Chapter 4 – Future Supply & Demand and Projected Needs

4.1 Introduction

This chapter presents the process used to determine future water demands and projected needs within the study area. It includes a discussion of population projections, determination of future demands, and calculation of future supplies which are assumed to be available without implementing any of the supply components described in Chapter 5. From this data, conclusions were drawn about projected water needs for 2030 and 2050.

4.2 Population Projections

Two different methodologies for projecting future population were considered: The Governor's Office of Planning and Budget (GOPB), in conjunction with local Area of Governments (AOG), is the agency responsible for preparing population and other demographic projections for the State of Utah. In May 2005, the Mountainland AOG broke down the latest Governor's Office of Planning and Budget population projections for Summit County by incorporated cities and towns with the remainder as the balance of county. The city projections include Park City's estimated population for each decade from 2010 through 2050. Using this data and the 2000 Census tract data as a guide to future population distribution, the population of the study area in 2030 was estimated to be 64,300. For 2050, the projected population was estimated to be 86,300. Table 4-1 contains the GOPB population estimates for the study area.

The other approach taken to forecast population for the study area was to consider the maximum potential development within the Basin. Summit County has adopted a land use plan (Snyderville Basin General Plan) that identifies where development will be permitted and how densely it will be allowed to develop. Park City also has a similar land use plan that establishes the projected densities within the city limits. Using the densities associated with each land use, populations at build out were estimated for the various land use categories.

Comparatively, the two methods produced somewhat different results. While the GOPB projections estimate a study area population of approximately 86,300 by 2050, the build out method estimated the ultimate population within the study area to be only 75,600. Although the build-out method is often useful for planning purposes, this method assumes that current zoning laws and associated population densities will remain unchanged for the next 45 years. As experience in other communities demonstrates, zoning laws can and do change when property values increase and pressures mount to accommodate growth. Therefore, the higher GOPB population estimates were not considered unreasonable and are used for the purposes of this study.

TABLE 4-1
Snyderville Basin Population Projections

City/Area	Population					
	2001	2010	2020	2030	2040*	2050*
Park City	7,647	10,987	15,339	19,776	19,325	20,904
Balance of Snyderville Basin**	16,212	23,002	34,320	44,541	55,303	65,423
TOTAL	**23,859**	**33,989**	**49,659**	**64,317**	**75,603**	**86,327**

Source: Governor's Office of Planning and Budget, "2005 Baseline City Projections," June 2005.
* The Governor's Office of Planning and Budget (GOPB) models projections to 2030, all projections beyond this date are estimated using other methods and are provided by GOPB for scenario analysis.
** Estimated based on 2000 Census population distribution.

4.3 Projected Future Demands

4.3.1 Demand Modeling

UDWR has developed the Utah Water Demand/Supply model to project the future water demands. UDWR's base water use data for the year 2001 and the GOPB population projections were used to estimate water demands within the study area for each 10-year period from 2010 to 2050. These demands were projected both with and without water conservation. Figure 4-1 shows the projected demands with and without conservation.

FIGURE 4-1
Projected Future Water Demands

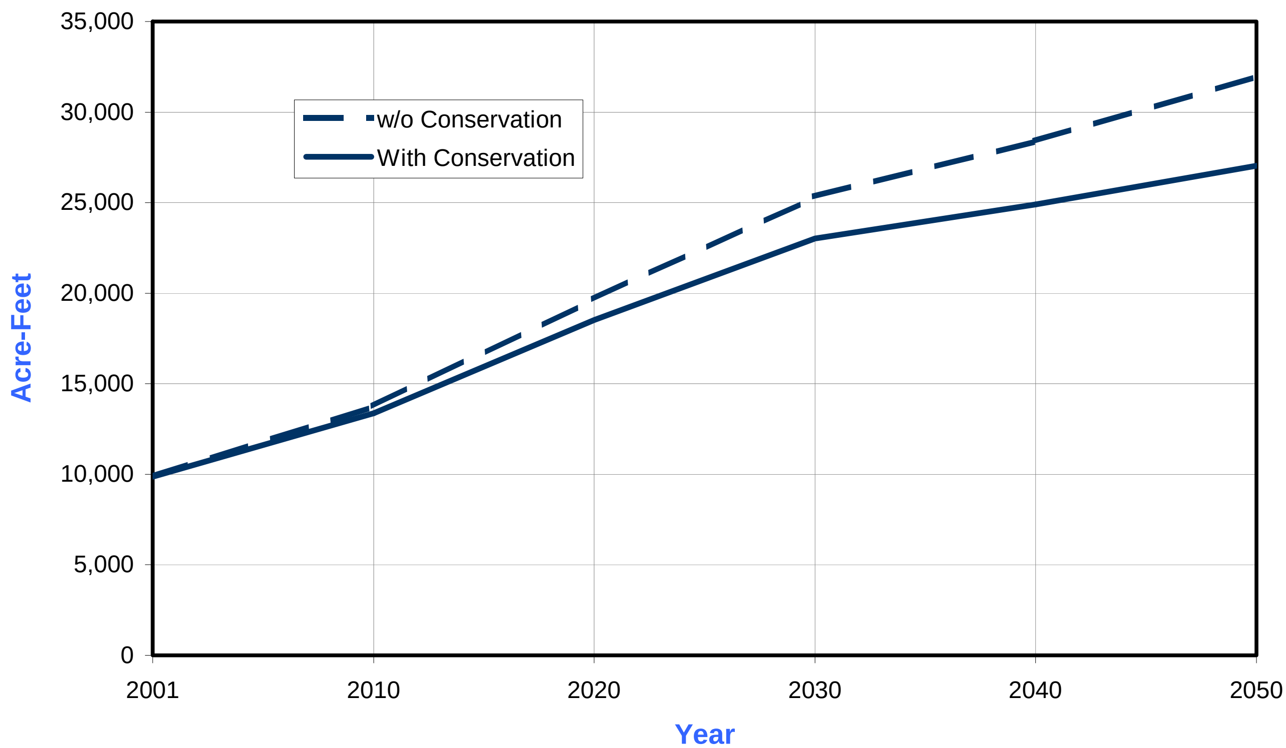


Table 4-2 shows the projected demands for Park City and the rest of the Snyderville Basin for each 10-year increment without water conservation. Table 4-3 shows the projected demands for Park City and the rest of the Snyderville Basin for each 10-year increment with water conservation. The total water demand in 2030 without conservation is projected to be 25,300 acre-feet. With conservation, the 2030 demand decreases by about 2,300 acre-feet to 23,000 acre-feet per year. Projections for the year 2050 are similarly calculated. The total water demand in 2050 without conservation is projected to be 32,000 acre-feet. With conservation, the 2050 demand is projected to decrease by about 5,000 acre-feet to 27,000 acre-feet per year. Figure 4-2 compares the 2030 and 2050 demands (with conservation) to the current demand, basin safe yield, and available supply as estimated in Chapters 2 and 3.

TABLE 4-2
Projected Future M&I Demands (Without Conservation)

City/Area	M&I Water Demand* (acre-feet)				
	2010	2020	2030	2040	2050
Park City	6,794	9,485	12,228	11,949	12,926
Balance of Snyderville Basin	6,975	10,198	13,108	16,449	19,052
TOTAL	**13,769**	**19,683**	**25,336**	**28,398**	**31,978**

* Includes 427 acre-feet of public non-community system use. See Table 3-3.

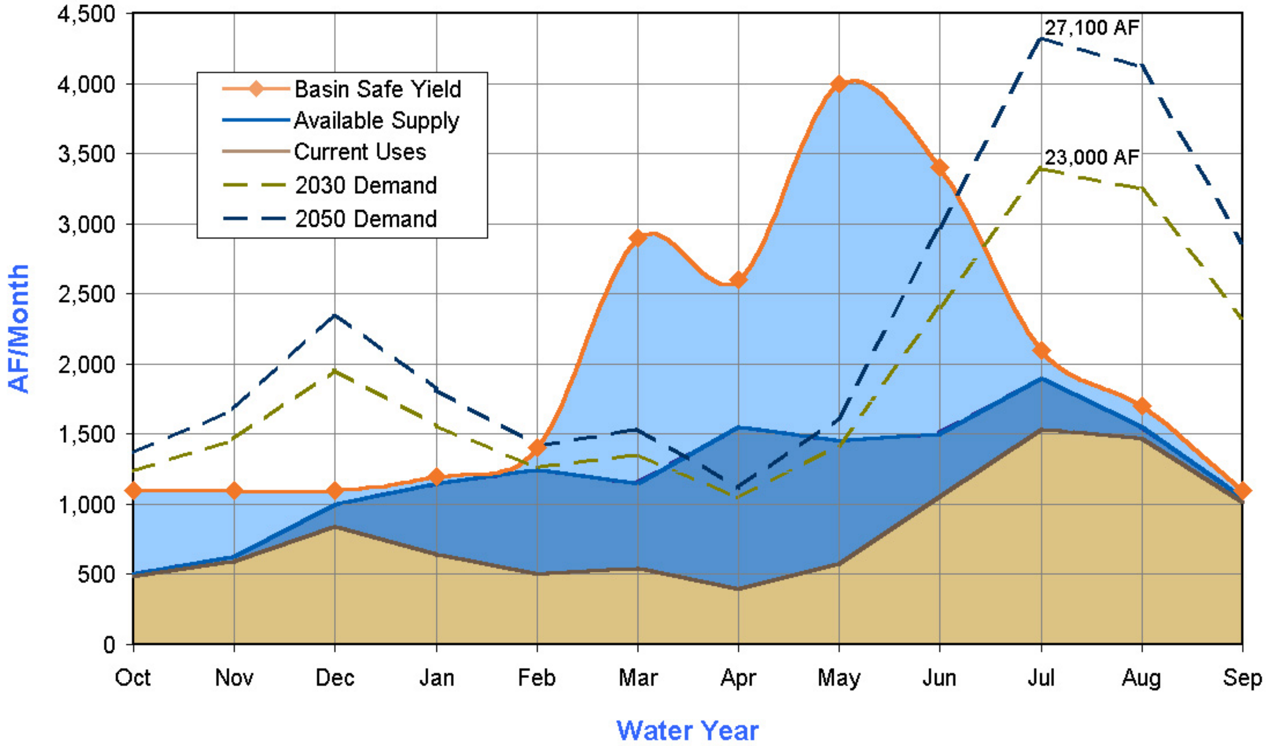
Several water suppliers within the study area have indicated that using population-based demand projections to project future demands is problematic. Many have suggested that an equivalent residential connection method would be more appropriate. One reason for these concerns is the fact that a large segment of the water use in the area comes from a non-permanent or transient population (tourists, second homeowners, etc.). Another concern is that large landscape water use such as golf courses cannot be properly reflected in population-based units (such as gallons per capita per day). After carefully considering each of these concerns, UDWR determined that the methodology employed by the Utah Water Demand/Supply model adequately addresses these issues and there is little risk that the resulting water use projections underestimate actual future demands.

TABLE 4-3
Projected Future M&I Demands (With Conservation)

City/Area	M&I Water Demand* (acre-feet)				
	2010	2020	2030	2040	2050
Park City	6,598	8,908	11,094	10,458	10,899
Balance of Snyderville Basin	6,787	9,603	11,930	14,450	16,132
TOTAL	**13,385**	**18,511**	**23,024**	**24,908**	**27,031**

* Includes 427 acre-feet of public non-community system use. See Table 3-3.

FIGURE 4-2
Comparison of 2030 and 2050 Demands (with Conservation) to Current Demand and Available Supply



4.3.2 Water Conservation

As demonstrated above, water conservation will play a significant role in helping water suppliers in the area to meet future needs. In addition to this important benefit, water conservation may also:

- Conserve energy as less water needs to be treated, pumped and distributed.
- Lessen the leaching of chemicals and other pollutants into streams and aquifers as water is applied more efficiently to urban landscapes and agricultural crops.
- Reduce future stream diversions and groundwater withdrawals that would otherwise occur, thereby enhancing water quality, environmental and recreational functions of natural waterways (UDWR, 2003b).

The State of Utah has developed a specific goal to conserve water use directly linked to M&I needs. This goal is to reduce per capita water demand from public community systems by at least 25 percent from 1995 to 2050. In the Snyderville Basin and Park City area, the accomplishment of this goal is estimated to be equivalent to a total decrease in demand of approximately 5,000 acre-feet per year by 2050. This reduction would account for a significant portion of the area's anticipated future water needs. This goal is based on modeling and research that indicates indoor and outdoor water use can be reduced by 25 percent or more with little change in lifestyle. (UDWR, 2003b).

Recognizing the importance of water conservation to Utah's future, the Utah Legislature passed the Water Conservation Plan Act in 1999. This act requires each water retailer with more than 500 connections, and all water conservancy districts, to prepare water conservation plans and submit them to UDWR. Water conservation plans are to be updated and resubmitted every 5 years from the original submittal date. In addition to this legislative requirement, the state's water funding boards require any entity requesting funds for water projects to have a water conservation plan in place, regardless of its size. Only five of the eight systems in the study area are required by law to prepare a water conservation plan. Of the three that are not required to do so, only High Valley Water has submitted a plan.

Although the Water Conservation Plan Act has helped elevate the importance of water conservation planning in the Snyderville Basin area, water providers in the area must set strong water conservation goals and ensure they are met by implementing appropriate measures. If a significant effort to achieve water conservation goals is not made, it may be difficult to justify large investments in new water development projects by state and Federal Governments.

Many western mountain resort communities have implemented stricter watering ordinances, such as no outside watering or using only native plants requiring no additional water on all new construction. If Government entities in the study area were to implement similar ordinances for all new construction, the conservation goals discussed above could be more easily met. The current per capita use for indoor residential, commercial, and institutional categories amounts to about 150 gpcd. With a current total water use of 317 gpcd, there is a significant potential for reduction of outdoor water use in the study area.

Water conservation efforts within the Snyderville Basin have yielded significant results in recent years. All three of the major water suppliers within the Study area (Park City, Mountain Regional Water Special Service District, and Summit Water Distribution Company) have realized declines in total demand in the neighborhood of 25 percent in just a few years. While drought-related responses certainly played a significant role in these reductions, it is likely that residents within the Basin will maintain at least a portion of these gains into the future. In order to help this to happen, the conservation message will need to continue to be emphasized during years of normal and above normal precipitation.

4.3.3 Wastewater Dilution Requirements

For the Snyderville Basin Water Reclamation District (SBWRD) to meet its State Discharge Permit requirements for discharging its treated M&I wastewater to East Canyon Creek, it has to rely on a minimum stream flow for dilution of the effluent to meet the designated beneficial uses for East Canyon Creek. The SBWRD is considering an upgrade to its treatment facility from the existing "Type 1" effluent treatment to reverse osmosis in order to comply with phosphorus limits. The current limit for phosphorus is 100 ppb, but the state is looking at reducing the limit to 50 ppb. SBWRD recently completed a very costly upgrade of its treatment system to meet the 100 ppb limit, and if this additional upgrade is necessary, it may be cheaper to purchase water for instream dilution flows, or to reduce its discharge volume by reuse.

Under a contract with SBWRD, Kleinfelder, Inc., recently completed a flow augmentation study on East Canyon Creek to determine the quantity of water that would be required to maintain minimum instream flows to allow achievement of beneficial uses designated for East Canyon Creek ("East Canyon Creek Flow Augmentation Feasibility Study: Summit and Morgan Counties, Utah, February 2005"). That study concluded that the maximum amount of augmentation to meet the instream flow goals is calculated to be approximately 1,095 acre-feet, which would provide a minimum 6 cfs for instream flow from July through September. This requirement is shown in the study for the year 2030, since 2030 is the planning time frame of the SBWRD. As the population increases, however, an additional 500 acre-feet would be needed by the year 2050 for a total need of about 1,600 acre-feet in 2050. SBWRD is interested in planning this future demand as part of the overall long-term demand addressed by this current study. Including this industrial water requirement of 1,100 acre-feet for 2030 and 1,600 acre-feet for 2050 as a part of the projected demand leaves water reuse as a potential development option that may be used to meet future needs.

4.3.4 Susceptible Mine Tunnel Flows

A large portion (approximately 50 percent) of the water used by Park City comes from old mine tunnels. The mining operations have ceased and the tunnels used for water supply are being maintained by Park City for water supply purposes. Because the tunnels are old and the maintenance being performed is only sufficient to keep the water flowing, if a tunnel collapse were to occur, the city's ability to meet peak demands would be at least temporarily reduced until repairs could be made or replacement sources developed. The city is also concerned that maintenance of the tunnels will become increasingly more difficult and expensive as the tunnels age and as the availability of qualified miners continues to decline.

The tunnels also have unique water quality issues associated with their use for drinking water purposes. The mines are former lead and silver mines and they contain heavy metals, arsenic, antimony, and other potential contaminants. The city has to carefully operate the tunnel systems so as to limit the amount of contaminants in the water supply. It also has to treat some of the water from the tunnels to remove contaminants. Concern over the long-term effects of potential contaminants on the water supply raises issues with the reliability of these sources. For these reasons, the city is interested in developing 2,000 acre-feet of additional supply to provide backup in case of emergencies even though they are expected to continue using the mine tunnel water as long as it is available and of acceptable quality.

4.3.5 Adjusted M&I Demand

Adding the effluent dilution requirement (1,100 to 1,600 acre-feet per year) and susceptible mine tunnel volume (2,000 acre-feet per year) to the total demand projected with conservation as shown previously in Table 4-3 yields an adjusted total M&I demand for the study area as shown in Table 4-4. For purposes of this study, the 2030 demand of 23,000 acre-feet per year (with conservation) and 2050 demand of 27,000 acre-feet per year (with conservation) are the demands that will need to be met by a combination of the projected reliable supplies discussed below and the water supply development options presented in Chapter 5.

TABLE 4-4
Adjusted M&I Demands

	Population or Volume (acre-feet)	
	2030*	2050*
Population	64,300	86,300
Calculated M&I Demand	**25,300**	**32,000**
Water Conservation	(2,300)	(5,000)
Net M&I Demand	**23,000**	**27,000**
Minimum Instream Flow / Effluent Dilution Requirement	1,100	1,600
Susceptible Mine Tunnel Flows	2,000	2,000
Adjusted M&I Demand	**26,100**	**30,600**

* Rounded to nearest 100 acre-feet.

4.4 Projected Reliable Supplies

There are a number of water supply resources in the study area which were not included in the existing supplies discussed in Chapter 2 but which, for purposes of this report, are assumed to be available supplies for 2030 and 2050. These include the Lost Creek Canyon Pipeline Project, the Jordanelle Special Service District import, additional groundwater supplies, and agricultural water conversions. Also, the need for continued system surplus/reserve will continue into the future. Following is a discussion of each, including the amount by which they are expected to affect future available supplies. It is important to note that this study assumes that these water supply resources are developed concurrently with the growing population and are utilized to become part of the projected reliable supplies.

4.4.1 Lost Creek Canyon Pipeline

The Lost Creek Canyon Pipeline Project was completed and dedicated in October 2004. The current capacity of this project is 1,600 acre-feet per year. The source water comes from shallow wells near the Weber River above Rockport Reservoir. The existing infrastructure included in this importation project consists of the following: a shallow groundwater well system on the Weber River; a booster pump station; approximately 27,000 linear feet of 24-inch water transmission line to convey water from the well system to the Signal Hill Water Treatment Plant; a 3 MGD (2,080 gpm), expandable to 6 MGD (4,200 gpm), membrane water treatment plant located on the ridgeline above Three Mile Canyon; and two open reservoirs totaling approximately 15 acre-feet of raw water storage (Aqua Engineering, 2003). Current agreements contemplate that the pipeline may potentially convey up to 6,600 acre-feet per year to the Snyderville Basin. Although an expansion of the water importation capability of this system is presented as a potential water supply system component in Chapter 5, for purposes of determining projected future needs, this infrastructure is assumed to contribute 1,600 acre-feet per year to the reliable supplies for 2030 and 2050.

4.4.2 Jordanelle Special Service District Import

Park City currently receives water from Jordanelle Special Service District (JSSD) under a 20-year lease. This water comes from the Ontario Drain Tunnel. The current delivered flow capacity is approximately 1.4 MGD (1,000 gpm) and up to 1,000 acre-feet per year. The facilities for this delivery have already been constructed and are in operation. They consist of a filtration water treatment plant located at the mouth of the Ontario Drain Tunnel on the northwest side of Jordanelle Reservoir and approximately 15,400 linear feet of 12-inch treated water transmission pipeline. Even though the 1,000 acre-feet per year delivery contract expires in 2022, both Park City and JSSD expect deliveries will continue in perpetuity.

4.4.3 Additional Groundwater Development

In its study of the Basin, the Utah Geological Survey (UGS) found the groundwater system in the Snyderville Basin to be highly compartmentalized. Pumping of groundwater in one compartment does not appear to directly affect groundwater levels in other compartments. While it is possible that the majority of the best groundwater sources have already been developed by the existing water suppliers in the Basin, it is still very likely that additional groundwater development will occur. While the three largest water suppliers in the area (Park City, Mountain Regional Special Service District, and Summit Water Distribution Company), do not intend to develop any substantial amount of additional groundwater, other smaller entities and individuals with approved groundwater rights will likely continue to develop small quantities of groundwater. For purposes of the projected needs calculations in this chapter, it is assumed that these groundwater developments will add 200 acre-feet per year to the 2030 reliable supplies and 300 acre-feet per year to the 2050 reliable supplies.

4.4.4 Agricultural Water Conversions

As with other urbanizing areas of the state, lands historically used for agriculture in the Snyderville Basin are being developed into homes and businesses. Based on the State Engineer’s calculations of depletion, a portion of the water once used on irrigated lands becomes available to meet the needs of the new M&I uses. The depletion allowed for the new use can be no greater than the depletion allowed for the agricultural use, and there may be limitations on the new use if there would be adverse effects to other water right holders in the area.

UDWR inventories water related land use for the entire state on a rotating basis. In 2003, surface irrigated acreage within the study area was estimated to be 1,100 acres. At the current development rate, and realizing that some of the lands are currently protected under conservation easements as open space and others will likely be protected, it is estimated that in 2050 the irrigated acreage will decline to less than a few hundred acres.

By 2050, UDWR estimates that 300 acres of irrigated lands have associated water rights that could be converted. The water associated with these lands that should become available for M&I uses would be between 400 and 500 acre-feet per year. For purposes of the projected needs calculations in this chapter, it is assumed that these conversions will add 400 acre-feet per year to the 2030 reliable supplies and 500 acre-feet to the 2050 reliable supplies.

4.4.5 System Surplus/Reserve Capacity Needs

As discussed in Chapter 2, the actual reliable water supply within the Snyderville Basin may be somewhat lower than the estimate of 14,000 acre-feet per year of available supply (see Table 2-4 and Section 2.4.2). Subtracting the actual 2001 use of 9,800 (rounded) acre-feet from 14,000 acre-feet leaves a difference of 4,200 acre-feet per year. There are a number of factors which currently prevent the use of much of this surplus supply. One of the major limiting factors is that each system is operated independently from the others. When one system is experiencing its peak demand, it cannot be met using another system's resources. There are some interconnections between water systems to provide this capability, but they are not widespread. The history of competition among water providers in the Snyderville Basin has also limited the amount of cooperation achievable to meet each other's needs. In addition to these concerns, much of this surplus or reserve capacity, does not correspond to peak demand times, and without additional surface storage in the Basin, is not available when needed.

Furthermore, local water suppliers and prudent water planning standards stress the importance of providing a sufficient amount of reserve capacity to prevent shortages during emergencies, when some water sources may not be available. As a result, for purposes of this study, this surplus or reserve capacity of 4,200 acre-feet per year has been subtracted from projected reliable supplies.

This volume of water needed for reserve capacity is expected to increase in the future as the M&I demand grows and greater stress is placed on existing water systems. The ability to share water supplies among water providers is also expected to improve, as more interconnects are constructed and the area becomes more densely populated bringing systems closer together. For purposes of this study, the projected percentages of total available supplies needed for reserve capacity will reduce from the current 30 percent to 20 percent for years 2030 and 2050. This reserve capacity is therefore computed to be 6,500 acre-feet in the year 2030 and 7,500 acre-feet in 2050. Table 4-5 summarizes the projected reliable supplies as discussed in this section and as used for the calculation of projected needs.

4.5 Projected Future Needs

In order to calculate the projected future additional M&I water needs within the Snyderville Basin, the projected reliable supplies are subtracted from the adjusted M&I demands as shown in Table 4-5. As shown from this calculation, an additional water supply of approximately 15,400 acre-feet will be needed in 2030 and 20,700 acre-feet will be needed in 2050. These numbers represent the future supply deficits that need to be satisfied by the various water supply options presented in Chapter 5.

TABLE 4-5
Projected M&I Needs

	Volume (acre-feet)		
	2001	2030	2050
Adjusted M&I Demand	**9,800**	**23,000**	**27,000**
In-stream Flow & Dilution Req.	**0**	**1,100**	**1,600**
Mine tunnel replacement water	**0**	**2,000**	**2,000**
Projected M&I Demand	**9,800**	**26,100**	**30,600**
Existing Supplies*	**14,000**	**14,000**	**14,000**
Lost Creek Canyon Pipeline Project	0	1,600	1,600
Jordanelle Special Service District Import	0	1,000	1,000
Additional Groundwater	0	200	300
Agricultural Conversions	0	400	500
Reserve Capacity	(4,200)	(6,500)	(7,500)
Projected Reliable Supply	**9,800**	**10,700**	**9,900**
Projected Additional M&I Needs**	**0**	**15,400**	**20,700**

* Available supply from Chapter 2 (rounded to nearest 100 acre-feet).
** Projected M&I Demand minus Projected Reliable Supply.