
| **Subtotal of Pump Station** | | | | | **$832,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $755,000 | $755,000 |
| Connections to Transmission System | | 5 | EA | $10,000 | $50,000 |
| Engineering and Contingencies (35%) | | | | | $282,000 |
| **Subtotal of Well Field** | | | | | **$1,087,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$4,152,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$239,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$4,391,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $383,000 |
| Electricity ($0.09 kWh) | $8,000 |
| Operation & Maintenance | $63,000 |
| **Total Annual Costs** | **$454,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $2,270 |
| Per 1,000 Gallons | $6.97 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $355 |
| Per 1,000 Gallons | $1.09 |

## Cost Estimate A-5

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Well field: | Pecos Valley Counties (large) | | |
| Quantity: | 10,000 | Ac-Ft/Yr | |
| Peak: | 13.4 | MGD | (1.5:1 peak) |
| Distance: | 50 | miles | |
| Static Head: | 0 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 36 in | 264,000 | LF | $171 | $45,144,000 |
| Right of Way Easements (ROW) | 20 ft | 121 | Ac | $2,000 | $242,000 |
| Engineering and Contingencies (30%) | | | | | $13,543,000 |
| **Subtotal of Pipeline** | | | | | **$58,929,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 700 HP | 1 | LS | $2,110,000 | $2,110,000 |
| Ground Storage Tank with Roof | 2.3 MG | 1 | LS | $862,000 | $862,000 |
| Engineering and Contingencies (35%) | | | | | $1,040,000 |
| **Subtotal of Pump Station** | | | | | **$4,012,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $7,120,000 | $7,120,000 |
| Connections to Transmission System | | 10 | EA | $10,000 | $100,000 |
| Engineering and Contingencies (35%) | | | | | $2,527,000 |
| **Subtotal of Well Field** | | | | | **$9,747,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$72,688,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$4,186,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$76,874,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $6,702,000 |
| Electricity ($0.09 kWh) | $1,656,000 |
| Operation & Maintenance | $848,000 |
| **Total Annual Costs** | **$9,206,000** |

| | |
|---|---|
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $921 |
| Per 1,000 Gallons | $2.83 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $250 |
| Per 1,000 Gallons | $0.77 |

## Cost Estimate A-6

**Transmission Facilities for Groundwater Study**

| | | |
|---|---|---|
| Wellfield: | Pecos Valley Counties (large) | |
| Quantity: | 10,000 Ac-Ft/Yr | |
| Peak: | 13.4 MGD | (1.5:1 peak) |
| Distance: | 50 miles | |
| Static Head: | 200 ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 36 in | 264,000 | LF | $171 | $45,144,000 |
| Right of Way Easements (ROW) | 20 ft | 121 | Ac | $2,000 | $242,000 |
| Engineering and Contingencies (30%) | | | | | $13,543,000 |
| **Subtotal of Pipeline** | | | | | **$58,929,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 1300 HP | 1 | LS | $3,036,000 | $3,036,000 |
| Ground Storage Tank with Roof | 2.3 MG | 1 | LS | $862,000 | $862,000 |
| Engineering and Contingencies (35%) | | | | | $1,364,000 |
| **Subtotal of Pump Station** | | | | | **$5,262,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $7,120,000 | $7,120,000 |
| Connections to Transmission System | | 10 | EA | $10,000 | $100,000 |
| Engineering and Contingencies (35%) | | | | | $2,527,000 |
| **Subtotal of Well Field** | | | | | **$9,747,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$73,938,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$4,258,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$78,196,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $6,817,000 |
| Electricity ($0.09 kWh) | $1,901,000 |
| Operation & Maintenance | $876,000 |
| **Total Annual Costs** | **$9,594,000** |

| | |
|---|---|
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $959 |
| Per 1,000 Gallons | $2.94 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $278 |
| Per 1,000 Gallons | $0.85 |

## Cost Estimate A-7

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Pecos Valley Counties (large) | | |
| Quantity: | 10,000 | Ac-Ft/Yr | |
| Peak: | 13.4 | MGD | (1.5:1 peak) |
| Distance: | 100 | miles | |
| Static Head: | 0 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 36 in | 528,000 | LF | $171 | $90,288,000 |
| Right of Way Easements (ROW) | 20 ft | 242 | Ac | $2,000 | $484,000 |
| Engineering and Contingencies (30%) | | | | | $27,086,000 |
| **Subtotal of Pipeline** | | | | | **$117,858,000** |
| | | | | | |
| **Pump Stations** | | | | | |
| Pump Station | 700 HP | 2 | LS | $2,110,000 | $4,220,000 |
| Ground Storage Tank with Roof | 2.3 MG | 2 | LS | $862,000 | $1,724,000 |
| Engineering and Contingencies (35%) | | | | | $2,080,000 |
| **Subtotal of Pump Stations** | | | | | **$8,024,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $7,120,000 | $7,120,000 |
| Connections to Transmission System | | 10 | EA | $10,000 | $100,000 |
| Engineering and Contingencies (35%) | | | | | $2,527,000 |
| **Subtotal of Well Field** | | | | | **$9,747,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$135,629,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$7,811,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$143,440,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $12,506,000 |
| Electricity ($0.09 kWh) | $1,854,000 |
| Operation & Maintenance | $1,478,000 |
| **Total Annual Costs** | **$15,838,000** |

| | |
|---|---|
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $1,584 |
| Per 1,000 Gallons | $4.86 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $333 |
| Per 1,000 Gallons | $1.02 |

## Cost Estimate A-8

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Pecos Valley Counties (large) | | |
| Quantity: | 10,000 | Ac-Ft/Yr | |
| Peak: | 13.4 | MGD | (1.5:1 peak) |
| Distance: | 100 | miles | |
| Static Head: | 200 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 36 in | 528,000 | LF | $171 | $90,288,000 |
| Right of Way Easements (ROW) | 20 ft | 242 | Ac | $2,000 | $484,000 |
| Engineering and Contingencies (30%) | | | | | $27,086,000 |
| **Subtotal of Pipeline** | | | | | **$117,858,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 1000 HP | 2 | LS | $2,670,000 | $5,340,000 |
| Ground Storage Tank with Roof | 2.3 MG | 2 | LS | $862,000 | $1,724,000 |
| Engineering and Contingencies (35%) | | | | | $2,472,000 |
| **Subtotal of Pump Station** | | | | | **$9,536,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $7,120,000 | $7,120,000 |
| Connections to Transmission System | | 10 | EA | $10,000 | $100,000 |
| Engineering and Contingencies (35%) | | | | | $2,527,000 |
| **Subtotal of Well Field** | | | | | **$9,747,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$137,141,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$7,898,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$145,039,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $12,645,000 |
| Electricity ($0.09 kWh) | $2,100,000 |
| Operation & Maintenance | $1,512,000 |
| **Total Annual Costs** | **$16,257,000** |

| | |
|---|---|
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $1,626 |
| Per 1,000 Gallons | $4.99 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $361 |
| Per 1,000 Gallons | $1.11 |

## Cost Estimate A-9

**Transmission Facilities for Groundwater Study**

| | | |
|---|---|---|
| Wellfield: | Pecos Valley Counties (small) | |
| Quantity: | 3,000 Ac-Ft/Yr | |
| Peak: | 4.0 MGD | (1.5:1 peak) |
| Distance: | 10 miles | |
| Static Head: | 0 ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 20 in | 52,800 | LF | $84 | $4,435,000 |
| Right of Way Easements (ROW) | 20 ft | 24 | Ac | $2,000 | $48,000 |
| Engineering and Contingencies (30%) | | | | | $1,331,000 |
| **Subtotal of Pipeline** | | | | | **$5,814,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 85 HP | 1 | LS | $663,000 | $663,000 |
| Ground Storage Tank with Roof | 0.7 MG | 1 | LS | $480,000 | $480,000 |
| Engineering and Contingencies (35%) | | | | | $400,000 |
| **Subtotal of Pump Station** | | | | | **$1,543,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $2,136,000 | $2,136,000 |
| Connections to Transmission System | | 3 | EA | $10,000 | $30,000 |
| Engineering and Contingencies (35%) | | | | | $758,000 |
| **Subtotal of Well Field** | | | | | **$2,924,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$10,281,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$592,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$10,873,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $948,000 |
| Electricity ($0.09 kWh) | $439,000 |
| Operation & Maintenance | $152,000 |
| **Total Annual Costs** | **$1,539,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $513 |
| Per 1,000 Gallons | $1.57 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $197 |
| Per 1,000 Gallons | $0.60 |

**Cost Estimate A-10**

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Pecos Valley Counties (small) | | |
| Quantity: | 3,000 | Ac-Ft/Yr | |
| Peak: | 4.0 | MGD | (1.5:1 peak) |
| Distance: | 10 | miles | |
| Static Head: | 50 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 20 in | 52,800 | LF | $84 | $4,435,000 |
| Right of Way Easements (ROW) | 20 ft | 24 | Ac | $2,000 | $48,000 |
| Engineering and Contingencies (30%) | | | | | $1,331,000 |
| **Subtotal of Pipeline** | | | | | **$5,814,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 130 HP | 1 | LS | $795,000 | $795,000 |
| Ground Storage Tank with Roof | 0.7 MG | 1 | LS | $480,000 | $480,000 |
| Engineering and Contingencies (35%) | | | | | $446,000 |
| **Subtotal of Pump Station** | | | | | **$1,721,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $2,136,000 | $2,136,000 |
| Connections to Transmission System | | 3 | EA | $10,000 | $30,000 |
| Engineering and Contingencies (35%) | | | | | $758,000 |
| **Subtotal of Well Field** | | | | | **$2,924,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$10,459,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$602,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$11,061,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $964,000 |
| Electricity ($0.09 kWh) | $458,000 |
| Operation & Maintenance | $156,000 |
| **Total Annual Costs** | **$1,578,000** |

| **UNIT COSTS (Until Amortized)** | |
|---|---|
| Per Acre-Foot | $526 |
| Per 1,000 Gallons | $1.61 |

| **UNIT COSTS (After Amortization)** | |
|---|---|
| Per Acre-Foot | $205 |
| Per 1,000 Gallons | $0.63 |

## Cost Estimate A-11

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Pecos Valley Counties (small) | | |
| Quantity: | 3,000 | Ac-Ft/Yr | |
| Peak: | 4.0 | MGD | (1.5:1 peak) |
| Distance: | 50 | miles | |
| Static Head: | 0 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 20 in | 264,000 | LF | $84 | $22,176,000 |
| Right of Way Easements (ROW) | 20 ft | 121 | Ac | $2,000 | $242,000 |
| Engineering and Contingencies (30%) | | | | | $6,653,000 |
| **Subtotal of Pipeline** | | | | | **$29,071,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 400 HP | 1 | LS | $1,670,000 | $1,670,000 |
| Ground Storage Tank with Roof | 0.7 MG | 1 | LS | $480,000 | $480,000 |
| Engineering and Contingencies (35%) | | | | | $753,000 |
| **Subtotal of Pump Station** | | | | | **$2,903,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $2,136,000 | $2,136,000 |
| Connections to Transmission System | | 3 | EA | $10,000 | $30,000 |
| Engineering and Contingencies (35%) | | | | | $758,000 |
| **Subtotal of Well Field** | | | | | **$2,924,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$34,898,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$2,010,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$36,908,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $3,218,000 |
| Electricity ($0.09 kWh) | $522,000 |
| Operation & Maintenance | $395,000 |
| **Total Annual Costs** | **$4,135,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $1,378 |
| Per 1,000 Gallons | $4.23 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $306 |
| Per 1,000 Gallons | $0.94 |

## Cost Estimate A-12

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Pecos Valley Counties (small) | | |
| Quantity: | 3,000 | Ac-Ft/Yr | |
| Peak: | 4.0 | MGD | (1.5:1 peak) |
| Distance: | 50 | miles | |
| Static Head: | 200 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 20 in | 264,000 | LF | $84 | $22,176,000 |
| Right of Way Easements (ROW) | 20 ft | 121 | Ac | $2,000 | $242,000 |
| Engineering and Contingencies (30%) | | | | | $6,653,000 |
| **Subtotal of Pipeline** | | | | | **$29,071,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 575 HP | 1 | LS | $1,973,000 | $1,973,000 |
| Ground Storage Tank with Roof | 0.7 MG | 1 | LS | $480,000 | $480,000 |
| Engineering and Contingencies (35%) | | | | | $859,000 |
| **Subtotal of Pump Station** | | | | | **$3,312,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $2,136,000 | $2,136,000 |
| Connections to Transmission System | | 3 | EA | $10,000 | $30,000 |
| Engineering and Contingencies (35%) | | | | | $758,000 |
| **Subtotal of Well Field** | | | | | **$2,924,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$35,307,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$2,033,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$37,340,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $3,255,000 |
| Electricity ($0.09 kWh) | $596,000 |
| Operation & Maintenance | $405,000 |
| **Total Annual Costs** | **$4,256,000** |

| **UNIT COSTS (Until Amortized)** | |
|---|---|
| Per Acre-Foot | $1,419 |
| Per 1,000 Gallons | $4.35 |

| **UNIT COSTS (After Amortization)** | |
|---|---|
| Per Acre-Foot | $334 |
| Per 1,000 Gallons | $1.03 |

## Cost Estimate A-13

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Schleicher | | |
| Quantity: | 2,000 | Ac-Ft/Yr | |
| Peak: | 2.7 | MGD | (1.5:1 peak) |
| Distance: | 10 | miles | |
| Static Head: | 0 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 18 in | 52,800 | LF | $72 | $3,802,000 |
| Right of Way Easements (ROW) | 20 ft | 24 | Ac | $2,000 | $48,000 |
| Engineering and Contingencies (30%) | | | | | $1,141,000 |
| **Subtotal of Pipeline** | | | | | **$4,991,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 50 HP | 1 | LS | $600,000 | $600,000 |
| Ground Storage Tank with Roof | 0.5 MG | 1 | LS | $407,000 | $407,000 |
| Engineering and Contingencies (35%) | | | | | $352,000 |
| **Subtotal of Pump Station** | | | | | **$1,359,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $1,374,000 | $1,374,000 |
| Connections to Transmission System | | 6 | EA | $10,000 | $60,000 |
| Engineering and Contingencies (35%) | | | | | $502,000 |
| **Subtotal of Well Field** | | | | | **$1,936,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$8,286,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$477,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$8,763,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $764,000 |
| Electricity ($0.09 kWh) | $100,000 |
| Operation & Maintenance | $119,000 |
| **Total Annual Costs** | **$983,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $492 |
| Per 1,000 Gallons | $1.51 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $110 |
| Per 1,000 Gallons | $0.34 |

## Cost Estimate A-14

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Schleicher | | |
| Quantity: | 2,000 | Ac-Ft/Yr | |
| Peak: | 2.7 | MGD | (1.5:1 peak) |
| Distance: | 10 | miles | |
| Static Head: | 50 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 18 in | 52,800 | LF | $72 | $3,802,000 |
| Right of Way Easements (ROW) | 20 ft | 24 | Ac | $2,000 | $48,000 |
| Engineering and Contingencies (30%) | | | | | $1,141,000 |
| **Subtotal of Pipeline** | | | | | **$4,991,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 80 HP | 1 | LS | $654,000 | $654,000 |
| Ground Storage Tank with Roof | 0.5 MG | 1 | LS | $407,000 | $407,000 |
| Engineering and Contingencies (35%) | | | | | $371,000 |
| **Subtotal of Pump Station** | | | | | **$1,432,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $1,374,000 | $1,374,000 |
| Connections to Transmission System | | 6 | EA | $10,000 | $60,000 |
| Engineering and Contingencies (35%) | | | | | $502,000 |
| **Subtotal of Well Field** | | | | | **$1,936,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$8,359,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$481,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$8,840,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $771,000 |
| Electricity ($0.09 kWh) | $112,000 |
| Operation & Maintenance | $121,000 |
| **Total Annual Costs** | **$1,004,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $502 |
| Per 1,000 Gallons | $1.54 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $117 |
| Per 1,000 Gallons | $0.36 |

## Cost Estimate A-15

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Schleicher | | |
| Quantity: | 2,000 | Ac-Ft/Yr | |
| Peak: | 2.7 | MGD | (1.5:1 peak) |
| Distance: | 50 | miles | |
| Static Head: | 0 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 18 in | 264,000 | LF | $72 | $19,008,000 |
| Right of Way Easements (ROW) | 20 ft | 121 | Ac | $2,000 | $242,000 |
| Engineering and Contingencies (30%) | | | | | $5,702,000 |
| **Subtotal of Pipeline** | | | | | **$24,952,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 225 HP | 1 | LS | $1,115,000 | $1,115,000 |
| Ground Storage Tank with Roof | 0.5 MG | 1 | LS | $407,000 | $407,000 |
| Engineering and Contingencies (35%) | | | | | $533,000 |
| **Subtotal of Pump Station** | | | | | **$2,055,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $1,374,000 | $1,374,000 |
| Connections to Transmission System | | 6 | EA | $10,000 | $60,000 |
| Engineering and Contingencies (35%) | | | | | $502,000 |
| **Subtotal of Well Field** | | | | | **$1,936,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$28,943,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$1,667,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$30,610,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $2,669,000 |
| Electricity ($0.09 kWh) | $144,000 |
| Operation & Maintenance | $317,000 |
| **Total Annual Costs** | **$3,130,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $1,565 |
| Per 1,000 Gallons | $4.80 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $231 |
| Per 1,000 Gallons | $0.71 |

## Cost Estimate A-16

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Schleicher | | |
| Quantity: | 2,000 | Ac-Ft/Yr | |
| Peak: | 2.7 | MGD | (1.5:1 peak) |
| Distance: | 50 | miles | |
| Static Head: | 200 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 18 in | 264,000 | LF | $72 | $19,008,000 |
| Right of Way Easements (ROW) | 20 ft | 121 | Ac | $2,000 | $242,000 |
| Engineering and Contingencies (30%) | | | | | $5,702,000 |
| **Subtotal of Pipeline** | | | | | **$24,952,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 325 HP | 1 | LS | $1,423,000 | $1,423,000 |
| Ground Storage Tank with Roof | 0.5 MG | 1 | LS | $407,000 | $407,000 |
| Engineering and Contingencies (35%) | | | | | $641,000 |
| **Subtotal of Pump Station** | | | | | **$2,471,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $1,374,000 | $1,374,000 |
| Connections to Transmission System | | 6 | EA | $10,000 | $60,000 |
| Engineering and Contingencies (35%) | | | | | $502,000 |
| **Subtotal of Well Field** | | | | | **$1,936,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$29,359,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$1,691,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$31,050,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $2,707,000 |
| Electricity ($0.09 kWh) | $193,000 |
| Operation & Maintenance | $326,000 |
| **Total Annual Costs** | **$3,226,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $1,613 |
| Per 1,000 Gallons | $4.95 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $260 |
| Per 1,000 Gallons | $0.80 |

## Cost Estimate A-17

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Glasscock, Reagan | | |
| Quantity: | 500 | Ac-Ft/Yr | |
| Peak: | 0.7 | MGD | (1.5:1 peak) |
| Distance: | 10 | miles | |
| Static Head: | 0 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 12 in | 52,800 | LF | $48 | $2,534,000 |
| Right of Way Easements (ROW) | 20 ft | 24 | Ac | $2,000 | $48,000 |
| Engineering and Contingencies (30%) | | | | | $760,000 |
| **Subtotal of Pipeline** | | | | | **$3,342,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 10 HP | 1 | LS | $500,000 | $500,000 |
| Ground Storage Tank with Roof | 0.1 MG | 1 | LS | $170,000 | $170,000 |
| Engineering and Contingencies (35%) | | | | | $235,000 |
| **Subtotal of Pump Station** | | | | | **$905,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $1,611,000 | $1,611,000 |
| Connections to Transmission System | | 9 | EA | $10,000 | $90,000 |
| Engineering and Contingencies (35%) | | | | | $595,000 |
| **Subtotal of Well Field** | | | | | **$2,296,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$6,543,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$377,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$6,920,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $603,000 |
| Electricity ($0.09 kWh) | $22,000 |
| Operation & Maintenance | $101,000 |
| **Total Annual Costs** | **$726,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $1,452 |
| Per 1,000 Gallons | $4.46 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $246 |
| Per 1,000 Gallons | $0.75 |

## Cost Estimate A-18

**Transmission Facilities for Groundwater Study**

| | | |
|---|---|---|
| Wellfield: | Glasscock, Reagan | |
| Quantity: | 500 Ac-Ft/Yr | |
| Peak: | 0.7 MGD | (1.5:1 peak) |
| Distance: | 10 miles | |
| Static Head: | 50 ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 12 in | 52,800 | LF | $48 | $2,534,000 |
| Right of Way Easements (ROW) | 20 ft | 24 | Ac | $2,000 | $48,000 |
| Engineering and Contingencies (30%) | | | | | $760,000 |
| **Subtotal of Pipeline** | | | | | **$3,342,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 15 HP | 1 | LS | $513,000 | $513,000 |
| Ground Storage Tank with Roof | 0.1 MG | 1 | LS | $170,000 | $170,000 |
| Engineering and Contingencies (35%) | | | | | $239,000 |
| **Subtotal of Pump Station** | | | | | **$922,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $1,611,000 | $1,611,000 |
| Connections to Transmission System | | 9 | EA | $10,000 | $90,000 |
| Engineering and Contingencies (35%) | | | | | $595,000 |
| **Subtotal of Well Field** | | | | | **$2,296,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$6,560,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$378,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$6,938,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $605,000 |
| Electricity ($0.09 kWh) | $25,000 |
| Operation & Maintenance | $102,000 |
| **Total Annual Costs** | **$732,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $1,464 |
| Per 1,000 Gallons | $4.49 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $254 |
| Per 1,000 Gallons | $0.78 |

## Cost Estimate A-19

**Transmission Facilities for Groundwater Study**

| | | |
|---|---|---|
| Wellfield: | Glasscock, Reagan | |
| Quantity: | 500 Ac-Ft/Yr | |
| Peak: | 0.7 MGD | (1.5:1 peak) |
| Distance: | 50 miles | |
| Static Head: | 0 ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 12 in | 264,000 | LF | $48 | $12,672,000 |
| Right of Way Easements (ROW) | 20 ft | 121 | Ac | $2,000 | $242,000 |
| Engineering and Contingencies (30%) | | | | | $3,802,000 |
| **Subtotal of Pipeline** | | | | | **$16,716,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 35 HP | 1 | LS | $570,000 | $570,000 |
| Ground Storage Tank with Roof | 0.1 MG | 1 | LS | $170,000 | $170,000 |
| Engineering and Contingencies (35%) | | | | | $259,000 |
| **Subtotal of Pump Station** | | | | | **$999,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $1,611,000 | $1,611,000 |
| Connections to Transmission System | | 9 | EA | $10,000 | $90,000 |
| Engineering and Contingencies (35%) | | | | | $595,000 |
| **Subtotal of Well Field** | | | | | **$2,296,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$20,011,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$1,152,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$21,163,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $1,845,000 |
| Electricity ($0.09 kWh) | $29,000 |
| Operation & Maintenance | $225,000 |
| **Total Annual Costs** | **$2,099,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $4,198 |
| Per 1,000 Gallons | $12.88 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $508 |
| Per 1,000 Gallons | $1.56 |

## Cost Estimate A-20

**Transmission Facilities for Groundwater Study**

| | | | |
|---|---|---|---|
| Wellfield: | Glasscock, Reagan | | |
| Quantity: | 500 | Ac-Ft/Yr | |
| Peak: | 0.7 | MGD | (1.5:1 peak) |
| Distance: | 50 | miles | |
| Static Head: | 200 | ft | |

**CONSTRUCTION COSTS FOR TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline | 12 in | 264,000 | LF | $48 | $12,672,000 |
| Right of Way Easements (ROW) | 20 ft | 121 | Ac | $2,000 | $242,000 |
| Engineering and Contingencies (30%) | | | | | $3,802,000 |
| **Subtotal of Pipeline** | | | | | **$16,716,000** |
| | | | | | |
| **Pump Station** | | | | | |
| Pump Station | 65 HP | 1 | LS | $627,000 | $627,000 |
| Ground Storage Tank with Roof | 0.1 MG | 1 | LS | $170,000 | $170,000 |
| Engineering and Contingencies (35%) | | | | | $279,000 |
| **Subtotal of Pump Station** | | | | | **$1,076,000** |
| | | | | | |
| **Well Field** | | | | | |
| Total Well Field Cost | | 1 | LS | $1,611,000 | $1,611,000 |
| System | | 9 | EA | $10,000 | $90,000 |
| Engineering and Contingencies (35%) | | | | | $595,000 |
| **Subtotal of Well Field** | | | | | **$2,296,000** |
| | | | | | |
| **CONSTRUCTION TOTAL** | | | | | **$20,088,000** |
| | | | | | |
| **Interest During Construction (18 months)** | | | | | **$1,157,000** |
| | | | | | |
| **TOTAL COST** | | | | | **$21,245,000** |

| **TOTAL ANNUAL COSTS** | **Cost** |
|---|---|
| Debt Service (6% for 20 years) | $1,852,000 |
| Electricity ($0.09 kWh) | $41,000 |
| Operation & Maintenance | $227,000 |
| **Total Annual Costs** | **$2,120,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot | $4,240 |
| Per 1,000 Gallons | $13.01 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $536 |
| Per 1,000 Gallons | $1.64 |

## Cost Estimate A-21

| | |
|---|---|
| **WUGNAME:** | Midland |
| **STRATEGY:** | T-Bar Well Field with additional 3,000 |
| **AMOUNT - T-BAR (ac-ft/yr):** | 13,600 |
| **AMOUNT - NEW WELL FIELD** | 10,000 |
| **AMOUNT - WINKLER WELL FIELD** | 6,000 |
| **AMOUNT -TOTAL** | 29,600 |

T-Bar costs are based on draft cost estimate by PSC. Provided by City of Midland on 5/16/05

**CONSTRUCTION COSTS**

| **Well Field - T-Bar** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Wells | | 43 | EA | $ 353,000 | $ 15,179,000 |
| Well field piping | | 20 | MGD | $ 250,000 | $ 5,000,000 |
| Well field site improvements | | 1 | LS | $ 3,643,000 | $ 3,643,000 |
| Engineering and Contingencies (35%) | | | | | $ 8,338,000 |
| | | | | | $ 32,160,000 |
| **Well Field - Winkler** | | | | | |
| Water wells | | 7 | EA | $ 419,000 | $ 2,933,000 |
| Well field pipeline | 10" | 2,800 | LF | $ 40 | $ 112,000 |
| Well field pipeline | 12" | 6,050 | LF | $ 48 | $ 290,000 |
| Well field pipeline | 14" | 600 | LF | $ 56 | $ 34,000 |
| Well field pipeline | 16" | 1,000 | LF | $ 64 | $ 64,000 |
| Well field pipeline | 18" | 800 | LF | $ 72 | $ 58,000 |
| Well field pipeline | 24" | 2,000 | LF | $ 84 | $ 168,000 |
| Well field pipeline | 27" | 2,000 | LF | $ 108 | $ 216,000 |
| Well field pipeline | 30" | 7,650 | LF | $ 135 | $ 1,033,000 |
| Other well field appurtenances | | | LS | $ 1,000,000 | $ 1,000,000 |
| Engineering and contingencies (35%) | | | | | $ 2,068,000 |
| | | | | | $ 7,976,000 |
| **New Well Field Pecos Alluvium** | | | | | |
| Wells | | 14 | LS | $712,000 | $9,968,000 |
| Well field piping | | 14 | EA | $10,000 | $140,000 |
| Engineering and Contingencies (35%) | | | | | $3,538,000 |
| | | | | | $ 13,646,000 |

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipe (T-Bar to Booster) | 36 in. | 177,210 | LF | $ 171 | $ 30,303,000 |
| Pipe (Winkler to Booster) | 36 in. | 93,270 | LF | $ 172 | $ 16,042,000 |
| Pipe (New Well Field to Booster) | 30 in. | 158,400 | LF | $ 135 | $ 21,384,000 |
| Pipe ( Booster to Odessa) | 54 in | 146,260 | LF | $ 294 | $ 43,000,000 |
| Pipe (Odessa to Midland) | 42 in | 85,144 | LF | $ 250 | $ 21,286,000 |
| Right-of-way easements | | 264 | AC | $ 2,000 | $ 528,000 |
| Engineering and Contingencies (30%) | | | | | $ 39,763,000 |
| Subtotal Pipeline | | | | | $ 172,306,000 |

| **Pump Station(s) & Ground Storage** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pump Station at T-Bar Well Field | 1700 HP | 1 | LS | $ 3,520,000 | $ 3,520,000 |
| Storage Tank at T-Bar Well Field | 6 MG | 1 | LS | $ 1,400,000 | $ 1,400,000 |
| Pump Station at New Well Field | 1700 HP | 1 | LS | $ 3,520,000 | $ 3,520,000 |
| Storage Tank at New Well Field | 5 MG | 1 | LS | $ 1,600,000 | $ 1,600,000 |
| Pump Station at Winkler Well Field | 1200 HP | 1 | LS | $ 2,910,000 | $ 2,910,000 |
| Storage Tank at Winkler Well Field | 5 MG | 1 | LS | $ 1,600,000 | $ 1,600,000 |
| Booster Station | 4500 HP | 1 | LS | $ 6,090,000 | $ 6,090,000 |
| Storage Tank at Booster Station | 8 MG | 2 | LS | $ 1,925,000 | $ 3,850,000 |
| Storage Tank at High Point | 8 MG | 2 | LS | $ 1,925,000 | $ 3,850,000 |
| Chlorination and other improvements | | 1 | LS | ########## | $ 20,000,000 |
| Engineering and Contingencies (35%) | | | | | $ 16,919,000 |
| Subtotal of Pump Station(s) | | | | | $ 65,259,000 |

| | | |
|---|---|---|
| **CONSTRUCTION TOTAL** | | $ 277,701,000 |
| **Permitting and Mitigation** | | $ 2,521,000 |
| **Interest During Construction** | (12 months) | $ 11,572,000 |
| **TOTAL COST** | | **$ 291,794,000** |
| **ANNUAL COSTS** | | |
| Debt Service (6% for 20 years) | | $ 25,440,000 |
| Electricity ($0.09 kWh) | | $ 2,907,000 |
| Water purchase | | $ 1,564,085 |
| Operation & Maintenance | | $ 3,797,000 |
| Total Annual Costs | | **$ 33,708,085** |
| **UNIT COSTS (Before Amortization)** | | |
| Per Acre-Foot of treated water | | $ 1,139 |
| Per 1,000 Gallons | | $ 3.49 |
| **UNIT COSTS (After Amortization)** | | |
| Per Acre-Foot | | $ 279 |
| Per 1,000 Gallons | | $ 0.86 |

## Cost Estimate A-22

**WUGNAME:** Midland
**STRATEGY:** T-Bar Well Field
**STRATEGY NUMBER:** F01-MID
**AMOUNT (ac-ft/yr):** 13,600

Based on draft cost estimate by PSC. Provided by City of Midland on 5/16/05

**CONSTRUCTION COSTS**

| **Well Field** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Wells | | 43 | EA | $ 353,000 | $ 15,179,000 |
| Well field piping | | 20 | MGD | $ 250,000 | $ 5,000,000 |
| Well field site improvements | | 1 | LS | $ 3,643,000 | $ 3,643,000 |
| Engineering and Contingencies (35%) | | | | | $ 8,338,000 |
| | | | | | $ 32,160,000 |

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipe | 36 in. | 368,860 | LF | $ 171 | $ 63,075,000 |
| Right-of-way easements | | 169 | AC | $ 2,000 | $ 338,000 |
| Engineering and Contingencies (30%) | | | | | $ 19,024,000 |
| Subtotal Pipeline | | | | | $ 82,437,000 |

| **Pump Station(s) & Ground Storage** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pump Station at Well Field | 1900 HP | 1 | LS | $ 3,768,000 | $ 3,768,000 |
| Storage Tank at Well Field | 6 MG | 1 | LS | $ 1,400,000 | $ 1,400,000 |
| Booster Station | 1900 HP | 1 | LS | $ 3,768,000 | $ 3,768,000 |
| Storage Tank at Booster Station | 6 MG | 1 | LS | $ 1,400,000 | $ 1,400,000 |
| Storage Tank at High Point | 6 MG | 1 | LS | $ 1,400,000 | $ 1,400,000 |
| Chlorination and other improvements | | 1 | LS | $ 8,000,000 | $ 8,000,000 |
| Engineering and Contingencies (35%) | | | | | $ 6,908,000 |
| Subtotal of Pump Station(s) | | | | | $ 26,644,000 |

| | | |
|---|---|---|
| **CONSTRUCTION TOTAL** | | $ 141,241,000 |
| **Permitting and Mitigation** | | $ 1,280,000 |
| **Interest During Construction** | (12 months) | $ 5,886,000 |
| **TOTAL COST** | | **$ 148,407,000** |

**ANNUAL COSTS**

| | |
|---|---|
| Debt Service (6% for 20 years) | $ 12,939,000 |
| Electricity ($0.09 kWh) | $ 2,111,000 |
| Operation & Maintenance | $ 2,064,000 |
| Total Annual Costs | **$ 17,114,000** |

**UNIT COSTS (Before Amortization)**

| | |
|---|---|
| Per Acre-Foot of treated water | $ 1,258 |
| Per 1,000 Gallons | $ 3.86 |

**UNIT COSTS (After Amortization)**

| | |
|---|---|
| Per Acre-Foot | $ 307 |
| Per 1,000 Gallons | $ 0.94 |

## Cost Estimate A-23

**WUGNAME:** CRMWD
**STRATEGY:** Winkler County Well Field
**AMOUNT (ac-ft/yr):** 6,000

**CONSTRUCTION COSTS**

| **Well Field** | **Size** | **Quantity** | **Unit** | **Unit Price** | | **Cost** |
|---|---|---|---|---|---|---|
| Water wells | | 7 | EA | $ 419,000 | $ | 2,933,000 |
| Well field pipeline | 10" | 2,800 | LF | $ 40 | $ | 112,000 |
| Well field pipeline | 12" | 6,050 | LF | $ 48 | $ | 290,000 |
| Well field pipeline | 14" | 600 | LF | $ 56 | $ | 34,000 |
| Well field pipeline | 16" | 1,000 | LF | $ 64 | $ | 64,000 |
| Well field pipeline | 18" | 800 | LF | $ 72 | $ | 58,000 |
| Well field pipeline | 24" | 2,000 | LF | $ 84 | $ | 168,000 |
| Well field pipeline | 27" | 2,000 | LF | $ 108 | $ | 216,000 |
| Well field pipeline | 30" | 7,650 | LF | $ 135 | $ | 1,033,000 |
| Other well field appurtenances | | | LS | $ 1,000,000 | $ | 1,000,000 |
| Engineering and contingencies (35%) | | | | | $ | 2,068,000 |
| | | | | | $ | 7,976,000 |

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | | **Cost** |
|---|---|---|---|---|---|---|
| Transmission pipeline | 36 in | 228,934 | LF | $ 171 | $ | 39,148,000 |
| Right-of-way easements | | 105 | AC | $ 2,000 | $ | 210,000 |
| Engineering and Contingencies (30%) | | | | | $ | 11,807,000 |
| Subtotal Pipeline | | | | | $ | 51,165,000 |

| **Pump Station(s) & Ground Storage** | **Size** | **Quantity** | **Unit** | **Unit Price** | | **Cost** |
|---|---|---|---|---|---|---|
| Pump Station | 1800 HP | 1 | EA | $ 3,650,000 | $ | 3,650,000 |
| Storage tank | 5 MG | 2 | EA | $ 1,212,000 | $ | 2,424,000 |
| Engineering and Contingencies (35%) | | | | | $ | 2,126,000 |
| Subtotal of Pump Station(s) | | | | | $ | 8,200,000 |

| | | | |
|---|---|---|---|
| **CONSTRUCTION TOTAL** | | $ | 67,341,000 |
| **Permitting and Mitigation** | | $ | 614,000 |
| **Interest During Construction** | (12 months) | $ | 2,806,000 |
| **TOTAL COST** | | **$** | **70,761,000** |

**ANNUAL COSTS**

| | | |
|---|---|---|
| Debt Service (6% for 20 years) | $ | 6,169,000 |
| Electricity ($0.09 kWh) | $ | 719,000 |
| Operation & Maintenance | $ | 726,000 |
| Water Purchase | $ | 587,000 |
| Total Annual Costs | **$** | **8,201,000** |

**UNIT COSTS (Until Amortized)**

| | | |
|---|---|---|
| Per Acre-Foot of treated water | $ | 1,367 |
| Per 1,000 Gallons | $ | 4.19 |

**UNIT COSTS (After Amortization)**

| | | |
|---|---|---|
| Per Acre-Foot | $ | 339 |
| Per 1,000 Gallons | $ | 1.04 |