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**Mailing Address:**

Water Resources Data System  
University of Wyoming, Dept 3943  
1000 E University Avenue  
Laramie, WY 82071

**Physical Address:**

Wyoming Hall, Room 249  
University of Wyoming  
Laramie, WY 82071

**Phone:** (307) 766-6651

**Fax:** (307) 766-3785

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# STAR VALLEY REGIONAL MASTER PLAN EXECUTIVE SUMMARY



Prepared for:  
Wyoming Water  
Development Commission

Prepared by:  
Sunrise Engineering, Inc.  
PO Box 609  
Afton, WY 83110



# STAR VALLEY REGIONAL MASTER PLAN

## EXECUTIVE SUMMARY

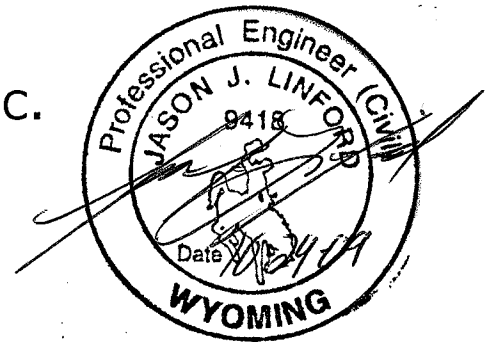
WYOMING WATER BASIN PLANNING PROGRAM

WYOMING WATER DEVELOPMENT COMMISSION

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Prepared By:

SUNRISE ENGINEERING, INC.  
Afton, WY 83110



In Cooperation with:

Boyle Engineering, Inc.  
Lakewood, CO 80228

Rendezvous Engineering  
Jackson, WY 83001

Harvey Economics  
Denver, CO 80246

Collins Planning Associates  
Jackson, WY 83001



## 1.0 INTRODUCTION

The Star Valley Regional Master Plan Level I Study was commissioned by the Wyoming Water Development Commission (WWDC) and sponsored by Lincoln County. The intent of the study was to investigate the potential of creating a regional water system to serve the population of the Star Valley area.

Results of the study indicate that the most feasible alternative is to develop two regional systems, one for the Upper Valley area and one for the Lower Valley. The estimated cost of constructing the Upper Valley and Lower Valley regional water systems are 11,000,000 and 17,780,000, respectively. The financial analysis indicates that in most cases the estimated increase in user fees in the form of monthly water rates and new user connection fees would be reasonable. This is based on the assumption that the projects will be funded using 67%/33% grant and loan combination from WWDC.

This study is a master plan for developing the Star Valley Upper Valley and Lower Valley Regional water systems. Future studies of specific areas in the valley are recommended. The regional system may not be constructed all at once, but regionalization may begin with smaller projects that work within the framework established in this study.

### 1.1 GENERAL STUDY LOCATION

Star Valley lies in north Lincoln County, Wyoming. The valley is approximately 45 miles long and 3 to 5 miles wide. Star Valley is geographically divided into upper and lower valley regions by an area known as the “narrows”; a several mile long section where the east and west mountains which border the valley come together leaving only a narrow floodplain where the Salt River passes through. Total population of Star Valley is estimated to be 12,600. The elevation of the valley floor varies from approximately 6,200 feet above sea level near Smoot at the southern end of Star Valley to approximately 5,800 feet at Alpine at the northern end of the valley.

### 1.2 SCOPE OF STUDY

Nineteen of the twenty-one Star Valley public water systems are studied in depth. The background of each system was investigated; the systems were mapped in a Geographical Information System (GIS); and the sources, storage capacity, water quality, water rights, and distribution systems were evaluated. A report for each system was prepared and is included in two separate binders with the title “Water System Investigation and Evaluations.” All of the systems studied are designated public water systems by the Environmental Protection Agency (EPA) and are listed below.

**TABLE 1.1 – EXISTING WATER SYSTEMS INVESTIGATED**

| UPPER VALLEY SYSTEMS                        | LOWER VALLEY SYSTEMS                    |
|---|---|
| ▪ Greater Smoot Water and Sewer District    | ▪ Turnerville Water and Sewer District  |
| ▪ Kennington Springs Pipeline Company       | ▪ Bedford Water and Sewer District      |
| ▪ Fairview Water and Sewer District         | ▪ Town of Thayne                        |
| ▪ Osmond Pipeline Company                   | ▪ Town of Star Valley Ranch             |
| ▪ Happy Valley Pipeline Company             | ▪ Leisure Valley, Inc.                  |
| ▪ Westview Service and Improvement District | ▪ Freedom Water and Sewer District      |
| ▪ Town of Afton                             | ▪ Etna Water and Sewer District         |
| ▪ Grover Water and Sewer District           | ▪ Trail Ridge Subdivision               |
|   | ▪ Town of Alpine                        |
|   | ▪ North Star Utility                    |
|   | ▪ North Alpine Special Service District |

This study also looks at the future population of the valley and projects future water demands. Using this data, regional water system alternatives are examined and a proposed regional water system layout is presented. An economic analysis of the proposed layout is also performed to determine the financial feasibility of a regional system.

Also included is a section on the impact that septic systems and leach fields might have on Star Valley ground water quality.

### 1.3 PREVIOUS STUDIES

There have been many water studies conducted over the years for the communities in Star Valley. The WWDC reports that it and the Legislature have funded over 25 studies in the valley over the last 30 years. Many of the studies have originated because of water quality problems resulting from source issues and from outdated, dilapidated systems.

## 2.0 EVALUATION OF EXISTING SYSTEMS

Site visits were conducted for each of the existing systems. During the initial visit an interview with the system operator was conducted where system information was gathered. System construction plans and previous water studies were also collected from engineering firms who designed the systems and conducted earlier water studies in the area. Water study documents were also acquired through the Wyoming Water Development Commission. Water rights data was gathered from the Wyoming State Engineers Office.

Water source and storage analysis was conducted using guidelines provided by the Wyoming Department of Environmental Quality (WDEQ, 2006). Pressure and flow information was calculated using H2O Net Water Modeling Software.

Water quality history was evaluated using the Safe Drinking Water Information System (SDWIS) reports provided by the EPA. Sanitary Surveys were collected from the U.S. EPA Region VIII office in Denver Colorado and reviewed for useful data. Each water source was sampled and tested.

A report for each system was prepared and is included along with this report in two separate binders with the title “Water System Investigation and Evaluations.”

## 2.1 WATER SOURCES

The existing water systems in Star Valley are supplied by 24 wells and 16 springs. The wells range in flow rate from 25 gallons per minute (gpm) to 1,200 gpm. Natural springs are abundant in the mountains around Star Valley. Many springs have been “developed” by utilizing cut-off walls, collection areas, spring boxes, etc. and used by many of the Star Valley water systems. The springs investigated vary in capacity from 12 gpm (Mill Hollow Spring, Grover) to 3,400 gpm (Periodic Spring, Afton)

## 2.2 WATER QUALITY

Water quality for the Star Valley water systems has been good in recent years. The abundance of high quality drinking water is one of the factors that makes living in Star Valley appealing. Many of the systems have completed major renovation projects in the last 20 years based on water quality concerns associated with old, undersized systems plagued with contamination issues.

Water quality tests performed on each of the 36 sources indicated that none were out of compliance with the current EPA primary standards. The only parameters which exceeded the EPA limits include one Sulfate occurrence, three Iron occurrences, and one Manganese occurrence; all secondary standards.

## 2.3 IDENTIFICATION OF HOT SPOTS

Some of the existing springs are considered “Hot Spots”, in other words they present the greatest risk of contributing to a public health hazard. There are several criteria selected on which to base the decisions. First was the springs location in relation to streams, roads, slopes and whether they lie in the bottom of a canyon or draw. Second was the protection of the spring in relation to its age, construction methods, fencing, adjacent vegetation and drainage.

All springs have a greater risk of contamination than wells. Of the springs investigated the Mill Hollow Spring (Grover), Water Cress Spring No 2 (Happy Valley), Osmond Spring, and the Kennington Springs No. 2 raised the greatest concern. The Mill Hollow Spring does not produce enough water (6 to 12 gpm) to be worth the risk of having it connected to the Grover system. The Water Cress Spring No. 2, Osmond Spring and Kennington Springs No. 2 are not well protected and are the sole source of water for their respective systems.

## 2.4 WATER RIGHTS

Water rights associated with many of the springs that serve the water systems in Star Valley date back 100 years or more. The wells that are supplying water to the systems are of more recent date.

Most all of the wells have statement of completion dates that are less than 20 to 25 years old. A detailed list of water rights is included in the study.

Every system analyzed in this study has excess source capacity including the water rights associated with that capacity with the exception of the Town of Star Valley Ranch.

## 2.5 HISTORICAL WATER USE

The historical water use data for each system in Star Valley is located in the individual system reports. Some of the existing systems have kept detailed data over the past few years while other systems do not have any data available for review. Water use in Star Valley water systems has been historically high. This is influenced by the rural nature of the area and the past abundance of water.

Water use was analyzed in terms of equivalent residential units ERUs which is the amount of water used by an average household and in gallons per capita per day (gpcpd) which is derived in this study by dividing water use in ERUs by the average number of persons per household obtained from census data for each community. Average daily demand in the systems analyzed varied from 300 gallons per day (gpd)/eru (107 gpcpd) to 3,600 gpd/eru (1,302 gpcpd). Systems with meters on individual connections averaged 915 gpd/eru (327 gpcpd) while unmetered systems averaged 1,727 gpd/eru (617 gpcpd). The average State water use is around 330 gpcpd.

## 2.6 SYSTEM OPERATIONS

System government and management in the Star Valley water systems takes on various forms including incorporated towns, water districts, pipeline companies, privately owned utilities, and home owners associations.

## 2.7 WATER STORAGE

Water storage (water tank) capacity among the different water systems in Star Valley seems to be the most variable characteristic studied. Seven of 19 systems have less storage than is required by current WDEQ regulations.

# 3.0 CREATION OF GIS

The major features of each water system were inventoried and entered into a Geographical Information System (GIS) which is a computerized map with data linked to each feature in the map. The features included in the GIS are: waterlines, water sources (wells, springs), water storage tanks, pressure reducing valves, booster pump station, and fire hydrants. These data were collected by collecting GPS points within the study area and incorporating those points into a database.

In order to make decisions about the location of a regional water system, data must be over-laid and analyzed visually to see potential conflicts and benefits of spatial relationships. The proximity of one system to another is important when deciding the costs of combining two or more systems. A copy

of the GIS is provided to WWDC as well as Lincoln County along with the report in electronic format.

## 4.0 POPULATION GROWTH PROJECTIONS

A challenge in projecting the Star Valley population is that very little data exists that breaks the County into sub-areas, yet the various areas of the County are growing at starkly different rates. The County Planning Department is the only source of information that addresses this issue.

Total population for both Lower and Upper Star Valley is estimated to grow from 12,600 in 2008 to nearly 30,000 by 2040. Estimated growth rates are listed in Table 4.1.

**TABLE 4.1 – GROWTH RATES**

|           | Lower Valley | Upper Valley |
|-----------|--------------|--------------|
| 2008-2020 | 5.05%        | 1.66%        |
| 2021-2025 | 5.05%        | 0.97%        |
| 2026-2040 | 2.50%        | 0.80%        |

## 5.0 SPATIAL POPULATION GROWTH MODEL

A spatial population growth model predicts where population growth will occur. For purposes of this study the Spatial Population Growth Model has two purposes. First the model shows where to place the regional pipelines and second the model provides input for the hydraulic evaluation for sizing the pipeline system.

UPlan, an urban growth model that projects future land use patterns, according to user-definable assumptions about densities, environmental constraints, and local land use plans was used to create a growth scenario based on planning and zoning inputs, population growth percentage, growth attraction, and growth discouragement to predict where growth might occur for the next 30 + years.

The results indicate that the Lower Valley trends are similar to those of the Upper Valley in that growth will be concentrated in and around communities, towns, utilities, roads, and commercial businesses. The way of life in Star Valley can determine where you live more than proximity to industrial and commercial centers. The environmental impacts on growth are less restrictive due to the large amount of farmland and open space available. It is difficult to determine the random and sporadic growth of low density areas which dominate Star Valley.



## 6.0 PROJECTED FUTURE WATER USE

In order to locate and size the transmission lines for a regional system it is necessary to know the future demand of each of the existing systems that will connect to the regional system. It is also necessary to predict where new public water systems might be created that will hook into the regional system. In other words, the amounts and locations of future water demand need to be known.

The population growth projections and the spatial population growth model (UPlan model), discussed previously, were used to determine the amount and location of the growth that is expected to take place in Star Valley over the next several years (out to 2040). This information was used to determine the future water demand for each existing water system and in other areas of the Valley that may not yet have a water system as well as the Upper and Lower Valley regions as a whole.

Water demand for the Upper Valley area is expected to increase from 1,204 million gallons per year (mgpy) in 2008 to 1,736 mgpy in 2040. For the Lower Valley water use is expected to increase from 2,477 mgpy to 8,295 mgpy over the same period.

## 7.0 WASTEWATER TREATMENT METHODS

In growing rural areas, there is rising concern about the health effects of contaminants in the shallow groundwater system introduced by the increased density of septic systems. In areas such as Star Valley, there has not been significant impact of low-density septic leachate on the shallow groundwater aquifer system; however, with human population on the rise, the increased septic leach field density may contribute in areas to increased concentrations of groundwater contaminants, primarily from nitrate. The 2008 analytical data suggest that the shallow aquifer may have been impacted by nitrate sources in some locations, and while not exceeding the EPA drinking water limit, appropriate protective plans should be considered. Lincoln County has implemented a program where in new subdivisions with average lot sizes smaller than five acres enhanced septic systems are required. Enhanced systems reduce nitrate in the wastewater that is discharged to the leach field.

## 8.0 RAW WATER USES

If the regional system is developed as proposed, several existing public wells and springs may become available to use as raw water sources for irrigation. Removing the springs from the culinary systems and using them for irrigation will alleviate the contamination risk that exists with springs used for culinary use. Also, it is logical that the wells not used for the regional system will have value as irrigation wells.

The study explores two irrigation options in brief; first, the development of irrigation systems for municipal facilities like parks, cemeteries, and golf courses and second, the development of community irrigation systems for residential irrigation.

The results of the analysis indicate the practicality and feasibility of using existing spring sources and wells for irrigation sources will need to be investigated more fully on a case by case basis in future studies. It will likely be more practical to irrigate larger parcels such as parks, cemeteries, golf courses, etc. with system retained sources than to try to irrigate residential lots. Many communities in the Valley are very spread out making impractical to reach out to the outlying residences. If residential irrigation is feasible, the system will likely be focused on the main part of the Town or Community.

## 9.0 POTENTIAL REGIONAL SYSTEM ALTERNATIVES

Regional water systems generally consist of a water source, reservoir, well field, etc. and a transmission line with points of use along the transmission line. In order to determine how a Star Valley Regional water system would operate, several alternatives were considered covering various issues related to water sources, storage, system government, transmission and distribution and requirements for connection. The analysis resulted in the proposed regional system concept described below.

The recommended regional concept is to have two separate regional systems, the Upper Valley Regional Water Supply System and the Lower Valley Regional Water Supply System. Existing public water systems and future public water systems (systems with more than 15 connections) will be allowed to connect. Water systems will be connected at one point. At the connection, the water supplied to the public water system by the regional system will be metered and the system will be billed based on use.

The proposed regional systems would be operated by a joint powers board where each publicly owned water system eligible for state and federal funding (municipalities, special improvement districts, etc.) will have a seat.

## 10.0 CONCEPTUAL DESIGN OF SELECTED ALTERNATIVE

The designs of the regional subsystems are based on supplying the projected year 2040 maximum daily demand.

In locating the regional transmission lines the goals were: 1) to connect the existing public water systems; 2) provide a waterline along the length of Highway 89; the major transportation corridor extending along the length of the valley and 3) to use the UPlan model to locate lines where growth is expected to occur. The study contains maps showing the proposed layouts.

Each community system connected to the regional system will be connected by means of a PRV/Solenoid Operated Flow Control Valve. The valve will be connected to the community system's tank via telemetry. When the water level in the tank drops to a designated point, the valve will open and supply water to the community system.

Each regional subsystem will have two small tanks (50,000 gallons each) that are referred to as “wet wells.” The elevation of the wet wells will govern the pressure in the regional subsystem. The supply wells will be connected to the wet wells via telemetry and will turn on and off in order to keep the wet well full. In this way, pressure will be maintained in the regional system while the variable demands of the system are met as the connection valves to the community systems open and close.

## 11.0 ECONOMIC ANALYSIS AND PROJECT FINANCING

The economic analysis and financing plan has been developed to serve as a basis for funding by the State or other funding agencies in conjunction with local participants. Once establishing a local funding share, this financing plan evaluates several approaches for allocating costs in pursuit of a fair and equitable regional plan for providers and their water users. Table 11.1 shows the projected capital and operating costs for each of the regional systems.

**TABLE 11.1 – PROJECTED CAPITAL & OPERATING COSTS FOR THE STAR VALLEY REGIONAL WATER SYSTEMS**

|   | UPPER VALLEY | LOWER VALLEY | TOTAL        |
|---|--------------|--------------|--------------|
| Construction Costs (one time)                             | \$11,000,000 | \$17,780,000 | \$28,780,000 |
| Well Purchase Costs (one time)                            | \$854,513    | \$2,314,594  | \$3,169,106  |
| Operations & Maintenance Costs* (annually)                | \$500,000    | \$480,000    | \$980,000    |
| *Annual costs are assumed to increase over time.          |              |              |              |
| Note: All dollars are expressed in 2008 constant dollars. |              |              |              |

Grant money would be applied for with the potential of 67% grant money being secured for the new systems from a funding agency such as WWDC. The remaining 33% would be financed through a loan which might also be provided through WWDC. The annual payment on the 33% loan monies, (\$277,000 for the Upper Valley system and \$498,000 for the Lower Valley system) added to operating and maintenance costs and well purchase costs totaled an annual cost of \$777,217 for the Upper Valley system and \$977,765 for the Lower Valley system.

The cost of the regional system would be allocated fairly and equitably amongst the existing water providers by projecting customers and associated water demands and allocating annual costs by the proportion of each provider’s water needs to the total for the respective systems. The new costs would be added to operational costs that already exist in the individual systems.

The break even rate that the regional systems would need to charge water providers is \$0.60 per 1,000 gallons and \$0.89 per 1,000 gallons for the Upper Valley and Lower Valley systems, respectively. This rate would be in addition to the existing system’s water rates. However, these rates may be adjusted from existing rates in light of cost savings resulting from connection to the regional water system. The ability to pay evaluation suggests that in general the increases in rates and tap fees are reasonable. However, for some systems, the calculated increases may be excessive. It should be noted that the purpose of the financial analysis is to look at overall feasibility of the

regional systems. As individual providers express an interest, a cost of service study and rate projection will be performed for each water provider.

## 12.0 CONCLUSION AND RECOMMENDATIONS

### 12.1 CONCLUSIONS

This study located a plan to develop two regional water systems in Star Valley. How this plan will be implemented depends on the funding available and the level of interest by the parties involved (WWDC, Lincoln County, and the public water systems). The regionalization of water systems in Star Valley could either happen with two big projects (one for the Upper Valley and one for the Lower Valley) or could happen more slowly with certain areas, which are currently poised for regionalization, being addressed first and the regional systems growing from there. Either way, this Master Plan will serve as a guide for WWDC and Lincoln County in future water system expansion and regionalization by providing decisions makers with a “big picture” perspective.

From a financial standpoint the regional systems are feasible, looking at the systems overall. Although rates will increase for many users there will be a great benefit and value to many of the existing systems in having a new, reliable, secure water source. Many of the existing systems have very low water rates, however these systems are also in great need of improvements. Either with or without the regional system, many of these systems will likely need costly improvements in the near future.

Most importantly, each water provider must weigh the regional system benefits in considering the repayment costs. Benefits for further consideration are as follows:

- Dependability, reliability from a looped, redundant system
- Risk of timing, location of growth
- Future system requirements, water quality vs. septic contamination
- Risk of system failure
- Growth and density focused around regional water system
- Increased land values from regional water and higher densities
- Economy of scale
- Support from WWDC

Individual water providers should examine and consider each of these benefits in its decision about whether or not to participate in a Star Valley Regional Water System.

## 12.2 RECOMMENDATIONS FOR LEVEL II STUDIES

It is recommended that Level II studies be performed on the areas that appear to be poised for regionalization. These areas have public water systems that are in close proximity to each other and appear to have interest in regionalization. These areas, listed from North to South, are: 1) Alpine, North Alpine, North Star Utility; 2) Bedford, Thayne; 3) Afton, Auburn; and 4) Smoot, Happy Valley, Osmond, West View.