

**EXECUTIVE SUMMARY  
LARAMIE WATER MANAGEMENT PLAN, LEVEL II**

August 25, 2006

Submitted to:

Wyoming Water Development Commission  
Herschler Building  
Cheyenne, WY 82001

Prepared for:

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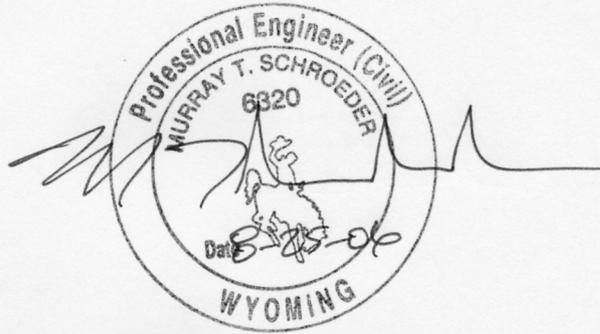


611 Skyline Road  
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In Conjunction with:

Camp Creek Engineering, Inc.  
Burns & McDonnell  
Wyoming Groundwater, LLC  
Fassett Consulting, LLC

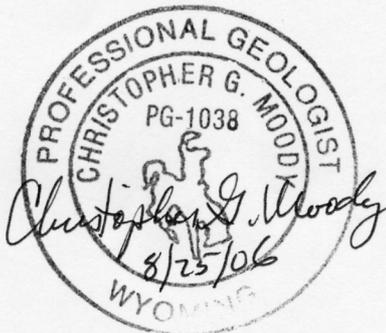
I, Murray T. Schroeder, a Wyoming registered Professional Engineer, certify that this Laramie Water Management Plan, Level II report was prepared by me or under my direct supervision.



Murray T. Schroeder

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I, Christopher Moody, a Wyoming registered Professional Geologist, certify that this Laramie Water Management Plan, Level II report was prepared by me or under my direct supervision.



Christopher Moody

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## **EXECUTIVE SUMMARY**

### **ES.1 Introduction**

The City of Laramie has completed the Laramie Water Management Plan, Level II funded by the Wyoming Water Development Commission. The general objectives of the project included:

- Prepare a preliminary design and cost estimate for the Laramie River Pipeline. This pipeline would bring water from the Laramie River to the existing water treatment plant southeast of the City. The justification for this project had been documented in previous planning studies, but the concept was lacking a design and cost estimate suitable for WWDC Level III funding.
- Investigate the feasibility of controlling spring discharges in the City Springs (Turner Wells) area to provide additional water supply to the City and to protect water quality. This concept had been presented in previous planning studies, but had not been developed.
- Investigate the feasibility of constructing a non-potable irrigation water system to water large green spaces in the City. This concept had also been examined in previous planning studies, but the cost of irrigating with non-potable water had never been directly compared to the cost of continuing to irrigate with potable water.
- Prepare a Water System Master Plan that addresses the comprehensive water system needs of the City including water supply development to meet increased demands, to correct internal distribution system deficiencies, and to improve operational performance.

### **ES.2 Laramie River Pipeline**

The City diverts water into the Pioneer Canal for delivery to Sodergreen Reservoir, about 18 miles southwest of the City. The canal is about 2.5 miles long. Next, an existing pipeline transmits water from Sodergreen Reservoir to the City water treatment plant. Canal seepage loss does not allow the City to use their entire permitted water right. During periods

of drought and despite having the Number 1 priority water right in the river, diverted water does not make it to the water treatment plant. This was experienced in 2002.

The Laramie River Pipeline would eliminate seepage losses and provide supply reliability during drought like conditions. A conceptual design of the pipeline is presented on Figure ES1. A total project cost estimate for this pipeline project is \$7,700,000. This project is recommended for final design and construction as a priority capital project.

### **ES.3 Turner Wellfield Modifications**

The existing Turner wells do not capture and control all of the natural discharge from City Springs. Having the capability to capture and control all of the natural discharge from City Springs would provide assurance of safe water quality and make full use of the City's water rights.

A conceptual design was developed to install three shallow wells close to City Springs to enhance the collection of spring discharge. Figure ES-3 shows the location of proposed wells. Each well would have a design capacity of approximately 500 gpm. The shallow wells would be operated continuously at rates needed to maintain the head in the Casper Aquifer below the existing Springbox collection system. Pumped water would be treated and piped into the City Zone 1 Reservoir. When municipal demand is low, the water may be re-injected into the Casper Aquifer at the Spur Wellfield via a Casper Aquifer Storage and Retrieval system. The Turner Wellfield improvements and Aquifer Storage and Retrieval projects have a total project cost estimate of \$3,630,000. The City should pursue a WWDC Level II study that includes test well work in the Turner area and a pilot test of the aquifer storage project.

### **ES.4 Irrigation Water Alternatives**

Large green space irrigation of parks and athletic fields, as shown in Figure ES-3, could be achieved with several water resources. The objective of the evaluation of irrigation alternatives was to determine which of the following practices is best:

- Alternative No. 1 - Potable Water. Continue, as past and current practice, to irrigate large green spaces using treated municipal water.

- Alternative No. 2 – River Water. Transfer a portion of the irrigation water rights off the Monolith Ranch to points of use within the City. Water from the Monolith Ranch would flow downstream in the Laramie River and would then be pumped from the river and distributed in a piping and storage system separate from the treated water distribution system.
- Alternative No. 3 – Groundwater. Make use of groundwater supplies from the Forelle Limestone Aquifer. Wells would be located at individual green spaces and supply water to those areas.
- Reuse water. Use of wastewater effluent was evaluated, but not in depth. Estimates of the available water reuse water supply were prepared.

The evaluation considered the capital and operational costs of each alternative and intangible factors. Irrigation with groundwater was found to be about \$752/acre/year and irrigation with potable water was found to be about \$800/acre/year. Based on 280 acres of parks that could potentially be irrigated with groundwater, this difference translates to about \$13,500/year. On the other hand, the water quality benefits of using potable water in the distribution system are critically important. The additional irrigation water circulating through the distribution system (Alternative 1) promotes better drinking water quality by providing a lower water age. The City water distribution system presently has borderline water quality concerns with respect to disinfection by products (not in violation of standards), and the additional “circulation” is beneficial. The City should continue to irrigate with potable water.

### **ES.5 Transmission Distribution and Storage System**

The study included an evaluation of the City’s water transmission, distribution, and storage (TD&S) system. In addition, projects were described that would correct system deficiencies. Figure ES-4 is a system schematic. The findings of this evaluation include:

Transmission Pipeline Condition. All transmission pipelines are in good condition. Recent cathodic protection projects and transmission line replacement projects have extended the life of these lines many years.

Water Storage Tanks. All of Laramie’s water storage tanks are of adequate size and physical condition to meet the needs of the City for several years.

Large Water Meters. New large water meters are required at five of the City’s water production facilities. A project cost estimate to provide these meters is \$134,000.

Distribution System Piping - Condition

The condition of the existing distribution system piping is poor, especially in the older pressure Zones 1 and 2. Cast iron pipelines in these zones are damaged from the effects of soil corrosion. The water main failure rate is about three times the rate of similar municipalities. Water main replacement costs were estimated at:

- Priority No. 1 Mains (35,000 lf) - \$ 5,060,000
- Priority No. 2 Mains (72,200 lf) - \$10,900,000
- Priority No. 3 Mains (94,500 lf) - \$13,800,000

Distribution System Piping - Capacity

The hydraulic performance of the water distribution system is projected to be adequate in the eastern and western portions of the city (Pressure zone 3,4,6 and 7) even with modest City growth. This positive finding is because the City has invested in several water systems infrastructure projects since the mid 1990’s, including the West Laramie Tank and the East Side Tank Projects.

The hydraulic performance of the water distribution system in Zones 1 and 2 has several deficiencies under current conditions and is projected to have further problems under conditions of modest City growth. Planning level conceptual designs and cost estimates were prepared for projects that would correct these deficiencies and they include the following:

- Peak Hour Service Pressure Upgrades           \$15,200,000
- Fire Suppression Upgrades                         \$9,000,000

The fire suppression upgrades require that the peak hour service pressure upgrades have been made. Both of these projects include water storage tank construction, transmission, line construction, and the replacement of small water mains.

### **ES.6 Water Supply Master Plan**

A Water System Master Plan was prepared to help guide decisions regarding capital, operational and financing needs. Figure ES-5 presents the organization of the Water System Master Plan. The Plan addresses four basic elements of the water supply system, including Water Supply; the Transmission, Distribution, and Storage System; Operations and Revenues. The Elements of the Water System Master plan were evaluated with a simple financial accounting model to estimate the approximate revenue structure that must be in place to recover the costs for operating the water utility for a 20-year planning period. The evaluation considered the cost to fund the projects presented earlier in this summary as well as other projects and operational costs. Rate structures were estimated for several different planning scenarios including ones that assumed:

- municipal growth as projected by the Comprehensive Plan,
- no municipal growth,
- Conservation induced decreased water sales,
- and the effect of treating the groundwater supplies due to groundwater contamination,

The planning work provided the following important findings:

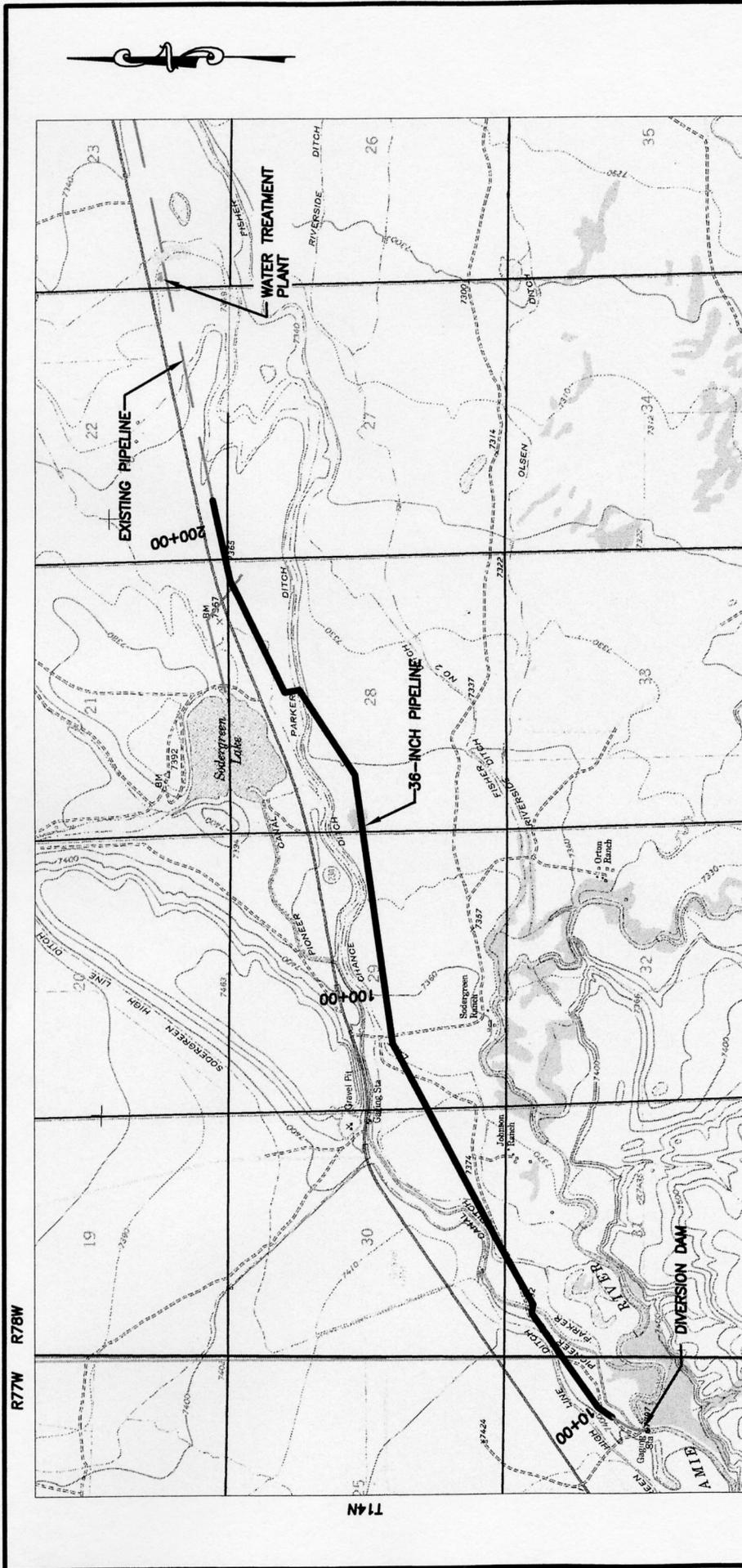
- Future water rate increases should track inflationary increases.
- Even with inflationary increases in the water rate structure, the planning work estimated that about \$3,000,000 per year of additional income would be needed to correct system deficiencies regardless of the planning scenario. This required revenue stream was based on favorable grant funding assumptions.
- Laramie water rates are high relative to other Wyoming municipalities. Therefore, the City should pursue revenue sources such as a capital facilities tax.

## **ES.7 Recommendations**

1. Obtain a resolution from the City Council that supports a comprehensive water system master plan and financing structure to correct existing water infrastructure deficiencies, to provide supplies for growing demand, and to support economic development. Key to that plan is a commitment to water rate increases that follow inflation.
2. Apply for a WWDC Level II Study grant from the WWDC to perform field investigations and additional analysis for the objective of controlling spring discharge at the City Springs and to field test the feasibility of an aquifer storage and recovery program in the Spur Wellfield.
3. Apply for a WWDC Level II Study grant from the WWDC to check all GIS data in the City water main database. The study program should include the collection of sufficient system monitoring data such that hydraulic model calibration can be performed.
4. Apply for a WWDC Level III grant to begin the final design and construction of the Laramie River Pipeline.
5. Implement the Casper Aquifer Protection Plan and enforce aquifer protection ordinance. Continue participation with the Environmental Advisory Committee, the WDEQ, the County, and University of Wyoming to facilitate CAPP support and enforcement.
6. Continue to implement and develop monitoring programs in the Casper Aquifer. Either hire a staff person or a local consultant to perform annual data collection and reporting for this program.
7. The City should request that the Laramie Economic Development Corporation market the fact that the City of Laramie has the potential water supply capacity to

support businesses that need large amounts of water. The City has water to sell and needs revenue to support the water enterprise fund. A specific volume or rate of water and the value of that water remains to be determined. A water marketing study should be performed.

8. The City should define a water treatment contingency plan that will provide immediate supply relief if the Casper Aquifer supplies do not meet federal drinking water standards, from either contamination or changing regulations.
9. The City should approach the senior water right holder west of the present Laramie River point of diversion to see if they are willing to sell the water right and or the land at a fair market value.
10. At this time the City should continue to irrigate large green spaces with treated potable water.



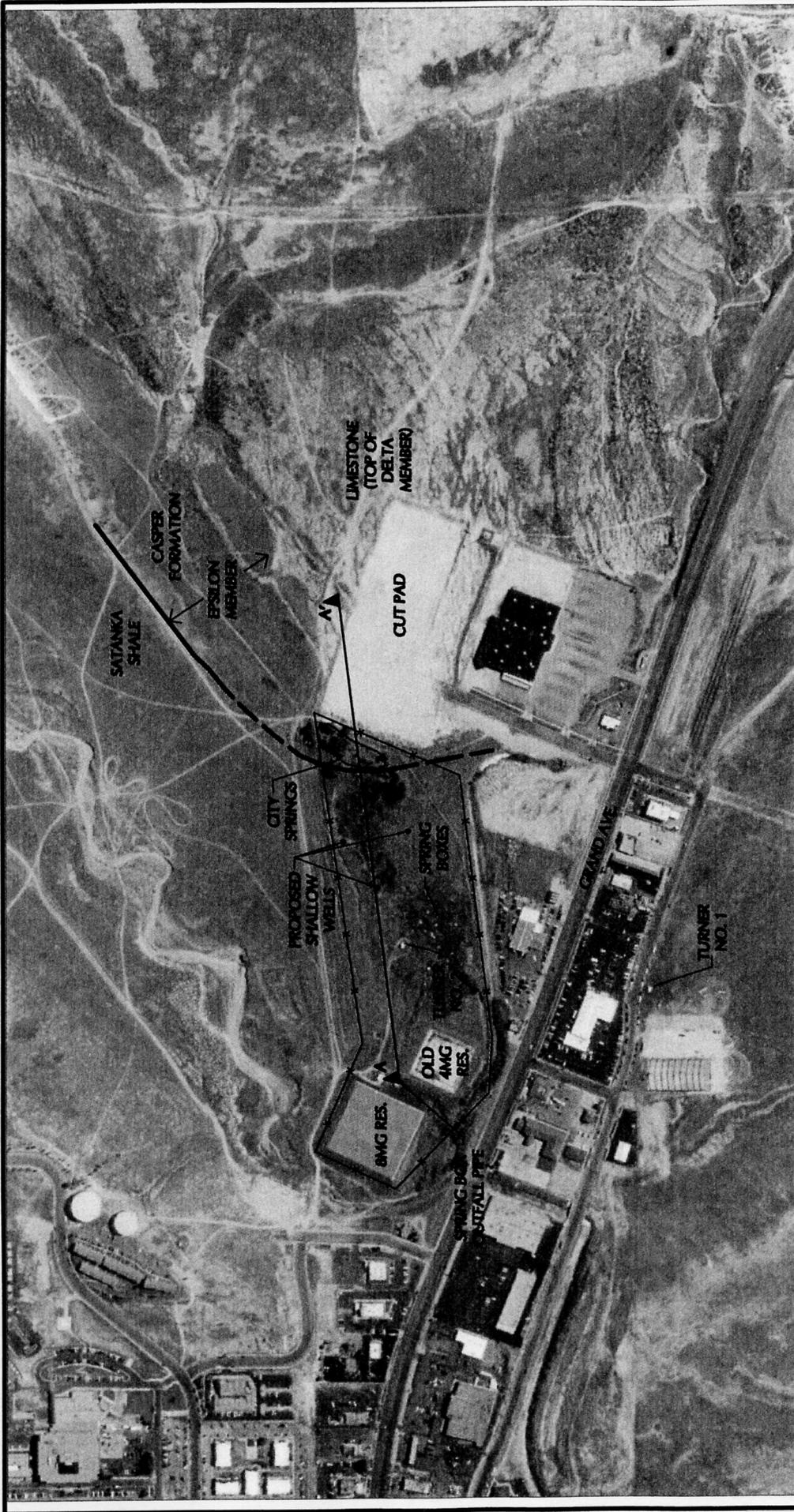
LOCATION MAP

ES-1

LOCATION MAP  
LARAMIE RIVER PIPELINE

LARAMIE WATER MANAGEMENT PROJECT, LEVEL II  
WYOMING WATER DEVELOPMENT COMMISSION





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ES-9



ES-2

Location of Proposed Shallow  
Wells at City Springs

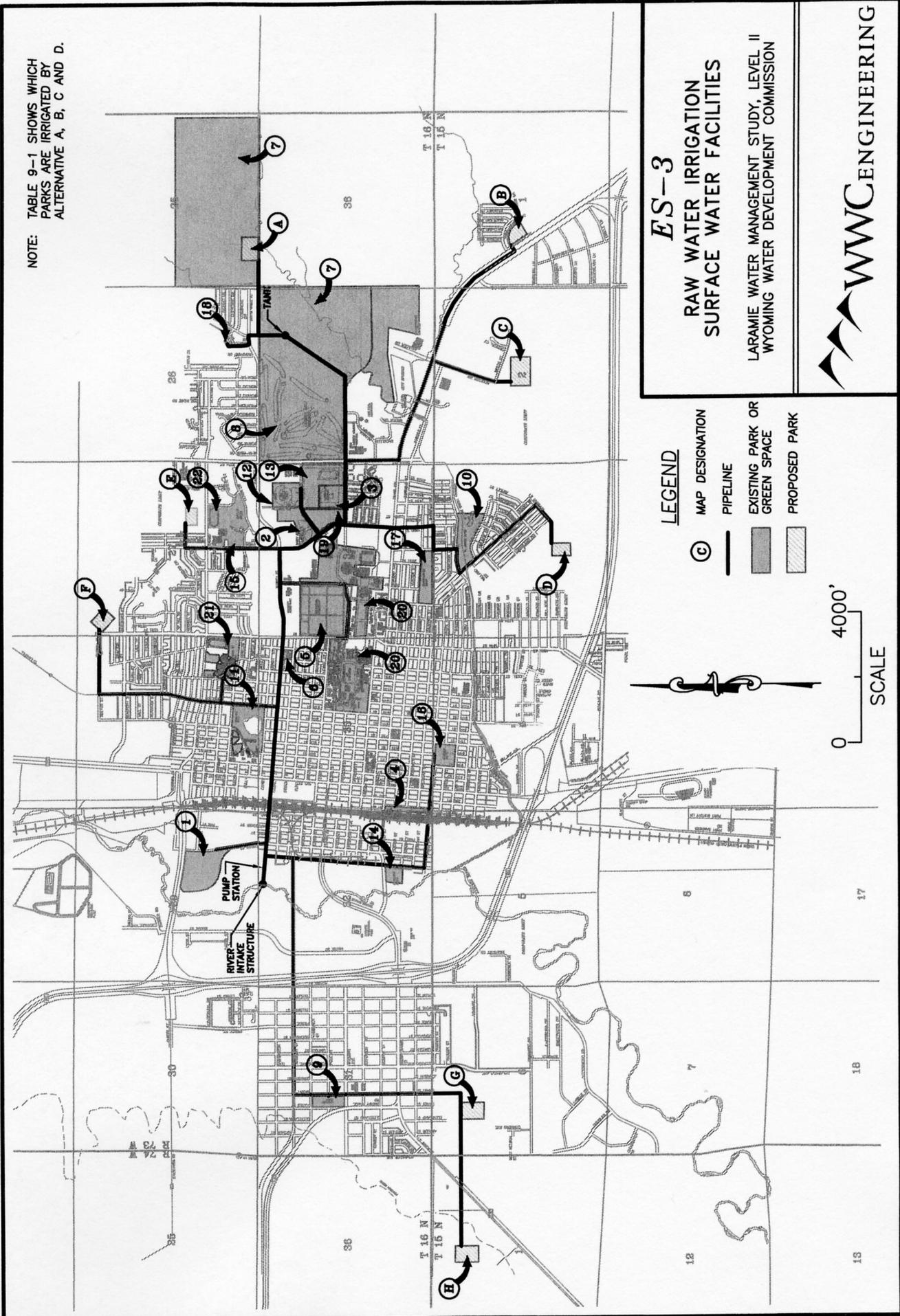
LARAMIE WATER MANAGEMENT STUDY, LEVEL II  
WYOMING WATER DEVELOPMENT COMMISSION



WYOMING

GROUNDWATER, LLC

NOTE: TABLE 9-1 SHOWS WHICH PARKS ARE IRRIGATED BY ALTERNATIVE A, B, C AND D.



**ES-3**

**RAW WATER IRRIGATION SURFACE WATER FACILITIES**

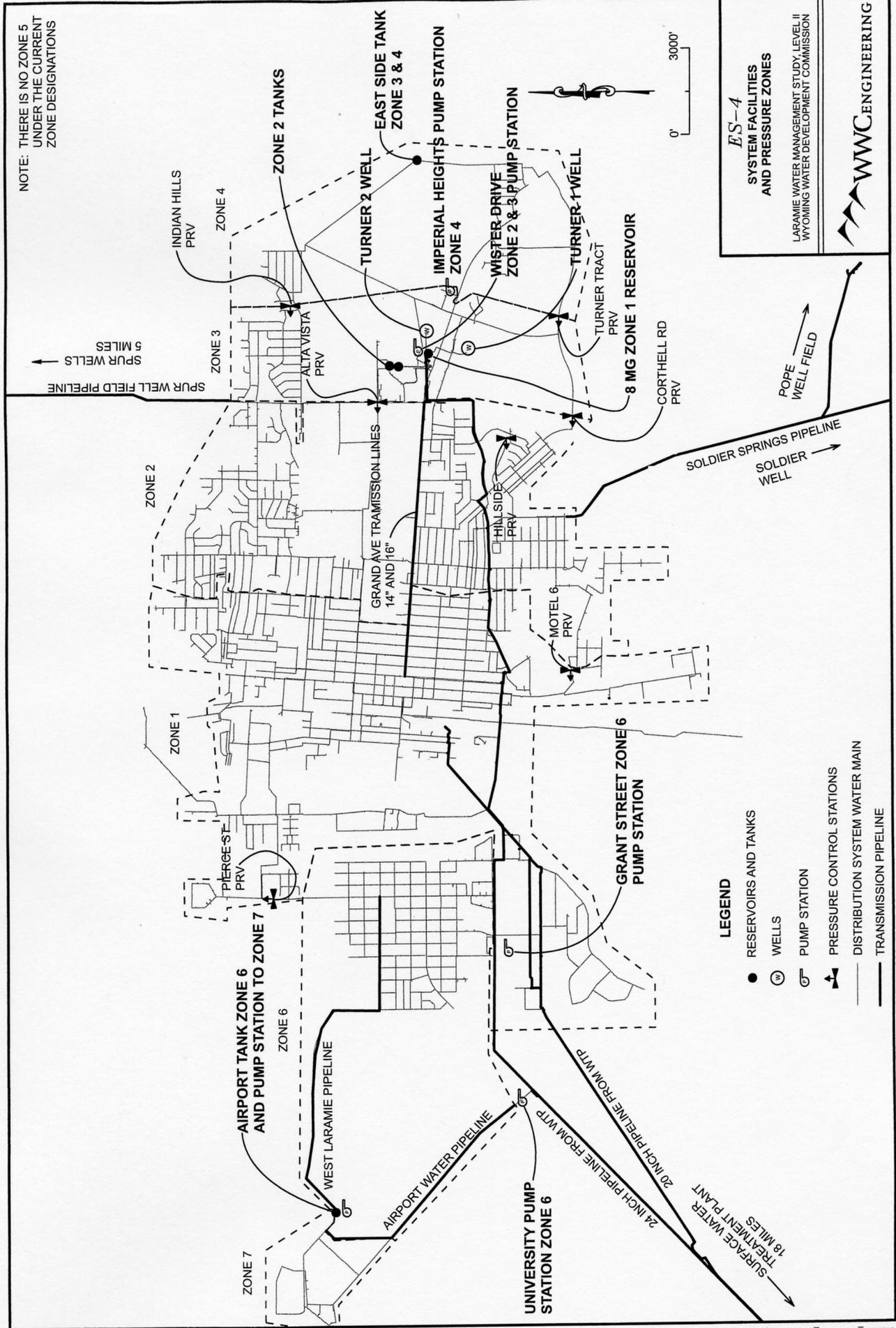
LARAMIE WATER MANAGEMENT STUDY, LEVEL II  
WYOMING WATER DEVELOPMENT COMMISSION

**LEGEND**

- (C) MAP DESIGNATION
- PIPELINE
- EXISTING PARK OR GREEN SPACE
- PROPOSED PARK



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NOTE: THERE IS NO ZONE 5 UNDER THE CURRENT ZONE DESIGNATIONS

SPUR WELL FIELD PIPELINE  
5 MILES

0' 3000'

**ES-4**  
**SYSTEM FACILITIES AND PRESSURE ZONES**  
 LARAMIE WATER MANAGEMENT STUDY, LEVEL II  
 WYOMING WATER DEVELOPMENT COMMISSION

**LEGEND**

- RESERVOIRS AND TANKS
- ⊙ WELLS
- ⊕ PUMP STATION
- ⊕ PRESSURE CONTROL STATIONS
- DISTRIBUTION SYSTEM WATER MAIN
- TRANSMISSION PIPELINE

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ES-5 Water System Master Plan Schematic

