



LEWIS YOUNG ROBERTSON & BURNINGHAM, INC.

SOCIO-ECONOMIC ANALYSIS

SNAKE VALLEY – JUAB AND MILLARD COUNTIES



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EXECUTIVE SUMMARY¹

Background and General Conditions

- The Las Vegas Valley Water District filed for water application in Snake Valley in 1989. Southern Nevada Water Authority (SNWA) applied to the Bureau of Land Management (BLM) for a right-of-way to build a pipeline to extract 25,000 to 50,000 acre feet (af) of groundwater from the aquifer under the Snake Valley;
- In 2009 a draft water agreement between the State of Nevada and the State of Utah was released. The agreement, if signed, will delay the Snake Valley hearing until 2019, divide the water between Utah and Nevada, outline protections for current water rights holders, and require the states to set baseline environmental triggers which would require action if degradation of vegetation or wildlife occurs;
- The agreement divides 132,000 af of water in the following manner: 55,000 af of allocated water rights to Utah, 12,000 af of allocated water rights to Nevada, 5,000 af of unallocated water rights to Utah, and 36,000 af of unallocated water rights to Nevada. Assuming 24,000 af still reside in the aquifer after allocating the water in the above manner, 18,000 af will be allocated to Nevada and 6,000 af to Utah;
- According to the Utah Water Right Analysis,² the Utah total for all water uses (ground and surface) is 84,638 af. The Nevada total for all water uses (ground and surface) is 23,030 af;
- County officials and residents of Juab and Millard Counties have the following concerns about the Utah/Nevada Snake Valley Water Rights agreement: (1) lack of sufficient water to maintain “family sustaining” employment in Juab and Millard Counties; (2) lack of sufficient water to sustain economic viability and growth in Juab and Millard Counties; (3) lack of sufficient water to sustain ground vegetation, thereby negatively effecting the West Desert environment; (4) inability to accurately monitor ground water draw-down; (5) the long lag-time before effects of water draw-down in excess or water recharge are experienced; and (6) the ability of Nevada to honor the agreement to protect the oldest water rights first after large investments in infrastructure are made;
- The Snake Valley is located in the West Desert of both Juab and Millard Counties in Utah and stretches across the Nevada border; and
- The main industry in the area is currently agriculture.

Socio-Demographics of Juab County

- The Snake Valley area of Juab County includes the communities of Callao, Fish Springs, Granite Ranch, Trout Creek, and Partoun;
- As of the 2000 Census the population was estimated at 268 persons. The West Desert area had a median age of 25 years which was younger than the County’s 26.5 years and the State’s 27.1 years. Median household income for the area was \$17,708, which was significantly lower than the County’s (\$38,139) and the State’s (\$45,726) median household income;
- Employment opportunities consist primarily of cattle ranching and alfalfa farming; and
- There is potential and opportunity for this area to grow and expand. However, if the agriculture industry is threatened or limited due to a shortage of water resources, the potential for future growth in other industries will subsequently be limited.

Socio-Demographics of Millard County

- The Snake Valley area of Millard County includes the communities of Gandy, Garrison, and Eskdale;
- As of the 2000 Census, the population was estimated at 200 persons. The West Desert Area of Millard County had a median household income of \$24,773. This was significantly lower than the County’s (\$36,178) and the State’s (\$45,726) median income;
- Agriculture makes up the majority of employment opportunities in of Millard County and includes mostly cattle ranching and farming;
- The Snake Valley area in Millard County offers more diverse employment opportunities compared to employment opportunities available in Juab County. Additional industries include:, education, automotive care, metal fabrication, and professional services; and

¹ Sources for information in the Executive Summary can be found in the body of the document.

- There is potential and opportunity for this area to grow and expand. However, if the agriculture industry is threatened or limited due to a shortage of water resources, the potential for future growth in other industries will subsequently be limited.

Resource Evaluation and Impacts

The major opportunities for resource development in Millard and Juab Counties include mining, energy, farming, grazing, recreation, and a limited amount of business development. Future growth is dependent on the availability of additional water as the existing water allocation is barely sufficient to serve current development.

- *Fiscal Impacts of Resource Development*
 - o For every \$1 million invested in Juab and Millard Counties, the local taxing entities will receive roughly \$11,850 and \$10,000 annually in tax revenues (assuming 2010 tax rates). These increased revenues will flow to the respective counties, school districts, water, and fire districts.
- *Mining*
 - o Utah is ranked in the top ten in the 2008/2009 Fraser Institute's Mineral Potential Policy Index;
 - o Inland Explorations Ltd. has an approved Notice of Intent to Conduct Exploration for the Thompson Knolls/Road Canyon area in Millard County;
 - o Maestro Ventures Ltd. and Palladon Ventures Ltd. are exploring gold mining possibilities in Kings Canyon, Millard County;
 - o Inland Explorations Ltd. has an approved Notice of Intent to Conduct Exploration at Keg Mountain, Juab County;
 - o The Utah Geological survey estimates approximately 147,000 ounces of gold and 2,583,000 ounces of silver in the Thomson Knolls/Road Canyon area;
 - o The Utah Geological Survey estimates approximately 261,000 ounces of gold and 972,000 ounces of silver in Kings Canyon;
 - o Based on an average mine size of approximately 100 hundred acres, and depending on the rate of extraction, each mine could employ several hundred employees;
 - o Assuming a life of mine (LOM) of 10 years and given the current high silver and gold prices, the pre-tax net present value of each mine is between approximately \$40 million and \$80 million;
 - o While water requirements vary depending on the type of mine, water is required during all stages of mining and is needed even in the early process before mining begins; and
 - o In the past, Inland Explorations has used 171,428 gallons of water to do preliminary drilling and exploration research in Tooele County, which calculates to approximately 28.6 gallons of water per foot drilled.
- *Renewable Energy Sources*
 - o The West Desert has the potential to develop renewable energy resources in the form of geothermal energy, wind energy, and solar energy as described below. These resources cannot be developed without sufficient water resources;
 - o The Utah Renewable Energy Zone (UREZ) Task Force project has been created to meet the goal of providing 20 percent of Utah's electricity through renewable energy resources by 2025. The first phase of the project, identifying geographic locations of renewable resources, has been completed. Information from this study has been included in this report. A draft of the second phase of the study has recently been released and includes more detail about the costs and potential development of renewable energy resources in the Snake Valley;
 - o The Drum Mountain area, located in Juab and Millard Counties, is one of nine of the most promising geothermal resource areas in Utah. The estimated initial investment cost of developing a geothermal plant is \$150 million. Construction would last approximately one year and employ 100 - 150 individuals. After completion, the estimated number of full-time employees for operations and maintenance would be 10 - 15. Approximately 20,000 - 40,000 gallons of water per day would be required during construction with additional but limited water needs upon completion;
 - o Wasatch Wind, a local wind developer, recently erected a wind tower outside of Garrison (Millard County) as part of the preliminary stages of gathering data and assessing the possibility of developing a

wind farm in the area. The area around Garrison is currently classified as a wind zone by the UREZ Task Force project. Wind farms require large amounts of water in the initial stages of construction. The Milford Wind Corridor project estimated a one-time use of 220 acre feet of water for dust control and compaction in the construction stage of development. Investment in a wind farm could be similar to the investment in the Milford Wind Corridor project -- approximately \$86 million creating 200 construction jobs and 12 permanent jobs upon completion;

- o Plans have been drawn up by a local engineering and surveying company for a potential solar energy plant in the West Desert of Juab County. Power generated from the plant is estimated to be 34,020 kWh/day. Depending on the type of plant developed, water required to operate the plant could vary from four af to 34 af per year. Initial plant investment is estimated to be approximately \$28 million and could create 100-150 temporary construction jobs and 20-24 long-term jobs once completed; and
- o Juab and Millard counties may lose the potential to develop the following types of renewable energy sources if water is limited in these areas. Potential lost future economic benefits from renewable energy sources are summarized as follows:

ENERGY IMPACTS			
	DURING CONSTRUCTION		ON-GOING
	INVESTMENT	JOBS	JOBS
Geothermal	\$150,000,000	100-150	10-15
Wind	\$86,000,000	200	12
Solar	\$28,000,000	100-150	20-24

- *Farming/Cattle Industry*

- o The livestock industry of the Snake Valley is an important contributor to Utah’s economy;
- o The Bureau of Land Management (BLM) and the State of Utah School and Institutional Trust Lands Administration (SITLA) lease approximately \$16,841 worth of AUMs to Juab County Snake Valley residents;
- o BLM and SITLA lease approximately \$50,058 worth of AUMs to Millard County Snake Valley residents;
- o If water decreases to the point of affecting vegetation in the area, the amount of available AUMs would decrease. BLM, SITLA, and farmers’ revenues would decrease accordingly. If available grazing land decreases by ten percent, SITLA and BLM revenues would decrease as follows:

REVENUE IMPACTS				
ASSUMES 10% DECREASE IN VEGETATION				
	SITLA		BLM	
	JUAB COUNTY	MILLARD COUNTY	JUAB COUNTY	MILLARD COUNTY
Decrease in Annual Revenues	\$411	\$1,221	\$1,273	\$3,785
20-Yr Decrease in Revenues	\$8,220	\$24,420	\$25,460	\$75,700

- o The increased cost to farmers to replace one AUM with alternative feed would be approximately \$50-\$60; thus the total approximate increase in cost for farmers to replace ten percent of current grazing land would be as follows:

COST IMPACTS TO FARMERS		
ASSUMES 10% DECREASE IN VEGETATION		
	INCREASED COST TO FARMERS	
	JUAB COUNTY	MILLARD COUNTY
Total Approximate Annual Cost For Alternative Cattle Feed	\$52,000 - \$63,000	\$156,000 - \$187,000
Approximate Cost for Alternative Cattle Feed Over 20-Yrs	\$,1040,000- \$1,260,000	\$3,120,000 - \$3,740,000

- If additional water is taken from the area, the costs of pumping will increase as it becomes necessary to increase well depth in order to access water. Because aquifers are layered, the cost of pumping will not necessarily increase incrementally with depth. Depending on the depth of each layer, the costs of drilling to the next layer and pumping could increase exponentially; and
 - As well depth increases, more horsepower and bigger pumps are required to lift water from greater depths. The initial cost to deepen the existing wells in the Snake Valley of Juab County by 50 feet would be approximately \$1,382,000 and \$2,138,000 to deepen the existing wells in Millard County.
- *Small Business/Manufacturing*
 - Existing businesses such as the dairy farm, automotive shop, rock quarry, and concrete company would potentially be negatively impacted if water is pumped from the Valley;
 - Assuming sufficient water is available to support business operations, small business development opportunities for the Juab and Millard County areas include: meat packing, hand-made soap, customer service call/internet services, and furniture construction;
 - The initial investment cost of constructing a meat packing plant employing approximately four individuals is estimated to be \$400,000; and
 - Investing in business development in the West Desert becomes more risky if water is pumped from the area due to the uncertain future of available water in these communities.
 - *Tourism & Recreation*
 - Millard and Juab Counties have accessible outdoor activities that are conducive to developing a tourism and recreation industry;
 - Recreational activities include rock hounding, hiking, backpacking, horseback riding, bird watching, hunting, and ATV trails. The accessibility of these outdoor activities in the area provides an opportunity to develop tourist accommodations such as dude ranches, correctional camps, or youth camps;
 - An existing hunting guide and outfitting business estimates a revenue decrease of approximately \$50,000 should water be pumped from the area; and
 - A dude ranch could be developed for approximately \$2.5 million to \$4 million creating an estimated three to nine winter jobs and five to twenty summer jobs upon completion. Annual revenues for a dude ranch with 30 rooms are estimated to be \$1,560,000 (assuming 40 percent occupancy), amounting to \$31.2 million over 20 years (with a net present value of over \$19 million.)

Juab County Public Meeting

- The Juab County meeting was held in Callao on November 5, 2009;
- Comments and concerns were voiced on the topics of farming, employment opportunities, lifestyle, environmental/health issues, Fish Springs National Wildlife Refuge, water trends, economic development opportunities, and recreation/tourism opportunities in the area;
- *Farming*: Most farmers raise cattle or grow hay. Many farmers use only half of the acres they own because of lack of water. Another concern of the farmers is the effect of the dropping water table on the plants and grazing land. If plants on the surface die, grazing could be negatively impacted. This would also affect the BLM and the State of Utah School and Institutional Trust Lands Administration which lease land to the farmers for grazing;
- *Other Employment Opportunities*: There are few additional opportunities for employment in the area. Since very little profit is earned by farmers, many would like additional opportunities to stimulate their incomes;
- *Lifestyle*: Residents enjoy the solitude, quiet, closeness to the land, and clean air found in this area of the County. They believe that seeking to actively develop the area would compromise this lifestyle; however, they understand the importance of safe and appropriate growth. Pumping from the area would limit this growth and threaten their current lifestyles;
- *Environmental/Health Issues*: Residents worry that many plants will die as a result of pumping water from the area. This could create increased dust storms and health issues associated with that dust. Additionally, the increased dryness of plant life and lack of water could create a risk of fire danger in the area;
- *Fish Springs National Wildlife Refuge*: This Refuge would be heavily affected by pumping. The Refuge is accustomed to receiving 32,000 acre feet; however, the current draft agreement allocates only 20,000 af to the refuge. If the Refuge is allocated less water, thousands of acres could dry up, closing many areas of the Refuge, and shortening or eliminating hunting altogether;

- *Water Trends:* All residents believe there is no excess water to pump to Nevada. The water table has slowly dropped throughout the years; previously wet meadows are now completely dry;
- *Economic Development Opportunities:* Residents would like to develop sufficient employment opportunities to allow some of the youth to stay in the area upon graduation. Potential development opportunities include: a renewable solar energy system, a geothermal energy system, wind farm, mining, and small business development. Plans for a solar energy plant have already been drawn up; and
- *Recreation/Tourism:* Current recreational opportunities such as horseback riding, hiking, shooting, 4-wheeling, and snowshoeing could be developed in the form of youth camps, correctional camps, or dude ranches.

Millard County Public Meeting

- The Millard County meeting was held in Eskdale on January 13, 2010;
- Comments and concerns were voiced on the topics of farming, employment opportunities, growth, lifestyle, environmental/health issues, water trends, economic development opportunities, and recreation/tourism opportunities in the area;
- *Farming:* According to Snake Valley residents, approximately 60 percent of the community is involved in the agriculture industry (cattle ranching and farming of alfalfa, barley, and corn). Sufficient water is not available to farm the full amount of land owned by most farmers;
- *Other Employment Opportunities:* More opportunities exist for employment in this end of the valley. Existing businesses include: a rock quarry, tire shop, concrete company, auto shop, and a metal fabrication shop. Many residents also work out of their homes by offering professional services such as accounting, financial consulting, and computer consulting;
- *Growth:* This area has experienced significant growth since the 1970's. Eskdale is estimated to have economically increased 10 times in the past 30 years.³ Additionally, Eskdale is looking to develop additional housing units as well as numerous other facilities in the near future which will place increased demands on the water supply;
- *Lifestyle:* Residents enjoy the friendliness, support, and feeling of camaraderie that comes from living in a small community;
- *Environmental/Health Issues:* Residents worry about the increased dust in the area as a result of pumping water from the aquifer. The area is already susceptible to dust storms that prove dangerous to human safety and cost travelers time and money to reroute their travels. Additional dust could also threaten agricultural crops;
- *Water Trends:* Residents in the area around Eskdale and Garrison have seen a drop in the water table of approximately 1.25 – 1.5 feet per year since 1999. If a well has to be deepened, the costs of pumping could more than double;
- *Economic Development Opportunities:* This area of Millard County could prove to be a good environment for a solar energy plant or a wind farm. Wasatch Wind, a wind energy developer, is looking to develop a project close to Garrison; and
- *Recreation/Tourism:* Some recreational activities in the area include: rock climbing, hunting, and 4-wheeling. Popular hunting in the area includes deer, antelope, geese, dove, and elk.

Evaluation of General Plan

- *Juab County:* Juab County's General Plan states that they "promote economic development and diversification...which will create family-sustaining employment, enhance the quality of life, and develop a beautiful, productive, and safe place for the citizens of Juab County to work and live."⁴ The plan further states that one concern in regard to growth is the availability of water as ground water levels have been declining; and
- *Millard County:* According to Millard County's General Plan, agricultural land, tourism-related activities, and economic and community growth are all dependent on water; thus, a lack of water would compromise the vision that Millard County has for the future.

Development Potential

- *Juab County:* Juab County has no specific development plans for the near future but is looking into the possibility of mining development in the area; and

³ Comments made by residents at the Millard County meeting

⁴ Juab County General Plan, page 94

- *Millard County:* The community of Eskdale has specific development plans in place to expand agriculture by growing its 300 cow dairy farm to 600 cows, increasing its farm acreage to use all permitted water, and developing specialty crop production. Plans are currently being drawn up to construct a house of worship, offices, a training center, an assembly area, and an additional residential subdivision.

Quality of Life Issues

- *Dust:* If the water table drops low enough to kill vegetation, more dust will be created, increasing the risk of dust storms in the area. An increase of dust and dust storms may affect the health of Utah residents and also impact the agriculture and grazing industry; and
- *Wildlife:* Various plants and wildlife may be affected by a decrease in water in the Snake Valley area. Fish Springs National Wildlife Refuge is currently home to the Least Chub, a fish that is a candidate for the endangered species list.

INTRODUCTION

Lewis Young Robertson & Burningham, Inc. was retained to assess the economic impacts of the Southern Nevada Water Authority's proposal to pump and pipe groundwater from the Snake Valley area to locations in southern Nevada. This analysis identifies the impacts to both Millard and Juab Counties, with impacts specifically identified by each County.

BACKGROUND AND APPROACH

In 1989, the Las Vegas Valley Water District filed for water applications in the Snake Valley. Many Snake Valley residents protested these applications at that time; however, nothing was done for many years regarding these applications. In 2004, the Southern Nevada Water Authority (SNWA) applied to the Bureau of Land Management (BLM) for a right-of-way to build a pipeline from the basins where it had water applications to the Las Vegas area. SNWA was specifically seeking to extract 25,000 to 50,000 acre feet of groundwater from the Snake Valley.⁵ Shortly after SNWA applied for a right-of-way to build the pipeline, the U.S. Congress passed the Lincoln County Conservation, Recreation, & Development Act. This Act required a National Environmental Policy Act (NEPA) analysis as well as a Basin & Range Carbonate Aquifer System (BARCASS) Study. The Act also stated, "Prior to any trans-basin diversion from ground-water basins located within both the State of Nevada and the State of Utah, the State of Nevada and the State of Utah shall reach an agreement regarding the division of water resources of those interstate ground-water flow system(s) from which water will be diverted and used by the project. The agreement shall allow for the maximum sustainable beneficial use of the water resources and protect existing water rights."⁶

The results of the BARCASS Study were published in 2008. The study showed more water in the aquifer than had previously been suspected; however, the year the study had been completed had been an exceptionally wet year. The State of Utah financed additional studies and since 2007 the Utah Geological Survey has been developing groundwater monitoring networks in the Snake Valley and surrounding areas to monitor water levels and trends in the area.

In May 2008 SNWA requested a hearing for Snake Valley. This hearing has currently been delayed until at least 2011. In August 2009 a draft of the water agreement between the State of Nevada and the State of Utah was released. This agreement, once signed, would delay the Snake Valley hearing until 2019, split the water between Utah and Nevada, outline protections for current water rights holders, and require the states to set baseline environmental triggers that would require action if degradation of vegetation or wildlife occurs.⁷

Many Utah and specifically Snake Valley residents oppose the agreement believing that the allocation of water favors Nevada over Utah. It is estimated that approximately 132,000 acre feet (af) of water lie in the aquifer below the Snake Valley.⁸ An acre foot is approximately 326,000 gallons of water, which is enough to supply water to approximately one to two households for a year, or enough water to irrigate an acre of land with one foot of water.⁹ The current draft of the agreement between Utah and Nevada divides the 132,000 af in the following manner: 55,000 af of allocated water rights to Utah, 12,000 af of allocated water rights to Nevada, 5,000 af of unallocated water rights to Utah, and 36,000 af of unallocated water rights to Nevada. Assuming 24,000 af still reside in the aquifer after allocating the water in the above manner, 18,000 af will be allocated to Nevada and 6,000 af to Utah.¹⁰ The agreement accounts for Utah's existing water usage based on pre-1989 ground water rights. However, the agreement does not take into account land being watered from surface sources and land in current production with post-1989 water rights.¹¹ The Utah Water Right Analysis estimates the Utah total for all uses (ground and surface) at 84,638 af and the Nevada total for all uses (surface and ground water) at 23,030 af.¹² Therefore,

⁵ Clark, Lincoln, and White Pine Counties Groundwater Development Project, Segment 9 Snake Valley Basin, <http://water.nv.gov/hearings/spring%20valley%20hearings/SNWA/0.%20Overview/final%20scoping%20package.pdf>

⁶ Public Law 108-424 Section 301 (e)(3)

⁷ Agreement for Management of the Snake Valley Groundwater System, http://naturalresources.utah.gov/pdf/snake_valley_agree.pdf

⁸ Agreement for Management of the Snake Valley Groundwater System, http://naturalresources.utah.gov/pdf/snake_valley_agree.pdf

⁹ Henetz, Patty. "Did Utah blink in Snake Valley talks?" *The Salt Lake Tribune*

¹⁰ Agreement for Management of the Snake Valley Groundwater System, http://naturalresources.utah.gov/pdf/snake_valley_agree.pdf

¹¹ Approximately 1,801 acres (Utah Water Right Analysis)

¹² The Utah Water Right Analysis is a document that was assembled in August 2009 by the Utah Water Rights Department to document the history and nature of the accompanying documents which were developed as part of the Snake Valley water negotiation process. Utah Department of Resources, <http://waterrights.utah.gov>

the current agreement allows for sufficient water for substantive growth in Nevada while jeopardizing current employment for Utah's Snake Valley residents and any opportunity for growth in the area.

In addition to allocating the water between Utah and Nevada, the agreement includes a monitoring plan to measure the effects of the draw down to ensure that what flows out of the aquifer each year does not exceed the recharge of water from the surrounding mountains. If water drawn exceeds recharge, the States would be required to protect the oldest water rights first. Nevada's water rights only date back to applications filed in 1989; thus the pre-1989 water rights of Utah residents would be protected first. Many residents fear that if draw down exceeds recharge, Nevada would have a hard time honoring the agreement even though a monitoring plan would be in place. Reasons for this include: (1) the long lag time before the effects of water draw-down in excess of water recharge are actually experienced, (2) the long recovery time should damage to existing vegetation take place, and (3) the large investments in infrastructure that Nevada will have made in order to pump from the area. One rancher asked, "Does anyone think [the] Southern Nevada [Water Authority] is going to build a \$15 billion pipeline and then let somebody turn it off?"¹³

Many Utah residents and local officials agree that pumping water from the Snake Valley will result in negative impacts to those living in and around the Snake Valley and will also limit growth and development in the area. Potential negative impacts include: reducing an already low average family income, the inability to sustain future growth, and disrupting a water sensitive environment. In the words of one resident, "Putting a limit on local use of water handicaps all future Snake Valley growth. It devastates plans by young families to move to the area. It approximates 'the kiss of death' for this area."¹⁴ If sufficient water is available, there is significant opportunity for growth and development in the Utah's Snake Valley area.

California's San Joaquin Valley is an example of a once prosperous agricultural area that was turned into a dust bowl when water was rationed to protect a tiny fish called the delta smelt. As the amount of water available to farmers decreased, the economy died, driving up the unemployment rate in some areas of the valley to as high as 40 percent.¹⁵ Like the San Joaquin Valley, Utah's Snake Valley is also agricultural land. If water available to support the area's farmers is rationed, the fate of the Snake Valley will most likely be no different than that of the San Joaquin Valley.

This report includes an analysis of the existing economic base of the Snake Valley, a resource and infrastructure analysis, and an impacts analysis to determine the potential economic effects on the Snake Valley residents of pumping water from the Snake Valley aquifer.

In preparation of this report, Lewis Young Robertson & Burningham, Inc. interviewed many residents in the Snake Valley area of Juab and Millard Counties. Two additional information meetings were also held in the towns of Callao and Eskdale in order to access the economic state of the area, the economic potential of the valley, and the potential impacts to the area should pumping occur.

¹³ Loomis, Brandon. "Snake Valley ranchers filed by 'sellout' water deal." *Salt Lake Tribune*

¹⁴ John Conrad (Resident of Millard County and Dairy Farm owner)

¹⁵ "California's Man-Made Drought." *Wall Street Journal*.

EXISTING CONDITIONS

The Snake Valley is located in the West Desert on the western edge of both Juab and Millard Counties. Many small communities reside in the Snake Valley and earn their livelihood from the land. The main industry of the area is currently agriculture; however, opportunities for growth in other industries also exist. The key hindrance to growth in the area is the current lack of water and the future additional shortage of water that would be caused if Nevada were to pipe water from the area to send to Las Vegas. Many residents have seen a decreasing trend in available water throughout the years and fear that water is not available to send elsewhere without first negatively affecting the Snake Valley area.

SOCIO-DEMOGRAPHICS

JUAB COUNTY

The Snake Valley area of Juab County contains many small communities including, Callao, Fish Springs, Granite Ranch, Trout Creek and Partoun. These communities are located in the West Desert close to the Nevada border. Using Census 2000 data for the West Juab CCD (County Subdivision) the population was estimated to be 268 persons and households were estimated at 82. Table 1.1 further shows Census 2000 data comparing average household size, median age, and median household income for Utah, Juab County, and the West Desert area. The West Desert or Snake Valley area had a younger median age than the County and the State and also had a significantly lower median household income. This lower median household income could be attributed to the limited employment opportunities in the area.

TABLE 1.1 JUAB COUNTY DEMOGRAPHICS

	UTAH	JUAB COUNTY	WEST JUAB CCD
Average Household Size	3.13	3.31	3.27
Median Age	27.1	26.5	25
Median Household Income	\$45,726	\$38,139	\$17,708

Employment opportunities in the West Desert mainly consist of cattle ranching and alfalfa farming with a few exceptions. Some of these exceptions include the four school teachers in the area, two of which only work part-time. Fish Springs National Wildlife Refuge also employs a few West Desert residents. According to Snake Valley residents, most residents who farm alfalfa use their crops to feed their cattle; very few residents are able to sell the alfalfa for a profit. Those that are able to sell some of their alfalfa usually sell to dairy farms in Millard County.

Many residents have seen a decreasing trend in the amount of water available to them over the last 30 years. One resident claims that the water table used to be 1.5 feet at her house in Callao but is now at 4.5-5 feet.¹⁶ Another resident once used surface water to farm his land. However, that water has since dried up, leaving 200 acres idle.¹⁷ As water decreases in the Snake Valley, the costs to operate family-sustaining businesses increases substantially.

MILLARD COUNTY

The Snake Valley area of Millard County includes the communities of Gandy, Garrison and Eskdale. Using Census 2000 data for the Garrison-Sevier Lake CCD (County Subdivision), the population was estimated to be 200 persons and households were estimated at 63. Table 1.2 shows Census 2000 data comparing average household size, median age, and median household income for Utah, Millard County, and the West Desert area. The Snake Valley area of Millard County varied little from the County and State in terms of average household size and median age; however, similar to the West Desert area in Juab County, the median household income was significantly lower.

TABLE 1.2 MILLARD COUNTY DEMOGRAPHICS

	UTAH	MILLARD COUNTY	GARRISON-SEVIER LAKE CCD
Average Household Size	3.13	3.19	3.17
Median Age	27.1	29.9	27
Median Household Income	\$45,726	\$36,178	\$24,773

¹⁶ Beth Anderson (Juab County resident)

¹⁷ George Douglass (Juab County resident)

Agriculture makes up a majority of the employment opportunities in the Snake Valley area of Millard County and includes mostly cattle ranching and farming. Residents cite beef as the major product of the area followed by dairy and sheep farms. The ranchers in Millard County vary from those of Juab County in that they ship approximately half of their feed or hay to other areas. Some growth in farming for individual farmers has occurred in the last few years as local residents acquire and combine the land of elderly pioneer farmers who leave the area or pass away. The Snake Valley in Millard County also offers more diverse employment opportunities than does the Juab area. Industries include: agriculture, education, automotive care, metal fabrication, and professional services. This diverse offering of services and employment opportunities is a good indication of growth in the area.

There is potential and opportunity for this area to grow and expand to include other industries such as mining and renewable energy resources; however, agriculture is the base industry of the area. If this industry is limited or threatened by a decrease in available water, all potential future growth will subsequently be limited. All residents interviewed anticipate a decrease in available water should water be pumped from the Valley. Many residents have already witnessed a decrease in water throughout the last 30 years. Residents estimate that available well water has been decreasing since 1999 at approximately 1.25 – 1.5 feet per year.¹⁸

WATER USE

In late May 2006, Nevada and Utah agreed to do a water right inventory in order to estimate the magnitude of the depletion associated with existing rights, which would be used in the Snake Valley Water Rights negotiation process. Based on the tabulations included in this water rights inventory, there are approximately 18,635 acres of land with groundwater water irrigation rights in Juab and Millard Counties. Of these 18,635 acres, approximately 14,006 acres are being irrigated. The discrepancy between the acreage with water rights and the acreage being irrigated could be due to a number of factors. Two of the factors include: (1) the decline in the water level has made the water too expensive to access and it is no longer economically viable to irrigate; or (2) the water level has dropped to the point where there is no longer sufficient water available to irrigate the total acreage for which there are currently water rights. Interviews with several farmers in the Snake Valley area indicated that due to lack of water, they are only able to use a portion of their land for agricultural uses. One farmer has 350 acres and only uses half,¹⁹ one has 1,016 acres and only uses 750,²⁰ another farmer has 750 acres and only uses 300,²¹ and another owns 200 acres and is unable to use any of it.²² One farmer claims that the land is too salty and not enough water is available to create a system to leech out the salt in order to use the land for production.²³ Another farmer sites the decrease in surface water as the reason for his limited production.²⁴ While the responses might vary slightly, all farmers reach the same conclusion: most land owned is not put into full production because of the lack of available water.

The inability to fully utilize land due to current water shortages in the Snake Valley compromises the ability of the residents to provide a family-sustaining income and limits possibilities for growth. The U.S. Department of Agriculture estimates the average net cash business income for farm operator households in 2005 was \$15,603. The Bureau of Labor Statistics Occupational Outlook Handbook, 2008-2009 edition states, "Additionally, most farmers - primarily operators of small farms - have income from off-farm business activities or careers, often greater than that of their farm income." Farmers in the Snake Valley area of Millard and Juab County, however, do not have the luxury of stimulating their farming income with outside income. Because few additional employment opportunities exist in the area, most farmers live solely off of the below-average income received through farming. As shown in tables 1.1 and 1.2, the average median income for residents in the Snake Valley area of both Juab and Millard County is currently well below the State's median income. A further decline in the amount of water available to sustain current agriculture levels will result in an even lower level of median income and will negatively impact Utah's agriculture industry.

¹⁸ Millard County meeting

¹⁹ Dennis Timm (Juab County resident)

²⁰ Don Anderson (Juab County resident)

²¹ Joe Matthews (Juab County resident)

²² George Douglass (Juab County resident)

²³ Don Anderson (Juab County resident)

²⁴ Dennis Timm, George Douglass (Juab County residents)

In addition to groundwater water rights for irrigation, there are also water rights in the Snake Valley area for quasi-municipal (domestic), stock and wildlife uses. Assuming a consumptive use for irrigation from surface and ground water sources is calculated at 2.5 af/acre,²⁵ Table 1.3 shows the use (in acre feet) of water in the Snake Valley.

TABLE 1.3 SNAKE VALLEY UTAH WATER USE

	IRRIGATION		QUASI-MUNICIPAL	STOCK	WILDLIFE	TOTALS
	ACRE-FEET	ACRES	ACRE-FEET	ACRE-FEET	ACRE-FEET	ACRE-FEET
Groundwater	25,638	10,255	113	886		26,637
Stream/OSW	9,083	3,633	17	634		9,734
Spring	11,866	4,747	3	831	20,000	32,700
Total	46,588	18,635	133	2,351	20,000	69,072

Source: Utah Water Right Analysis for "Allocated" category in the proposed Utah/Nevada Snake Valley Agreement

The initial water rights inventories conducted by the Utah Water Rights Department included all surface and groundwater uses due to the fact that there is no surface outflow from the Snake Valley. "The thinking was that whether the use was from surface or groundwater it had a direct impact on the groundwater system since any unused surface water finds its way to the groundwater system."²⁶ However, at Nevada's request, surface water rights were removed from the allocated groundwater rights calculations for Utah. Therefore, while the 55,000 acre feet of allocated water rights take into account groundwater sources, they do not account for or protect surface water rights. These rights are used by farmers who rely on streams and wetlands to water their land. It is possible that as water is pumped from the area water sources for farmers who rely on surface water for irrigation will decrease, forcing these farmers out of business. The Department of Water Rights is no longer granting water rights for the area.

The calculation for the proposed 55,000 acre feet of allocated water rights to Utah's Snake Valley was calculated as follows:

TABLE 1.4

Acres in the Utah Snake Valley	18,635 Acres
Acres in the Utah Hamlin Valley	1,733 Acres
Total Utah Acres in Agreement Boundary	20,436 Acres
Less: Acreage from Surface Sources ²⁷	4,764 Acres
Less: Post 1989 Acreage ²⁸	1,801 Acres
Less: Nevada Diversions Used on Utah Acres	732 Acres
Equals: Total Pre-1989 Acreage	13,071
Multiplied By: Consumptive Use Factor (2.5)	32,677 Acre Feet (consumption from Irrigation)
Plus: Equivalent Livestock Units	2,068 Acre Feet
Plus: Equivalent Domestic Units	156 Acre Feet
Equals: Total Pre-1989 Consumptive Use	34,901 Acre Feet
Plus: Fish Springs Wildlife Refuge	20,000 Acre Feet
Total Utah Allocated Water Rights	54,901 Acre Feet

While Utah is allocated only 55,000 af of allocated water rights, the Utah Water Right Analysis estimates the Utah Snake Valley total for all water uses²⁹ at approximately 84,638 af. Therefore, assuming a 2.5 acre foot per acre for consumptive use, there are approximately 11,855 acres in current production that could lose access to water. This scenario is likely to occur as residents in the area have seen the water table slowly drop throughout the years and previously wet meadows are now completely dry. Residents around Eskdale and Garrison estimate the water table has dropped 1.25 – 1.5 feet per year since 1999.³⁰ Table 1.5 shows the total potential decrease in net revenues for area farmers if 12,000 acres in current production no longer had access to water. The acreage shown in table 1.5 assumes an equal split between three types of common land

²⁵ Utah Water Right analysis used to develop the "allocated" category in the proposed Utah /Nevada Snake Valley Agreement

²⁶ Utah Water Right analysis used to develop the "allocated" category in the proposed Utah/Nevada Snake Valley Agreement

²⁷ Includes surface water from Snake Valley (3,633 acres), Hamblin Valley (1,063 acres) and Pleasant Valley (68 acres)

²⁸ Water rights granted post 1989

²⁹ Includes surface watering and post 1989 water rights

³⁰ Millard County Meeting

use. However, the actual amount of acres per land use that may lose access to water as a result of water being pumped from the aquifer to Nevada may vary from those shown in table 1.5.

TABLE 1.5 NET DECREASE IN REVENUES AS A RESULT OF INSUFFICIENT WATER

LAND USE	ACRES	NET REVENUE DECREASE PER ACRE ³¹	TOTAL NET DECREASE IN REVENUE
Alfalfa for Sale	4,000	\$200	\$800,000
Alfalfa for Cattle Feed	4,000	\$200	\$800,000
Grazing Cattle	4,000	\$200	\$800,000
Total	12,000		\$2,400,000

³¹ Estimated net profits per acre - Tom Baker, Baker Ranch, Snake Valley, Utah

RESOURCE EVALUATION AND IMPACTS

The Snake Valley in Juab and Millard Counties has many resources with significant development potential. The investment in and development of such resources would greatly benefit surrounding communities and also impact the revenues received by government entities. For every \$1,000,000 invested in Juab and Millard Counties, the local taxing entities will receive roughly \$11,850 and \$10,000 annually in tax revenues (assuming 2010 tax rates).³² These increased revenues will flow to the respective counties, school districts, water, and fire districts.

Currently agriculture is the main industry in the area; however, opportunities for development in mining, tourism, renewable energy resources, and small business manufacturing also exist. Each of these require sufficient water resources and would be limited if water resources were limited in the area. The total proposed Snake Valley Water Agreement initial allocation of unallocated water rights to Utah is only 11,000 acre feet of water. Assuming surface water currently available for irrigation is not affected by pumping water from the aquifer to Nevada, and the aquifer will recharge annually to 132,000 acre feet, only approximately 6,497 acre ft of water³³ will be available to Utah Snake Valley residents to sustain all future growth, while Nevada is being allotted 42,970 acre feet of water³⁴ for future growth.

MINING

Utah is considered to be a very mining-friendly state with significant potential for mining development. Utah is ranked in the top ten in the 2008/2009 Fraser Institute's Mineral Potential Policy Index. This index is a "report card to Governments on the attractiveness of their mining policies from the point of view of exploration managers world-wide."³⁵ Additionally, Utah's well-maintained infrastructure contributes to a lower economic threshold for possible mining development as roads, water, and power are generally readily accessible.

MILLARD COUNTY

The West Desert in Millard County has a number of areas with potential for mining development. Two such areas include the Thompson Knolls/Road Canyon area and Kings Canyon.

The Thompson Knolls/Road Canyon area is made up of approximately 3,000+ acres and is located to the west of the Confusion Range, south of Route 6. Mineralization at Thompson Knolls/Road Canyon consists mostly of gold, but also includes mineral occurrences of silver and copper. The Utah Geological Survey estimates approximately 147,000 ounces of gold and 2,583,000 ounces of silver in the Thompson Knolls/Road Canyon area. Currently, Inland Explorations Ltd., a private mining and exploration company, has completed mapping, sampling, ground-mag and IP surveys of the area.³⁶ Inland also has an approved Notice of Intent to Conduct Exploration and plans on drilling as soon as financing becomes available. The current economic downturn has limited drilling in Utah, but the company is optimistic that funds will become available in the near future, allowing exploratory drilling by the end of the year. If it is determined that there are sufficient minerals in the area, more exploration in the form of drilling will occur, followed by a feasibility study and an environmental impacts study. Once these studies are completed, the area will be ready for mining. This entire process is estimated to take a minimum of three years. Assuming a (life of mine) LOM of ten years and a total cost of \$560 per mined equivalent ounce (gold and silver), the pre-tax net present value of a mine in the Thompson Knolls/Road Canyon area would be between approximately \$40 million – \$60 million.³⁷

Kings Canyon, another location with mining potential, is located in the Confusion Range in southwestern Millard County. This project is currently being explored by the mining companies Maestro Ventures Ltd and Palladon Ventures Ltd. The Utah Geological Survey estimates approximately 261,000 ounces of gold and 972,000 ounces of silver in Kings Canyon. However, a publication through the Utah Geological Survey by John E. Zimmerman which further researches the gold mineralization at Kings Canyon states, "Overall, it is believed that there is the potential to delineate 500,000 to 1,000,000

³² Utah Property Tax Division

³³ 1,801 (acres of post 1989 water rights) x 2.5 acre ft /acre (consumptive use for irrigation) = 4,503.

11,000 acre feet (Utah's allocation of unallocated water rights) – 4,503 = 6,497 acre ft

³⁴ 66,000 acre feet – 23,030 acre feet of current use = 42,970

³⁵ Inland Explorations Ltd., <http://www.inlandexplorations.com>

³⁶ Inland Explorations Ltd., <http://www.inlandexplorations.com/s/Home.asp>

³⁷ This calculation assumes the current gold price of \$1,132/oz and the current silver price of \$18/oz and a gold equivalent of 188,328 oz.

ounces of gold resources in the project area. It appears that it is likely amenable to low cost open-pit mining and heap leach extraction. The Kings Canyon Project, therefore, has excellent potential to become a profitable and productive gold mine at current gold prices."³⁸ Assuming a LOM of 10 years and a total cost of \$560 per mined equivalent ounce (gold and silver), the pre-tax net present value of a mine in the Kings Canyon area would be between approximately \$60 million and \$80 million.³⁹

Water is needed in every stage of mining development, and therefore sufficient water resources are necessary to take advantage of the mining opportunities in Millard County. Specific water needs of mining development are described below.

JUAB COUNTY

Keg Mountain, located in Juab County, is currently being explored and researched by Inland Explorations Ltd. Keg Mountain is very similar to Thompson Knolls in that it is ready to be drilled as soon as financing becomes available. Both Keg Mountain and Thompson Knolls are Inland Explorations' top priorities at the moment, and the company is very optimistic for the development of these areas in the future. Currently there is no defined mineral resource for this area, thus the net-present value of a potential mine cannot be determined.

EMPLOYMENT OPPORTUNITIES

Assuming an average mine size of 100 acres, the mine would employ several hundred workers. According to the US Bureau of Labor Statistics, the average hourly salary for a mine worker is \$26/hour. Mine managers and mine engineers earn up to \$42/hour.

WATER NEEDS

In order for these potential mines to be developed, sufficient water must be available. Water is needed even in the early process before mining begins. Drilling must be performed to determine if the area has sufficient minerals to create a mine, and in order to drill, water must be obtained from a well or hauled in by truck. Inland Explorations used 171,428 gallons of water to do 6,000 feet of diamond drilling in Tooele County. This calculates into approximately 28.6 gallons of water per foot drilled.⁴⁰ The State of Nevada Department of Conservation & Natural Resources, Division of Water Resources cites a report that gives 1990 mining water use estimates. The report states, "Water use varies widely among operations and is dependent upon the mineral being recovered and the recovery process employed." Furthermore, the report claims that gold and silver operations accounted for over 70 percent of the State mining water use. For mining, on average, each county withdrew approximately 6,526 acre feet of water per year and consumed 3,451 acre feet per year.⁴¹

RENEWABLE ENERGY SOURCES

The West Desert has renewable energy resources. Renewable energy is typically defined as energy generated from natural resources such as sunlight, wind, rain, tides, or geothermal heat. The Snake Valley can likely profit from three of these natural resources: sunlight, wind, and geothermal heat. According to Strizki Systems, renewable energy systems have the potential to both protect the environment and earn a profit at the same time.⁴² This is made possible because all renewable energy is free, resulting in equipment being the only expense. Additionally, tax incentives may be available through the government, making the development of such resources even more affordable. In February of 2009 the U.S. Congress passed the American Recovery and Reinvestment Act, allocating more than \$80 billion in clean energy investments. Then in an address to a joint session of Congress later that month, the President encouraged the country to double the nation's supply of renewable energy in the next three years.⁴³ Clearly the government is encouraging the country to develop and use renewable energy resources.

³⁸ Zimmerman, John E. "Gold Mineralization at Kings Canyon, Millard County, Utah." *UGA publication 38*. At the time of this report, gold prices were \$900 an ounce.

³⁹ This calculation assumes the current gold price of \$1,132/oz and the current silver price of \$18/oz and a gold equivalent of 276,455 oz.

⁴⁰ Inland Explorations, Ltd., LYRB

⁴¹ Nevada Division of Water Planning, "Mining Water Use in Nevada – 1990, May 1992." <http://water.nv.gov/WaterPlanning/wat-fact/mining.cfm>

⁴² RE System Economics. Strizki Systems, <http://www.renewableenergyinternational.com/node/37>

⁴³ Energy & Environment. The White House, <http://www.whitehouse.gov/issues/energy-and-environment>

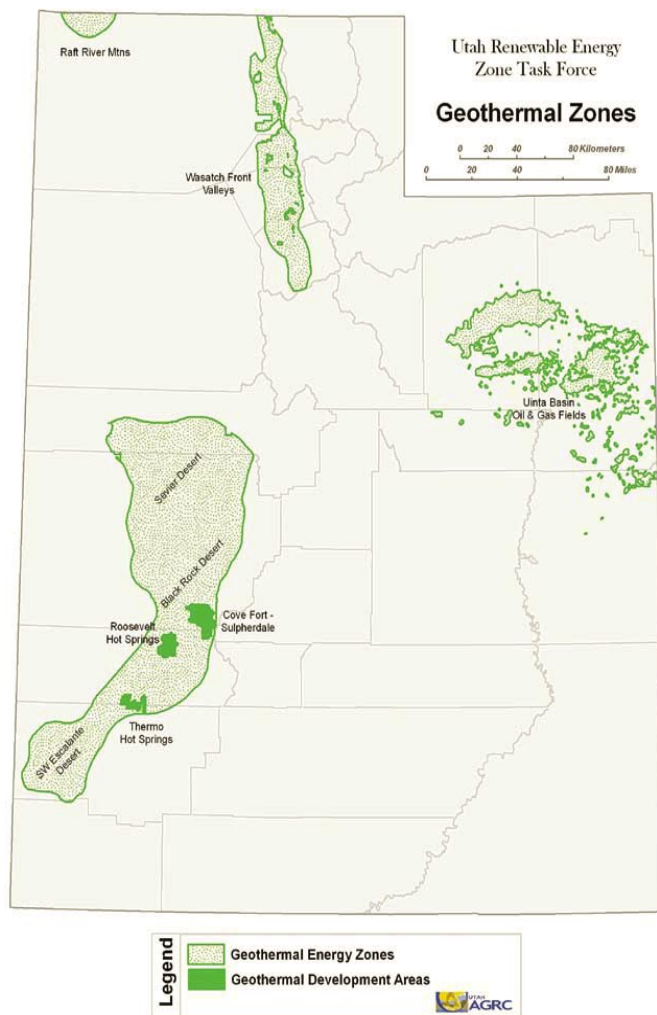
Additionally, Utah, as a member of the National Governors' Association Center for Best Practices Securing a Clean Energy Future, has been provided with funding to complete the Utah Renewable Energy Zone (UREZ) Task Force project in order to meet the goal of providing 20 percent of Utah's electricity through renewable energy resources by 2025. This project is separated into two phases, the first of which has already been completed and identifies geographic locations of renewable resources and estimates the potential of electrical energy capacity.⁴⁴ A draft of phase II was recently released and contains a more detailed analysis including quantifying the cost of potential energy generation.

GEOTHERMAL

Juab and Millard Counties

Utah currently has three geothermal electrical generation power plants, all of which are located in Beaver County. However, with recent technology allowing construction of geothermal plants in a six-month timeframe, rather than seven years, increased development is likely in the future.⁴⁵

FIGURE 1.1 GEOTHERMAL ZONES



The three power plants are: Roosevelt Hot Springs, Thermo Hot Springs and Cove Fort-Sulphurdale.⁴⁶ Plant expansions are planned for the future as follows: Roosevelt is planning to add 13 MW and Cove Fort is planning to construct a new 30 MW facility.⁴⁷ While there is currently no geothermal plant in Juab or Millard County, the Drum Mountain area, located in both Juab and Millard Counties, is one of nine of the most promising geothermal resource areas in Utah. The Utah Geological Survey has suggested that additional and deeper drilling be performed as this area may have potential for electric production in the future.⁴⁸

Figure 1.1 from the Utah Renewable Energy Zones Task Phase I Report: Renewable Energy Zone Resource Identification (page 39) shows the three current geothermal development areas as well as geothermal energy zones, or potential geothermal development areas.

Estimated investment costs of developing a geothermal energy plant the size of the proposed Cove Fort-Sulphurdale plant is \$150 million.⁴⁹ Construction would last approximately one year and employ 100-150 individuals. After completion, the estimated number of full-time employees for operations and maintenance would be 10-

⁴⁴ Utah Geological Survey, http://geology.utah.gov/sep/renewable_energy/urez/index.htm

⁴⁵ CleanTechnica, <http://cleantechnica.com/2008/11/07/utahs-first-geothermal-plant-in-over-20-years-completed/>

⁴⁶ Utah Geological Survey, <http://geology.utah.gov/emp/geothermal/powerplants.htm>

⁴⁷ "Utah's High Temperature Geothermal Resource Potential – Analysis of Selected Sites." *Utah Geological Survey*, July 2004.

⁴⁸ "Geothermal Development Needs in Utah." *Geothermal Energy Association*, June 2006.

⁴⁹ Enel North America estimates

15. These full time employees could earn between \$35,000 and \$90,000 annually (\$35,000 for entry-level and \$90,000 for plant manager).⁵⁰

Should additional resources be discovered in the future allowing for electric production through geothermal means, sufficient water will be required. If the area being developed lies within BLM or forest land, approximately 20,000 to 40,000 gallons of water per day would be required during construction.⁵¹ While the operational water needs of a completed geothermal plant vary depending on the type of plant constructed, both the binary and flash plants require little water.

WIND

MILLARD COUNTY

The West Desert in Millard County also has potential to develop a wind farm. Wasatch Wind, a local wind developer, is currently looking to develop a site outside of Garrison.⁵² A wind tower was recently erected as part of the preliminary stages of gathering data and assessing the possibility of developing a wind farm in the area. The entire process of gathering data and developing the wind farm could take four to five years, should sufficient wind be found in the area.⁵³ The development of a wind farm would benefit the surrounding community.

The Milford Wind Corridor project is one example of the successful development of a wind farm and the benefits that can come to a community as a result of that development. The Milford Wind Corridor recently completed in Milford, Utah has been an asset to the City as well as Beaver and Millard Counties. More than 200 construction jobs were created during the construction of the turbines and approximately 12 permanent jobs remain upon its completion. "Nearly \$30 million was spent directly with Utah businesses during development construction, while another \$56 million was spent with Utah businesses in indirect ways, through wages, taxes, permitting fees and more."⁵⁴ In addition, the wind farm helped stabilize the small community and added to its economic development while still maintaining its rural lifestyle.

If a wind farm is developed, it will benefit the residents in the West Desert as well as Millard County in a similar manner. Employment opportunities would increase as well as the local tax base. The initial stages of wind farm construction require large amounts of water. Water is needed for the concrete as well as other construction tasks. In addition, the BLM has strict guidelines regarding dust control, resulting in the need to water the roads used at frequent intervals. First Wind, the energy company and developer of the Milford Wind Corridor had a one-time use of 220 acre feet of water for dust control and compaction. The company also had to purchase water from the City because the well water was too alkaline for use with the concrete. If sufficient water is not available in the area in the coming years as a result of pumping, it will curtail the possibility of developing a wind farm in the Snake Valley area.

SOLAR ENERGY

JUAB AND MILLARD COUNTIES

The Snake Valley also has the opportunity to create a community renewable energy system using power generated by the sun. Figure 1.2 is a map from the Utah Renewable Energy Zones Task Force Phase I Report and shows Solar Energy Zones, or areas in the State of Utah that have potential for solar energy development. Areas with a slope equal to or less than one percent and a direct normal irradiance (DNI) of greater than six are considered sufficient for solar development. The Snake Valley in Juab and Millard Counties appears to have a number of locations that would be compatible for solar energy development.

In Juab County plans have been drawn up by a local engineering and surveying company for a potential solar energy project using a 12-acre site in an area adjacent to a Mt. Wheeler Power high tension line. The construction cost estimate to create this solar energy plant is approximately \$28,118,556. Power generated from a plant of this size is estimated to be 34,020 kWh/day.⁵⁵

⁵⁰ Enel North America estimates

⁵¹ Enel North America estimates

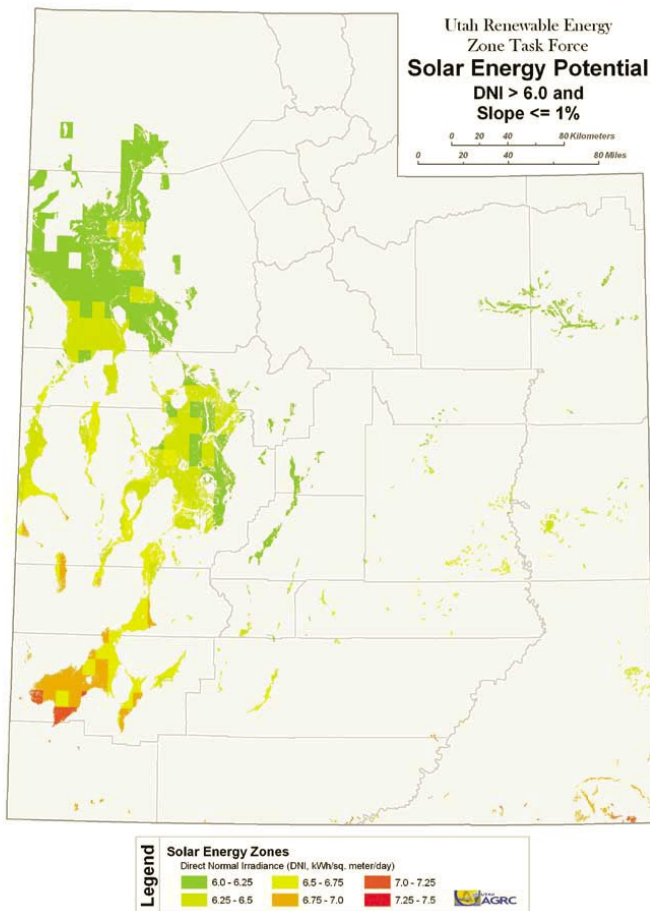
⁵² The area of Garrison has been classified as a wind zone in the Utah Renewable Energy Zones Task Force Phase I Report.

⁵³ Wasatch Wind Development, LLC

⁵⁴ First Wind, <http://www.milfordwind.com/milford/>

⁵⁵ Boss Engineering & Surveying and Merle Rawlings (Juab County resident)

FIGURE 1.2 SOLAR ENERGY POTENTIAL



Depending on the specific type of plant actually developed (recirculating power tower or parabolic trough), assuming annual kWh production of approximately 12,417,300, water required could range from four acre feet to 34 acre feet per year.⁵⁶ A plant of this size would create approximately 100-150 temporary construction jobs and approximately 20-24 long-term jobs once the plant is completed.⁵⁷ Such an addition of employment opportunities in the area would be a great incentive for families to move to the Valley and for youth to stay in the area upon graduation.

If sufficient water is not available, the development of this energy plant will be limited. Additionally, any future solar energy development would be negatively impacted if, as a result of less water, vegetation dries up and more dust is created. The dust would obscure the sun and limit sunlight, thus limiting the potential of a successful solar energy plant.

FARMING

Farming in the West Desert consists mostly of alfalfa and cattle ranching. Assuming water is plentiful in the future, there is potential for agriculture to continue to be bountiful. Many farmers who grow alfalfa in the West Desert of Juab County do not sell their crop to outside communities; instead, the alfalfa is typically used internally to feed their cattle.⁵⁸ Cattle farmers have anywhere from 80 head of cattle to approximately 200 head of cattle. The hay grown is typically used to feed the cattle in the wintertime when grazing is limited. In the summer months (six to seven months out of the year), many farmers graze their cattle on BLM land. Grazing permits must be acquired by farmers in order to allow their cattle to graze on BLM land. Permits are usually good for ten years; however, grazing permits have become harder to renew because of the increase in environmentalists seeking to protect the land currently used for grazing.⁵⁹

BEEF AND CATTLE

The beef and cattle ranching industry is an important contributor to Utah’s economy. The livestock industry contributes more than \$600 million to Utah’s economy and is also the largest single sector of Utah’s agricultural economy.⁶⁰ Additionally, much of the land used for grazing is public land and federally owned. The Bureau of Land Management (BLM) manages 1,472 grazing allotments and authorizes grazing through the leasing of 1,532 grazing permits. This is calculated to be approximately 1.2 million Animal Unit Months (AUM) of livestock use. AUM is the amount of forage

⁵⁶ USDE, Report to Congress – “Concentrating Solar Power Commercial Application study: Reducing Water Consumption of Concentrating Solar Power Electricity Generation.” p.17, http://www1.eere.energy.gov/solar/pdfs/csp_water_study.pdf, LYRB

⁵⁷ Merle Rawlings (Juab County resident)

⁵⁸ George Douglass (Juab County resident)

⁵⁹ Don Anderson (Juab County resident)

⁶⁰ Grazing Improvement Program (GIP) protects the environment and improves Utah’s rural economy

needed to feed one cow, one horse, or five sheep for one month.⁶¹ The State of Utah School and Institutional Trust Lands Administration (SITLA) also leases land.

The number of acres and AUMs leased, as well as annual revenues earned, by the BLM and SITLA in the Snake Valley area of Juab and Millard County is found in table 1.6.⁶² As seen in table 1.6, the BLM and SITLA lease approximately \$16,841 worth of AUMs to Juab County Snake Valley residents and \$50,058 worth of AUMs to Millard County Snake Valley residents.

TABLE 1.6 SITLA AND BLM ACRES, AUMs, AND REVENUE FROM GRAZING PERMITS

	SITLA			BLM			TOTAL REVENUE
	ACRES	AUM	REVENUE*	ACRES	AUM	REVENUE**	
Juab County	27,221	1,048	\$4,108	244,989	9,432	\$12,733	\$16,841
Millard County	62,052	3,115	\$12,211	558,468	28,035	\$37,847	\$50,058

* Farmers pay \$3.92 per AUM

** Farmers pay \$1.35 per AUM

If, as a result of water pumped from the area, the grazing foliage dies and the land cannot be grazed, the farmers will no longer lease the land from the BLM or SITLA. This will result in a decrease in revenues for the BLM and the SITLA as well as a decrease in revenues for the farmers who would either be forced to reduce the size of their herd of cattle due to lack of sufficient grazing land or to pay to replace the grazing land with alternative feed. The increased cost to farmers to replace one AUM with alternative feed is approximately \$50-\$60.⁶³ Tables 1.7 and 1.8 show the estimated revenue loss and increase in feed costs for cattle farmers assuming a decrease in the amount of vegetation resulting in a 10 percent loss of AUM's on SITLA and BLM land.

TABLE 1.7 REVENUE IMPACTS TO SITLA AND BLM (ASSUMES 10% DECREASE IN VEGETATION)

	SITLA		BLM	
	JUAB COUNTY	MILLARD COUNTY	JUAB COUNTY	MILLARD COUNTY
Decrease in Annual Revenues	\$411	\$1,221	\$1,273	\$3,785
20-Yr Decrease in Revenues	\$8,220	\$24,420	\$25,460	\$75,700

TABLE 1.8 COST IMPACTS TO FARMERS (ASSUMES 10% DECREASE IN VEGETATION)

	INCREASED COST TO FARMERS	
	JUAB COUNTY	MILLARD COUNTY
Total Approximate Annual Cost for Alternative Cattle Feed	\$52,000 - \$63,000	\$156,000 - \$187,000
Approximate Cost for Alternative Cattle Feed over 20-Yrs	\$,1040,000- \$1,260,000	\$3,120,000 - \$3,740,000

The cost of providing feed to cattle to replace SITLA and BLM grazing land is high. The higher cost of cattle feed could jeopardize the farmer's ability to remain in business and will most likely affect beef prices for Utah consumers.

AGRICULTURE

A decrease in available water will have a drastic negative impact on the agriculture industry in the area. Water is obtained by farmers in the Snake Valley by a number of sources; the most prevalent being wells and springs. Many farmers in the Snake Valley, who were interviewed in an effort to determine the situation of the area and the potential effects of pumping water from the Snake Valley, indicated that only part of the land available for farming is in production due to the lack of water. One resident of 30 years, who has spent a lot of time digging wells in the area, claims that he has seen the water table

⁶¹ Bureau of Land Management. "Grazing." <http://www.blm.gov/ut/st/en/prog/grazing.html>

⁶² BLM Fillmore Utah Office, LYRB (BLM grazing permits make up 90 percent of public land leased for grazing. Using data from the Trust Land Administration (accounting for 10 percent of leased land), leased BLM land was calculated and verified with the Fillmore Utah Office).

⁶³ Tom Baker (Baker Ranch, Snake Valley)

drop in the last few years.⁶⁴ Another resident of the area regularly waters her lawn and garden; however, when farmers around her pump water to water their crops, sufficient water is no longer available for her to water her small lawn and garden.⁶⁵ Yet another resident who lives 17 miles from Callao and owns 320 acres is unable to farm any of the land because of lack of water. The Eskdale community in Millard County currently owns 4,300 acres. Approximately 2,000 of these acres are used for production while 1,000 are idle because of the lack of water and irrigation systems.⁶⁶ Another farmer only uses 150 acres of his total 440 acres.⁶⁷ These statements are backed up by the fact that only a portion of the land in the Snake Valley with water rights is being irrigated.

While most farmers in the Snake Valley have at least one well, some farmers obtain water solely from the springs that run through their land. According to the Utah Water Right Analysis, approximately 4,764 acres in the Snake Valley are irrigated through surface water. Assuming consumptive use for irrigation is 2.5 af/acre,⁶⁸ this land requires approximately 11,910 acre feet of water to support current production. Since surface water rights were not accounted for in the Snake Valley Water Agreement, it is possible that if water is pumped from the area to Nevada, farmers who rely on surface water to irrigate their land will no longer have sufficient water to maintain their livelihood.⁶⁹ While some farmers who use surface water to water their crops may have groundwater water rights, digging a well can be economically unfeasible.

If water is pumped from the area, lowering the water table, farmers who use wells to partially or solely irrigate their crops will either need to re-dig their wells in other locations or their wells will have to be deepened. One farmer in the area has two wells, one in the Valley and one 100 ft. up on the mountain. His current cost of pumping water from the well on the mountain is approximately double the cost of pumping from the well in the Valley.⁷⁰ An additional factor that must also be taken into account when estimating the cost of pumping is the layering of aquifers. Costs don't necessarily increase incrementally with depth when pumping or drilling a well. Once a well runs dry, the next layer of the aquifer must be tapped or a new well must be dug. Since the layers of the aquifer vary in each well, costs could increase substantially should it be necessary to drill to the next layer of the aquifer. Also, as well depth increases, more horsepower and thus bigger pumps, are required to lift water from greater depths. The addition of additional pumps and materials with capability to pump from deeper depths creates added initial cost as well as added operating costs. The estimated initial cost to deepen an irrigation well by 50 feet is \$20,000 plus an increase in operating costs of 40 percent, while the cost to deepen a residential well by 50 feet is \$2,000 plus an increase in operating costs of 20 percent.⁷¹ There are approximately 124 wells in the Snake Valley of Juab County, 61 of which are residential and 160 wells in the Snake Valley of Millard County, 59 of which are residential.⁷² The initial cost to deepen the existing wells⁷³ in Juab County by 50 feet would be approximately \$1,382,000. The initial cost to deepen the wells in Millard County would be approximately \$2,138,000. The Eskdale community costs of pumping water are approximately \$70,000 - \$80,000 annually.⁷⁴ If wells were to be dug an additional 50 feet, the operation costs would increase to \$98,000 - \$112,000 annually.

Farmers claim they are already paying more for fuel and fertilizer than they have in the past; however, commodity prices for the products raised by the farmers have stayed relatively the same.⁷⁵ Thus, farmers are seeing a decreasing profit margin and state that they are lucky to break even. Currently the costs of pumping water are approximately half of the revenues earned from the sale of a calf (calves are sold for approximately \$500 each).⁷⁶ If the cost of pumping water increases, the costs to produce will exceed the revenues for most farmers, and few outside industries exist to supplement this income. Any plans for farmers to increase their acreage of crops or cattle herd will be unattainable.

⁶⁴ George Douglass (Juab County resident)

⁶⁵ Barbara Quiroz (Juab County resident)

⁶⁶ David Sturlin (Millard County resident)

⁶⁷ Jerald Bates (Millard County resident)

⁶⁸ Utah Water Right analysis used to develop the "Allocated" category in the proposed Utah/Nevada Snake Valley Agreement

⁶⁹ Utah Water Right Analysis

⁷⁰ Dennis Timm (Juab County resident)

⁷¹ 4-D Plumbing and Builders Supply estimates

⁷² Utah State Engineer

⁷³ It is assumed that the wells not classified as residential are irrigation wells.

⁷⁴ David Sturlin (Millard County Resident)

⁷⁵ Don Anderson (Juab County resident)

⁷⁶ Joe Matthews (Juab County resident)

Additionally, some farmers worry that pumping water to Las Vegas will bring brackish and salty water to the area. Currently the water flows north to the salt flats; however, if the direction of water flow changes and is pumped toward the south, the water may bring salt with it, ruining the land and making farming impossible.

Pumping water from the area will strongly impact the area negatively. The residents of Eskdale believe that pumping water from the area will hurt residential and commercial growth, reduce the productivity of crop and animal production, create additional dust dangers, and increase the salinity of the water. In the words of one resident, "Putting a limit on local use of water handicaps all future Snake Valley growth. It devastates plans by young families to move to the area. It approximates 'the kiss of death' for this area."⁷⁷ If water is not pumped from the area, there is significant opportunity for growth and development in the area.

SMALL BUSINESS/MANUFACTURING

IMPACTS TO EXISTING BUSINESSES

Some existing businesses in the Millard County Snake Valley area would be impacted by a decrease in water. Existing businesses in the area include: Mt. Moriah Stone Quarry, a dairy farm, a veterinarian, a Ready Mix Concrete Company, and an automotive shop. Potential impacts to these businesses of pumping water are outlined below.

MT. MORIAH STONE QUARRY

Mt. Moriah Stone Quarry is owned by Clay Iverson, a local Snake Valley resident. While Clay admits that a decrease in water wouldn't directly impact his business since very little water is used, indirect impacts would still exist. Currently the quarry employs seven individuals, and during the summer months an additional 10 – 30. If water decreases to the point that it is difficult for individuals to live in the Valley, the quarry may be affected.

DAIRY FARM AND VETERINARIAN

John Conrad runs a dairy farm in the area and is also the local veterinarian. Currently, John has plans to double the size of the dairy over the next two to four years; however, John expects these plans to be impossible should water be pumped from the Valley. Dairy farms in the area must be able to grow their own feed internally because they are so far away from outside resources. If a decrease in water makes it difficult to farm in the area, the dairy farm will not be sustainable due to the lack of available feed. Also, if the number of dairy cows or grazing cattle decreases in the area as a result of a decrease in dairy cow and cattle feed, there will be less need for veterinarian services.

READY MIX CONCRETE

Dean Baker runs the Ready Mix Concrete shop and sells concrete all over the Snake Valley. Dean estimated that the company has doubled in sales and revenues over the last ten years. Approximately 50 percent of all concrete purchases go to agricultural uses. Currently the company only employs two individuals, but Dean expects that should water decrease, the company may have to lay-off one employee. While Dean is unsure of the potential decrease in revenues should available water decrease, he is sure that the decrease will negatively affect sales since much of the concrete goes to agricultural uses and agriculture would be one of the first industries to be affected by a reduction in water resources.

AUTOMOTIVE SHOP

The automotive shop repairs equipment and sells parts. Currently the automotive shop employs one full-time and one part-time employee. Jonathan Weight, an employee at the automotive shop, expects that if farming decreases as a result of less available water, fewer parts will be purchased and fewer repairs will be needed, thus impacting automotive shop revenues. Water needs of a typical automotive shop are 90.6 gallons/month for 1,000 square feet.⁷⁸

BORDER INN

While the Border Inn is located on the Nevada side of the Snake Valley, it is important to note that it will also be impacted by the pumping of water from the Valley. Denys Koyle, the owner of the Inn, estimates that revenues have increased twenty times since 1977. Clearly, this business has grown over the years. However, if available water decreases in the area, impacting hunting and other tourist travel, fewer individuals will visit the Inn, thus decreasing revenue earned.

⁷⁷ John Conrad (Millard County resident)

⁷⁸ Appendix A

IMPACTS TO POTENTIAL SMALL BUSINESS DEVELOPMENT

If water is not pumped from the Valley, there is opportunity for small business development in the West Desert of both Millard and Juab Counties.

In Juab County, a small industry would provide great opportunity for growth in the area. Suggestions of business development ideas include meat packing, hand-made soap, and customer service call/internet services.⁷⁹ The community feels like a customer service call/internet business would be a feasible opportunity because of the potential for residents to work from their homes.

Using table 1.9 as a guideline, it is estimated that the initial investment cost of a meat packing plant employing approximately four individuals would be roughly \$400,000. The estimated water needs of a plant of this size are approximately 1,000 gallons of water per day; however, more water is typically used on days when the animals are slaughtered.

TABLE 1.9 MEAT PACKING PLANT COMPARISON

	ESTIMATED INITIAL INVESTMENT COST	NUMBER OF EMPLOYEES	ESTIMATED WATER NEEDS
Valley Packing Company	\$200,000	2 to 4	200 gal/day
Superior Meat Co.	\$400,000	3	NA
Ashton Farms	\$200,000 - \$500,000	4 to 8	1,500 - 5,000 gal/day
South Sanpete Pack	\$500,000 - \$1,500,000	4 to 9	1,000

In the town of Garrison in Millard County, both the grocery store and the gas station have closed. If sufficient water is available to support growth, these businesses could reopen in the future. Additionally, one resident has expressed the desire to start a small business fabricating antler furniture. He is hoping to employ up to four individuals.

These potential business development plans will be hindered if there is not sufficient water available. While little water would be required for most of these potential businesses, opportunity to develop them would be hindered if water is taken; investing in business development in the West Desert becomes risky if water is pumped from the area as the future of these small communities becomes unknown.

TOURISM & RECREATION

The West Desert in both Juab and Millard Counties is full of outdoor recreational opportunities. Recreational activities include rock hounding, hiking, backpacking, horseback riding, bird watching, hunting, and ATV trails.⁸⁰ The following section provides details regarding a few of these recreational activities as well as ideas for further development of these resources.

RECREATIONAL ACTIVITIES

JUAB COUNTY

Rock hounding, or the collection of rocks and minerals, is a popular recreational activity for many individuals. For the rock hounder seeking precious minerals, Topaz Mountain, in Juab County, is recommended as one of the world’s best places to find topaz. Juab County could develop a public quarry to aid the visiting rock hounder in the search for precious minerals.⁸¹

Another opportunity for tourism development in the West Desert of Juab County is the Pony Express National Historic Trail. This trail road follows the Pony Express Trail route through the West Desert. Along the way historic plaques are found marking the location of several pony express stations. Some old buildings along the route have been restored.

Fish Springs National Wildlife Refuge is also located in Juab County. “The refuge covers 17,992 acres with a 10,000 acre marsh system. Fish Springs provides vital habitat for migrating wetland birds and offers wildlife observation and hunting

⁷⁹ Juab and Millard County Meetings

⁸⁰ Millard County Tourism, <http://www.millardcountytravel.com> and Juab County Travel, <http://www.juabtravel.com>

⁸¹ Juab County Travel, <http://www.juabtravel.com>

to the general public.”⁸² Fish Springs accommodates more than 3,000 visitors each year.⁸³ Hunting opportunities include ducks, coots, mergansers, and geese. Fish Springs currently uses 32,000 af of water; however, the current agreement between Utah and Nevada only allocates 20,000 af to Fish Springs. If the water allocated to Fish Springs decreases, the Refuge may have to shorten the hunting season or stop hunting altogether.⁸⁴

MILLARD COUNTY

The mountains in Millard County attract rock hounds from all over the world. Specifically, the Antelope Springs area is known for its trilobites. Public and private quarries exist to aid explorers in their search for fossils.⁸⁵



Hiking trails exist for those of all ages, ranging from trails for day hikes to extended backpacking trips. Popular trails in Millard County include Notch Peak, Swasey Peak, and Crystal Peak. Many miles of ATV trails also exist in the West Desert in Millard County. A few specific and popular West Desert ATV trails include: Amasa Basin, Burbank Hills, Conger Mountain, and Cricket Mountains. All four of these trails have areas that range from easy to difficult for both the new and the more experienced rider. And, while Great Basin National Park is located in Nevada, it is also located in the Snake Valley, and is very accessible to residents and visitors in the West Desert area. Great Basin National Park is home to Wheeler Peak and Lehman Caves.⁸⁶ Because of the close proximity of this National Park, Millard County has the opportunity to benefit from increased tourism in the area. Millard County West Desert residents could take advantage of tourism in the area by providing more accommodations to those visiting the area and by developing its natural resources in such a way as to appeal to visiting tourists.

Hunting is also a popular recreational activity for the area. Deer, antelope, geese, dove, and elk are available to hunt at varying times throughout the year. The hunting aspect of the tourism industry in the area has grown in the last few years. One hunting guide and outfitting business (Triple H Hunting Guides and Outfitters) has grown by 40 percent in the last seven years and predicts an additional 20 percent growth for the next few years.⁸⁷ However, hunting like most activities in the area, is subject to limitations on water. Triple H Hunting Guides and Outfitters estimates a revenue decrease of approximately \$50,000 should water be pumped from the area. If water is taken, springs would dry up, decreasing the population of potential game in the area. Also, if water is taken from the area, the population of residents in the area would decrease because of the limited potential for growth, decreasing the demand for hunting guides and services.

ADDITIONAL OPPORTUNITIES FOR RECREATIONAL DEVELOPMENT

The accessibility of outdoor activities in the Snake Valley may provide an opportunity to develop tourist accommodations such as dude ranches or various other camps such as correctional camps or youth camps.

DUDE RANCHES: Dude ranches have recently become rather popular. The idea of leaving behind the city and fast-paced lifestyle for a chance to experience the outdoors is considered rejuvenating and appealing to many individuals. Dude ranches offer accommodations and numerous outdoor activities, the most important being horseback riding. Therefore, any dude ranch developed in the area should have access to large amounts of land for riding. The Dude Rancher’s Association provides useful information for those interested in starting a dude ranch. The Association estimates that current dude ranches on the market start at \$1.5 million. However, costs tend to increase if a dude ranch is started from raw land instead of purchased from an existing ranch. Trends show that it takes most individuals five to seven years to break even financially.⁸⁸ Local ranches estimate initial investment costs between \$2.5 million and \$4 million.⁸⁹

⁸² Fish Springs National Wildlife Refuge, <http://www.fws.gov/fishsprings/>

⁸³ Robert Sims (Fish Springs National Wildlife Refuge employee)

⁸⁴ Robert Sims (Fish Springs National Wildlife Refuge employee)

⁸⁵ Millard County Travel, <http://www.millardcountytravel.com>

⁸⁶ Millard County Travel, <http://www.millardcountytravel.com>

⁸⁷ Triple H Hunting Guides & Outfitters (Bruce Hubbard)

⁸⁸ The Dude Rancher’s Association, <http://www.duderanch.org/membership.cfm>

⁸⁹ Wind Walker Guest Ranch and Rockin’ R Ranch

Currently there are very few dude ranches in Utah. One popular dude ranch is the Wind Walker Guest Ranch, located in Central Utah in Sanpete County. This ranch can accommodate up to 74 people and offers activities such as horseback riding, nature spas, sightseeing, fishing, hiking and biking. Rates are approximately \$3,000 per couple for a one week stay with an additional cost of \$175 per night per child.⁹⁰ A comparison of the Wind Walker Guest Ranch with two other ranches (one in Utah and one in Colorado) is found in table 1.10.

TABLE 1.10 DUDE RANCH COMPARISON

	APPROXIMATE NUMBER OF ROOMS	APPROX. WEEKLY RATES PER COUPLE	NUMBER OF EMPLOYEES*	OCCUPANCY RATE*
Wind Walker Guest Ranch	20	\$3,000	3 to 9	20%-60%
Rockin' R Ranch	41	\$1,085	5 to 25	40%-80%
C Lazy U Ranch	40	\$2,600 winter \$3,600 summer	25 to 100	65%-100%

*The number of employees and occupancy rate varies according to the time of year. The summer season requires more employees and yields a higher occupancy rate.

The dude ranches in table 1.10 were used as a guide to project revenues and employment for a potential dude ranch in the Snake Valley area. A dude ranch with 30 rooms, charging approximate rates between \$2,000 and \$3,000 per couple per week, with an estimate of 40 percent occupancy, has the potential to earn between \$1,248,000 and \$1,872,000. With 40 percent occupancy and a rate of \$2,500, annual revenues are expected to be \$1,560,000, amounting to \$31.2 million over 20 years (with a present value of approximately \$19,441,048). Additionally, a dude ranch of this size would employ three to five individuals in the winter months and five to twenty individuals in the summer months, as occupancy during the summer months is expected to be significantly higher than 40 percent. Typical water needs for a lodging and care facility per 1,000 square feet are approximately 161.9 gallons/month.⁹¹

CORRECTIONAL CAMPS: Correctional camps are often used to help troubled youth. Two types of correctional camps exist. One type, often known as boot camp, is patterned after a military model and is run by staff with a military or correctional background. Another type of correctional camp, often known as wilderness or adventure-based therapy, focuses more on a therapeutic model, employing clinically trained staff.⁹² Wilderness camps use cooperative games, trust building activities, and outdoor adventures such as rock climbing/repelling, ropes courses, and backpacking. The rural nature of the Snake Valley is ideal for a correctional camp of this type. Opportunities for hiking, backpacking, and rock climbing are in abundance in the West Desert. A correctional camp would require sufficient culinary water to accommodate all visitors.

YOUTH CAMPS: Perhaps an opportunity exists to develop a facility in the West Desert to accommodate youth during the summer. This facility could provide accommodations for visits from established youth groups in the area or provide a summer camp program of its own, including activities such as horseback riding, hiking, and camping. The American Camp Association (ACA), an association that verifies the health, safety, and program quality of youth camps throughout the country, states that of the camps that are ACA accredited, 88 percent offer swimming, 48 percent offer horseback riding, and 22 percent offer wilderness programs.⁹³ While there are currently few areas for swimming, opportunities for horseback riding and wilderness adventures are present in the Snake Valley. Should a youth camp be established, culinary water and perhaps a pool would be needed.

⁹⁰ Wind Walker Guest Ranch, <http://www.windwalker.org/index.html>

⁹¹ See Appendix A: Floor Space and Water Needs of Various Businesses

⁹² Vivo, Meghan. "Wilderness Programs – Fresh Approaches after almost Three Decades of Helping Troubled Teens." *Drug Rehab Treatment*, <http://www.drugrehabtreatment.com/three-decades-wilderness.html>

⁹³ "Camp Trends – Trend Fact Sheet." *American Camp Association*, http://www.acacamps.org/media_center/camp_trends/fact.php

SUMMARY OF PUBLIC MEETINGS

Two scoping meetings were held with the residents of the Snake Valley in both Juab and Millard Counties. The first meeting was held on November 5, 2009 in the school house located close to Callao. The second meeting took place in the town of Eskdale on January 13, 2010. Many residents attended each of the meetings and were anxious to participate and voice their concerns about the proposed pipeline.

JUAB COUNTY MEETING

The following is a summary of the comments and concerns, divided by topic, that were voiced at the meeting held in Callao on November 5, 2009.

FARMING

The cattle and beef industry is very prominent in this part of the West Desert. A number of farmers told of using only half of the acres that they currently own to farm because sufficient water is not available to farm the rest. The other half of each farm could potentially be put into production if enough water was available; however, currently there is not sufficient water to farm the full amount of acres owned by each farmer.⁹⁴ Another concern of the farmers is the effect of the dropping water table on the plants and grazing land in the area. If the water table drops too low, the plants on the surface of the ground might die and could potentially be replaced by weeds that would negatively impact grazing in the area.⁹⁵ Additionally, these weeds and cheap grass could prove to be a great fire threat to the area.⁹⁶ The potential decrease in land that could be used for grazing would also affect the Bureau of Land Management (BLM) and the State of Utah School and Institution Trust Lands Administration (SITLA) which lease the land to farmers in the area for grazing.⁹⁷ If the land cannot be grazed, the farmers will no longer lease the land, resulting in a decrease in revenues for the BLM and Trust Lands Administration as well as a decrease in revenues for the farmers who would be forced to reduce the size of their herd of cattle due to lack of sufficient grazing land.



OTHER EMPLOYMENT OPPORTUNITIES

Currently there are very few opportunities for employment in the Snake Valley in Juab County. Most residents are farmers but have also expressed a desire to see more opportunities for employment for themselves and their families. Very little profit is earned by the farmers, and many would like additional opportunities to stimulate their income.⁹⁸ Currently the additional employment opportunities in the area consist of teaching at one of the local schools, working on county roads, or at Fish Springs National Wildlife Refuge.⁹⁹ Positions at the local schools and at Fish Springs are extremely limited.

⁹⁴ Dennis Timm, Cecil Garland, Ed Alder (Juab County residents)

⁹⁵ Ken Hill (Juab County resident)

⁹⁶ Kathy Hill (Juab County resident)

⁹⁷ Kathy Hill (Juab County resident)

⁹⁸ Marlene Bates (Millard County resident)

⁹⁹ Don Anderson (Juab County resident)

LIFESTYLE

Many of the residents live in the area because they value the lifestyle found there. They value the solitude, quietness, closeness to the land, clean air, and the connection they have with the animals of the area.¹⁰⁰ They believe that seeking to actively develop the area would compromise this lifestyle.¹⁰¹ Nevertheless, for them it is important to have the ability to promote and sustain healthy lifestyles and appropriate growth in the area. They recognize that in order to continue to enjoy this lifestyle, some growth must occur. Pumping water from the area threatens this growth and could diminish their current lifestyle, damage the environment, and threaten the health of those in the area.

ENVIRONMENTAL/HEALTH ISSUES

Residents of the area worry that many of the plants will die as a result of additional pumping of water from the area. Should the ground cover dry up, significantly more dust would result, thus creating more dust storms.¹⁰² Residents are concerned that the Snake Valley will become like Owens Valley California. In 1913 a pipeline was built in Owens Valley to pump water to Las Angeles. The Valley quickly dried up and the area is now plagued with numerous dust storms. An increase in dust storms in Utah would result in an increase in health issues associated with that dust. Additionally, the increased dryness of the plant life and the lack of available water could create a risk of fire danger in the area.¹⁰³

FISH SPRINGS NATIONAL WILDLIFE REFUGE

One area of the valley that would be heavily affected by pumping is Fish Springs National Wildlife Refuge. The refuge is fed by a spring from the underground aquifer; thus water taken from the aquifer could severely impact operations. The refuge is accustomed to receiving 32,000 af. However, the current agreement only allocates 20,000 af to the refuge. It is estimated that a reduction of water by one-third would result in a 25 percent decrease of open water. Currently the refuge already loses 20 percent of the water through evaporation. Those at the Refuge have also already seen the water at the northern and southern ends of the refuge drop by seven feet. Should the refuge be allocated less water, thousands of acres could dry up. Other potential impacts include the closure of additional areas in order to protect the birds as the holding ponds to protect ducks from hunters would dry up first. If these areas dry up, the hunting season may have to be shortened or hunting stopped all together.¹⁰⁴



WATER TRENDS

Most of the residents feel they are currently drawing out all of the water that is available in the area.¹⁰⁵ Residents at the meeting concurred that there is no excess water in the valley left to pump to Nevada. They expressed frustration that so many are arguing over water that is imaginary and that does not exist.¹⁰⁶ Throughout the years, residents of the West Desert have been innovative in using the water available to them in the most efficient manner. They have also voluntarily curtailed additional agricultural development at times because of the lack of water.¹⁰⁷ However, they also agree that if excess water was available they could most definitely use it. One resident expressed his frustration by stating, "You can't rob a community of water to take it to a metropolis. You can't destroy someone's house just to build your own."¹⁰⁸ Another resident stated, "Nevada thinks that they can put the water to a more beneficial use in Las Vegas, but what gives

¹⁰⁰ Ken & Kathy Hill (Juab County residents)

¹⁰¹ Byron Woodland (Juab County residents)

¹⁰² Ken Hill (Juab County residents)

¹⁰³ Ken Hill (Juab County residents)

¹⁰⁴ All information regarding Fish Springs National Wildlife Refuge was obtained through Robert Sims.

¹⁰⁵ Kathy Hill, Don Anderson, Jerald Bates (Juab and Millard County residents)

¹⁰⁶ Cecil Garland (Juab County resident)

¹⁰⁷ Kathy Hill (Juab County resident)

¹⁰⁸ Cecil Garland (Juab County resident)

them the right to trump our right to the water?"¹⁰⁹ They have watched throughout the years as the water table has slowly dropped. Many previously wet meadows are now completely dry. As surface water has grown dry, residents have had to supplement the water used with ground water, which is more expensive to pump.¹¹⁰ As the water table has dropped, wells have had to be replaced or deepened. A well of 30 feet, dug 30 years ago had to be replaced with one at 80 feet.¹¹¹ Residents of the West Desert are already limited by the small amount of water that is available to them. If this amount of water is decreased, the livelihood of all the residents will be threatened.

ECONOMIC DEVELOPMENT OPPORTUNITIES

While a few residents are wary of growth because they would like to protect their current lifestyle, most are open to limited and safe economic growth that would improve their quality of life. Currently most of the youth upon graduation move out of the area because of the limited employment opportunities offered.¹¹² Residents would like to develop the area to have sufficient employment opportunities to allow some of the youth to stay upon graduation and inherit the family farm.¹¹³ Many farmers would farm in the evenings and on Saturdays if they had other employment opportunities during the day. A few of the large potential development opportunities brainstormed at the meeting include a community renewable solar energy system,¹¹⁴ a geothermal energy system,¹¹⁵ and mining.¹¹⁶ Plans for the solar energy plant have already been drawn up by an engineering firm. It is anticipated that this renewable energy system would produce enough kilowatt hours per day to have a substantial return on investment as well as contribute numerous employment opportunities for those in the area.¹¹⁷ However, research must be done regarding the water needs of a solar energy plant to determine if it could truly be a possibility.

Additionally there are multiple opportunities for small business development. One business idea shared was to sell beef products "born, raised, and slaughtered in Snake Valley" directly to those consumers who are growing increasingly wary of where their meat is coming from.¹¹⁸ If additional water is needed in order to develop these businesses, many residents expressed a willingness to sell some of their water rights to the business in exchange for employment, thus increasing the residents' incomes. If a small business, such as a solar energy plant or beef sales business employing approximately 30 people was located in the area more people would move to the area.¹¹⁹

RECREATION/TOURISM

Potential exists for further development of the current recreational opportunities that are available in the area. Activities consist of horseback riding, hiking, shooting, 4-wheeling, and snowshoeing. These activities could be developed in the form of youth camps, correctional camps, or Dude Ranches.¹²⁰ Most residents are of the opinion that the Snake Valley mountains are the prettiest mountains around and thus should be taken advantage of and shared with those outside of the area. If recreational camps and ranches are developed, additional water would be needed to provide for the needs of these visitors.

¹⁰⁹ Ed Alder (Juab County resident)

¹¹⁰ Don Anderson (Juab Country resident)

¹¹¹ Jerald Bates (Millard County resident)

¹¹² Merle Rawlings (Juab Country resident)

¹¹³ Marlene Bates (Millard County resident)

¹¹⁴ Merle Rawlings (Juab Country resident)

¹¹⁵ Ken Hill (Juab Country resident)

¹¹⁶ Don Anderson (Juab Country resident)

¹¹⁷ Merle Rawlings (Juab Country resident)

¹¹⁸ Dennis Timm (Juab Country resident)

¹¹⁹ Don Anderson (Juab Country resident)

¹²⁰ Angela Skoubye (Juab Country resident)

MILLARD COUNTY MEETING

The following comments and concerns, divided by topic, were voiced at the meeting held in Eskdale on January 13, 2010.

FARMING

According to Millard County Snake Valley residents, approximately 60 percent of the community is involved in the agriculture industry which consists of cattle ranching and the farming of alfalfa, barley, and corn. In contrast with the West Desert residents of Juab County, those in Millard County use only half of the hay harvested for internal purposes; the other half is sold to surrounding communities. Beef is the major product of the area with some sheep production. A 650 cow dairy farm is also found in the area. According to the owner of this dairy farm, plans to pump water from the area, "...is devastating for any future plans. It will not allow growth."¹²¹ The farmers in this part of the Snake Valley currently suffer the same limitations as those in Juab County; sufficient water is not available to farm the full amount of land owned. Approximately 50 percent of the land owned by these residents is not in production due to lack of available water.¹²²



OTHER EMPLOYMENT OPPORTUNITIES

In contrast to the West Desert residents in Juab County, those in Millard have many more opportunities for employment. In addition to agriculture, a number of different industries exist in the Valley. Most of these opportunities are located in Baker, Garrison or Eskdale. A rock quarry, tire shop, concrete company, auto shop, and a metal fabrication shop are just a few of the businesses that exist in this part of the Snake Valley. Additionally, a number of residents work out of their homes offering professional services such as accounting, financial consulting, computer consulting, building maintenance and repair, and landscaping.¹²³ The Border Inn, located just over the border in Nevada, offers lodging, food services, and fuel. Great Basin National Park, also located in Nevada, draws employees from Utah.¹²⁴

GROWTH

The Snake Valley area in Millard County has experienced significant growth since the 1970's. Specifically Eskdale has grown considerably the past few years. Residents estimate that Eskdale has economically increased ten times in the past 30 years. Increasingly, more businesses have opened in the area and Eskdale is looking to build additional residential units as well as another educational facility.¹²⁵ The areas around Eskdale have also sustained growth. A few new homes, as well as a park, have recently been built in Garrison. The residents of this area welcome growth and desire to have more families live in the area. One incentive to grow is the increased amount of ancillary services that come with an increase in population. If the area is limited and unable to grow, communities like Eskdale may lose many services that are currently provided such as county road maintenance, state road maintenance, the deputy sheriff, the ambulance, and even the post office.



¹²¹ John Conrad (Millard County resident)

¹²² Dean Hayward (Millard County resident)

¹²³ David Sturlin (Millard County resident)

¹²⁴ Denys Koyle (Nevada resident)

¹²⁵ David Sturlin (Millard County resident)

Current residents believe that many more people, especially those of retirement age, would move back to the area if sufficient housing and sufficient employment opportunities were available. One challenge in providing sufficient housing is the inability of the homes to appreciate in value. A 1,400 square foot home costing approximately \$140,000 to build would not be able to sell at cost. In order to provide sufficient and affordable housing, homes would have to be built for less than \$100,000. Also, growth on the Nevada side of the Valley affects growth on the Utah side of the Valley and vice-versa. If a new business opens on the Nevada side of the Valley, the Utah side has an opportunity to grow because of the additional employment opportunities. Correspondingly, if a business on the Utah side of the Valley closes, the portion of the Snake Valley located in Nevada would suffer economically. Should a business on the Utah side be forced out of business as a result of pumping water from the area, the Nevada side of the Valley, more specifically the City of Baker, would lose many employment opportunities as well.

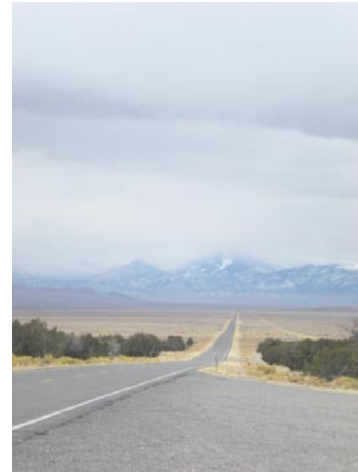
Many residents feel that pumping water from the Valley will limit growth in the area and in the words of one resident, "No growth is a death certificate."¹²⁶ Residents would like the opportunity to grow the area to its full potential. While currently most employment opportunities lie in agriculture, many residents look forward to the transition from agriculture to various other industries.¹²⁷ The danger of pumping water from the Snake Valley is that it will limit and negatively impact the agriculture industry. If water is pumped from the area, resulting in a threat to the agriculture industry, the future of all other businesses and industries will also be threatened.

LIFESTYLE

The residents of this area of Snake Valley enjoy the lifestyle that exists among these small communities. They believe that the culture found there is attractive to individuals living in other cities and suspect that it will draw more people to the Valley in the future.¹²⁸ People enjoy the friendliness, support, and feeling of camaraderie that comes from living in a small community such as Eskdale or Garrison.

ENVIRONMENTAL/HEALTH ISSUES

The Snake Valley residents in Millard County are also concerned about the effects on the environment of pumping water from the Valley. Along with the Juab residents, they believe that the potential increase of dust could be dangerous to the health and safety of those living in the area. Currently the area is already susceptible to dust storms in the late spring and summer months. Occasionally these dust storms can be dangerous to motorists and residents. In the past year, highway UT-21 has been closed twice because of dust storms. If dust increases in the area, US-50/US-6 might also be threatened. If US-6 is closed, motorists would have to take an alternate route, decreasing the number of visitors in the area and hurting the local businesses that rely on tourist traffic. Dust storms in the area have damaged cars, threatened human safety, cost travelers time and money to reroute their travels, and even filled irrigation ditches with dust. In 1999, the ground was so dry the area did not have sufficient water to keep weeds from littering the ground, leaving nothing to hold down the dust. Dust from the dust storm of 1999 filled the irrigation ditches and it is estimated that the cost to extricate the dust was \$4,000 - \$5,000.¹²⁹ When dust storms of this magnitude occur, they threaten agricultural crops as dust degrades and is detrimental to the quality of the crops. Additionally, any future solar energy development would be negatively impacted as dust obscures the sun and limits sunlight.



WATER TRENDS

The area around Eskdale and Garrison has already seen a decrease in the water available in the last few years. Eskdale alone has 24 wells, and starting in 1999 residents noticed a drop of approximately 1.25-1.5 feet per year in the wells. Additionally, several springs have dried up. If wells drop too low, they must be re-dug or deepened to access the next layer of the aquifer. The layering of the aquifers is such that if a well must be dug to the next layer, it could potentially be

¹²⁶ John Conrad (Millard County resident)

¹²⁷ Jerald Anderson (Millard County resident)

¹²⁸ Jerald Anderson (Millard County resident)

¹²⁹ Jerald Anderson (Millard County resident)

50 feet deeper. Thus the costs of pumping if a well has to be deepened could more than double. Additionally, economies of scale are lost when a well must be deepened. Most of the best water is found in the top 30-50 feet; thus residents are alarmed at the prospect of the water level dropping to 50 feet which is what authorities have predicted. Additionally, if culinary water drops below a certain level, it is sharing with agricultural sources which could be dangerous for the health and safety of the Snake Valley residents. If pumping is done in the area, Garrison will be the first to be impacted because it is located closest to the proposed pumping location. One resident stated, "If you restrict water to the way you have it now, there is no more growth here. What happens to communities that cannot grow? Look at the concept of the family farm."¹³⁰

ECONOMIC DEVELOPMENT OPPORTUNITIES

Residents of the Snake Valley in Millard County believe that the West Desert is a good environment for a solar energy plant¹³¹ as well as a wind farm.¹³² In fact, Wasatch Wind, a wind energy developer is looking to develop a project close to Garrison. A wind farm would create construction jobs as well as a few ongoing employment opportunities for the area.

Additionally, many residents see the opportunity for the development of a business that does light manufacturing or works with data processing. A service area could be designed for the area and residents would love to have a natural gas source as they do not have many alternative forms of energy for heat. The residents also expressed a great desire to see the construction of an additional paved landing strip in the area. This would allow for medical evacuation as well as more recreational fly-in type of events since the nearest Metro airport is 250 miles away. Eskdale currently has an airstrip that is used during the agricultural season; however, the strip will need to be relocated as the community grows and the quality of the strip will need to be improved to allow for greater use.

Demand also exists for perishable foods in the area. A grocery/ perishables market would be frequented by residents from Callao in the north end of the Valley down to Big Springs in the south end, as most residents would prefer to go up and down the Valley instead of over the mountain ranges. Currently the military often performs test and training missions in the area. The residents foresee that the West Desert area will become more popular and useful to the military as more and more areas are restricted to military activity. Because approximately 90 percent of the land in the area is federally owned, some limits to development may exist.

RECREATION/TOURISM

A significant amount of recreational opportunities lie in the Snake Valley in Millard County. Previously tours were offered at Gandy Warm Springs Cave. Currently the cave is closed but is expected to reopen sometime in the near future. Other recreational activities include: rock climbing, hunting, and 4-wheeling. Popular hunting in the area includes the hunting of deer, antelope, geese, dove, and elk. October through January are the most popular months for hunting. Triple H Hunting, located in Millard County, is a popular hunting guide and services business. The owners recently expanded the business by building cabins in the Snake Valley. Also, just over the border of Nevada is Great Basin National Park. The Park receives between 70,000 and 90,000 visitors a year, many of which come through the Snake Valley in Utah. Hidden Canyon Ranch, a popular guest ranch, also resides over the border in the State of Nevada. This ranch is accessible through the Town of Garrison. Some residents mentioned that there might also be potential for a guest ranch on the Utah side of the Valley.

¹³⁰ Dean Hayward (Millard County resident)

¹³¹ Jerald Anderson (Millard County resident)

¹³² David Sturlin (Millard County resident)

EVALUATION OF GENERAL PLAN & ADDITIONAL DEVELOPMENT POTENTIAL

While Juab and Millard Counties have many resources that can be developed, it is important to study the respective General Plans of each County in order to ensure ideas for development are in-line with the County vision. It must also be determined if pumping water from the area would compromise the integrity of the General Plans. The following section evaluates the General Plans of each County and outlines specific development plans already in place for each County.

EVALUATION OF GENERAL PLAN COMPATIBILITY AND VISION FOR COUNTIES

JUAB COUNTY

Part of Juab County's mission statement from its General Plan includes the dedication of elected officials to "promote economic development and diversification, including utilization of natural resources, which will create family-sustaining employment, enhance the quality of life, and develop a beautiful, productive, and safe place for the citizens of Juab County to work and live."¹³³ Opportunities for development in Juab County include growth and development in tourism as well as mining. One concern to growth outlined in the General Plan is the availability of water. The General Plan mentions how recent studies show that ground water levels have been declining. As a result of this decline the Plan states that "development and growth in selected portions of the County will be limited or perhaps restricted according to the availability of water."¹³⁴ Clearly Juab recognizes that limited water resources impose restrictions on growth and is therefore committed to protecting the area and sustaining the current lifestyle of its residents.

MILLARD COUNTY

"Water is considered the lifeblood of Millard County. Current and future residential, industrial, recreational, and agricultural development is determined by water quality, availability and allocation. It is in the County's interest to protect this limited resource by promoting the efficient use and management of its water resources."¹³⁵ Clearly Millard County is dedicated to protecting its water resources as any limit to these resources is detrimental to growth and development in the area. Millard County's General Plan clarifies its support of economic and community growth and also recognizes the economic benefits that tourism-related activities bring to the area. In addition, the General Plan outlines the importance of agricultural land in the County. Agricultural land is important to the County because it provides the "quality of life" that the residents of Millard County value, contributes to state and local economies, and also provides a suitable habitat for wildlife. According to the General Plan, Millard County ranks first in the state in alfalfa hay production, third in total grain production (wheat, barley, oats and corn), fourth in livestock inventory, and fifth in total acres planted. The General Plan further states that the agriculture industry has been a stabilizing force for the County as other industries have come and gone over the years.¹³⁶ Agricultural land, tourism-related activities, and economic and community growth are all dependent on water; thus a lack of water would compromise the vision that Millard County has for the future.

FUTURE SPECIFIC DEVELOPMENT PLANS

JUAB COUNTY

Juab County has no specific development plans in the Snake Valley in the near future but is looking into the possibility of mining development in the area.

MILLARD COUNTY

Millard County welcomes growth and development in the West Desert. Eskdale is one example of a growing community in the Snake Valley of Millard County. It has created a plan for additional development to take place in the next five to ten years. Development plans include the expansion of agriculture, housing, education and assembly facilities, and manufacturing services. The following provides more details regarding Eskdale's Development Plan.

Eskdale Development Plan

Agriculture: The community has plans to relocate the 300 cow dairy farm farther north from its existing location and expand to include a 600 milking cow herd in the next five years. It would like to start manure distribution and methane

¹³³ Juab County General Plan, page 94

¹³⁴ Juab County General Plan, page 115

¹³⁵ Millard County General Plan, page 58

¹³⁶ Millard County General Plan, page 20

collection for power generation, increase the farm acreage to use all permitted water, and develop specialty crop production using solar or geothermal collection. The community has approximately 1,000 additional acres of land for which it holds water rights. This land will probably be developed within the next ten years as the economy stabilizes and crop prices increase.

Facilities and Housing: Plans are currently being drawn up for a House of Aaron Sanctuary and Facilities Area which would include a house of worship, offices, a training center, and an assembly area. Fundraising is currently in process in order for this project to be realized in the next few years. The community is in the process of completing a Master Plan for Millard County to develop the property east of Eskdale for individual residences. Approximately 80 acres have been set apart for this subdivision plan. The existing water and sewer system in place for the current community would have to be expanded to accommodate future residences. This residential development plan is expected to begin in the next two to three years. As population grows, the community is also looking to build an education campus which would house post-secondary and vocational training classes. Other plans for the future include an elderly care and medical services clinic, visitor accommodations, and RV facilities.

Services and Manufacturing: The community believes that there is potential for a customer service call/internet business in the area as well as small assembly, prefabrication, and light manufacturing shops.

These plans for the Eskdale community may be threatened if water is pumped from the Valley. Additionally, the residents worry about water quality should pumping occur. If the water table drops, treatment costs will increase substantially. Also, if the agricultural aspect of the community is threatened, all additional development plans for the community will be threatened as farming is the livelihood of the area.

QUALITY OF LIFE ISSUES RELATED TO PUMPING OF THE SNAKE VALLEY

DUST

Many Snake Valley residents worry that if water is pumped from the area the Valley will end up like Owens Valley in California. In 1913 a pipeline was constructed to take water from Owens Valley to the Los Angeles area. The results of pumping from the area were vast. Owens Lake and approximately fifty miles of the Owens River ran dry; wetlands, springs, and marshes disappeared; and well water levels dropped. Farmers began to leave the area as their crops dried up, and the number of dust storms in the area increased.¹³⁷ Unfortunately the dust from the now dry Owens Lake is the largest source of toxic dust pollution in America. Many residents worry about cancer or other pulmonary illnesses caused by this toxic dust. Recognizing the health threats to those in the area, the Department of Water and Power (DWP) has since spent half a billion dollars trying to fix the lake and is also planning to restore water to 62 miles of the Owens River.¹³⁸ The costs of repairing the damage done to the area are great and many doubt the area will ever fully recover. Residents of the Snake Valley anticipate similar consequences should water be pumped from the Snake Valley. They anticipate that many streams and springs will run dry, that well water levels will drop, and that increased dust storms will plague the Wasatch Front.

HEALTH

The health impacts from increased levels of dust and increased dust storms are significant. Dr. Brian Moench, the president of Utah Physicians for a Healthy Environment, says that "particles inhaled cause the same kind of systemic inflammation as those from vehicle tail pipes and factory smoke stacks." Health consequences of increases in air pollution include a rise in blood pressure, vascular inflammation, an increase in heart attacks, strokes, and deep vein thrombosis. Many suspect that dust may also carry diseases such as meningitis, influenza, SARS, and foot and mouth disease. The dust in the West Desert is particularly threatening as it contains mercury, erionite, and the radioactive elements plutonium, uranium, cesium and strontium.¹³⁹

Along with the Utah Physicians for a Healthy Environment, the Utah Medical Association (UMA), the state's largest physicians group, also opposes pumping water from the area. The group believes that the proposed agreement to divide the water between Utah and Nevada lacks data on potential air-quality damage and fails to consider long-term health risks to those downwind of the area pumped.¹⁴⁰

Air pollution in Utah, and in particular Salt Lake City, is already at a high level. Recently the U.S. Environmental Protection Agency revealed that it plans to deny many areas in Utah certification under the Clean Air Act. Part of the reason for this rejection is that Utah has not been able to deal sufficiently with dust storms. While soot from vehicle tailpipes and heavy equipment has been reduced, regulators can do little when the soot mingles with dust from dust storms in the area. Jurisdictions that fail to meet the national air quality standards from the Clean Air Act may eventually be cut off from federal transportation funds. An increase in dust and dust storms to the area could be very costly for the State of Utah as it strives to meet air quality standards.¹⁴¹

IMPACTS ON AGRICULTURE

While many know that a decrease in water leads to an increase of dust, some may be surprised to learn that an increase in dust may also create water shortages. As dust storms move across the mountains, they leave a trail of dirt covering the snow and causing the snowpack to melt earlier than normal. The dust and dirt darken the snow on the mountains, causing the surface to absorb heat and melt quickly. Many farmers and ranchers rely on the slowly melting snowpack for water during the summer months. However, if the snowpack melts more quickly than normal, these same farmers and ranchers could be suffering from shortages of water by the end of the summer.¹⁴² If water is pumped from the Snake Valley area, the residents may experience a greater loss in water resources than was previously anticipated. Not only will the water table drop in the Valley create more dust, but runoff from snowpack in the mountains may also decrease as a result of this same increase of dust.

¹³⁷ Owens Valley Committee website, <http://www.ovcweb.org/OwensValley/Waterhistory.html>

¹³⁸ Linder, Michael. *KNX 10.70 News Radio*, <http://www.knx1070.com/pages/86152.php?videoEpisodeId=42>

¹³⁹ Moench, Brian. "Dust Storms Signal Danger for Utah." *Deseret News*

¹⁴⁰ Henetz, Patty. "Snake Valley Water Deal Could Kill Utahns, Docs Warn." *The Salt Lake Tribune*

¹⁴¹ Cohen, Bonner R. "EPA Rejects Utah Clean Air Plan Due to Natural Dust Storms." *The Heartland Institute*

¹⁴² Streater, Scott. "Climate Change, Water Shortages Conspire to Create 21st Century Dust Bowl." *The New York Times*



WILDLIFE

The National Park Service and U.S. Geological Survey have issued various reports detailing the negative impacts on plants, wildlife, and other park resources by taking water from the Snake Valley. Great Basin National Park in Nevada is home to 73 mammal species, 238 bird species, and more than 800 varieties of plants - all of which may be affected by a decrease in water. The streams, springs, and cave system in the Park also depend on the continued presence of water in the aquifer.¹⁴³

Fish Springs National Wildlife Refuge is also home to many plants and animals that may be affected by a decrease in water. Currently the Least Chub, a fish found in the refuge, is a candidate for the endangered species list.¹⁴⁴

¹⁴³ Hevel-Mingo, Karen. "Guv and Snake Valley." *The Salt Lake Tribune*

¹⁴⁴ Fish Springs National Wildlife Refuge, <http://www.fws.gov/fishsprings/pdfs/RepliteList.pdf>

APPENDIX A: FLOOR SPACE AND WATER NEEDS OF VARIOUS BUSINESSES

	FLOOR SPACE SF	MONTHLY CONSUMPTION GAL	DAILY CONSUMPTION PER 1K SF
Auto Dealer/Repair	283,160	769,231	90.6
Grocery	628,663	1,290,167	68.4
Lodging/Care Facilities	397,524	1,931,199	161.9
Manufacturing/Industrial	587,691	2,637,153	149.6
Recreation	569,402	1,714,000	100.3

Source: South Valley Sewer Impact Fee Analysis 2007, LYRB