WATER SUPPLY APPENDIX

Volume 2 – M&I Water Demands

Central Utah Project Completion Program

Supplement to the 1988 Definite Plan Report for the Bonneville Unit

October 2004

UTAH RECLAMATION MITIGATION AND CONSERVATION COMMISSION

SUPPLEMENT TO THE BONNEVILLE UNIT DEFINITE PLAN REPORT

WATER SUPPLY APPENDIX, VOLUME 2 – M&I WATER DEMANDS

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Central Utah Project Completion Program

Chapter 1

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

BACKGROUND AND SCOPE OF REFINEMENT

This M&I Water Needs Appendix presents a revised assessment of municipal and industrial (M&I) water needs of the Utah Lake Drainage Basin Water Delivery System (ULS) of the Bonneville Unit of the Central Utah Project (CUP). It was prepared initially to serve as a Supplemental Report to the *ULS Draft Plan Formulation Report* of February 2002 by the ULS Joint Lead Agencies - the Central Utah Water Conservancy District (District); Utah Reclamation, Mitigation and Conservation Commission (URMCC); and the U.S. Department of the Interior (DOI).

This most recent version of M&I Water Needs incorporates analyses of M&I water needs completed by the two Salt Lake County entities consisting of the Jordan Valley Water Conservancy District (Chapter 7) and the Metropolitan Water District of Salt Lake and Sandy (Chapter 8). An in-depth analysis of the water needs of Utah County was made by the District. The northern Utah County M&I needs are documented in this M&I Water Needs Appendix (Chapter 6) which draws upon work completed in another report, the *North Utah County Water Needs Study* completed by the District in October 2001. The in-depth analysis of southern Utah County water needs has been addressed in several reports with the results of the analyses being presented in Chapter 5 of this M&I Water Needs Appendix.

This M&I Water Needs Appendix identifies changes in methodology and assumptions since the February 2002 Draft Plan Formulation Report, presents an updated analysis of M&I water needs based on more recent population projections, provides a more detailed assessment of water availability from local sources, and describes wastewater recycling potential. The following chapters and appendices are contained in this M&I Water Needs Appendix.

- Chapter 1, Background and Scope of Refinement
- Chapter 2, Utah Lake Water Rights
- Chapter 3, Return Flows and Water Recycling
- Chapter 4, Eastern Juab County M&I Demands
- Chapter 5, Southern Utah County M&I Demands
- Chapter 6, Northern Utah County M&I Demands
- Chapter 7, Salt Lake County M&I Demands, Jordan Valley Water Conservancy District Service Area
- Chapter 8, Salt Lake County M&I Demands, Metropolitan Water District of Salt Lake and Sandy Service Area
- Chapter 9, Wasatch County M&I Demands
- Attachment A, Utah County Population Projections
- Attachment B, Detailed Compilation of Utah Lake Water Rights
- Attachment C, Agricultural Conversions
- Attachment D, Water Demand Sheets for Each County

The following subchapters of Chapter 1 review the derivation of the M&I water needs presented in the February 2002 Draft Plan Formulation Report, and then identify recent refinements in the

process of estimating M&I water needs from the ULS project, including revision of population projections, assumptions regarding local water supply availability, and the potential for reverse osmosis treatment of Utah Lake water and recycling of municipal wastewater.

SCOPING MEETINGS

Various scoping meetings were conducted by the joint-lead agencies to inform local water agency representatives and the general public of the proposed scope of the ULS planning effort, provide opportunities for local input to the planning process, and to determine M&I water needs of communities in the ULS service area. The first two public meetings were conducted as informal open houses - one in September 2000 to provide background information on the Bonneville Unit completion program and receive initial requests for Bonneville Unit water, and the other in October 2001 to provide information on the scope of the ULS, present preliminary results of the water needs analysis, and receive public comments.

Formal scoping meetings were held in February 2002 in Utah County and Salt Lake County to provide more specific information on ULS water delivery concepts and to solicit specific responses on those concepts from agency representatives and the public. The results of the various public meetings are documented in the following publications, which are on file at the District's office.

1. *Initial Scoping Comments, Utah Lake Drainage Basin Water Delivery System*, October 31, 2000.

2. *Public Information Meeting, Utah Lake Drainage Basin Water Delivery System*, October 17, 2001.

3. *Scoping Summary Report, Utah Lake Drainage Basin Water Delivery System*, May 2002.

At the scoping meetings it was stated that the M&I water demands analysis was preliminary and subject to revision based upon final population projections using census data for the year 2000.

DRAFT PLAN FORMULATION REPORT - FEBRUARY 2002

In February 2002, the *Draft Plan Formulation Report* was completed, which is on file in the District's Office. That report described the six-step planning process used to formulate water delivery concepts for the ULS. The steps consisted of 1) identifying water-related land resource problems and opportunities; 2) conducting inventories, forecasts and analyses of conditions related to those problems and opportunities; 3) formulating and assessing water delivery concepts to meet needs; 4) formulating those concepts into potentially viable alternatives; 5) evaluating and comparing the effects of those alternatives; and 6) laying the groundwork for the eventual selection of viable alternatives for subsequent National Environmental Policy Act compliance.

Key considerations during this six-step process were population projections, water conservation, and the capability of local water supplies to meet future M&I needs.

Initial M&I Water Requests as Presented in Draft Plan Formulation Report

The process of allocating project M&I water supply began with the evaluation of M&I water requests submitted to the District by communities and water agencies in October 2000, in response to a District letter requesting such information. Table 1-1 reiterates the summary of M&I water requests presented in the *Draft Plan Formulation Report.*

TABLE 1-1
Summary of M&I Water Requests
Draft Plan Formulation Report

Area	Municipal and Industrial (acre-feet)
East Juab County	2,600
Southern Utah County	65,000
Northern Utah County[1]	9,200
Salt Lake County	40,200
Wasatch County	4,000
Total	121,000

Notes:
[1]Communities of Eagle Mountain and Saratoga Springs are included in northern Utah County.
[2]Wasatch County amended their request with a letter dated April 26, 2001 to limit the amount of water requested to 4,000 acre-feet of municipal and industrial water.
Source: Initial Scoping Comments, October 31, 2000, Utah Lake Drainage Basin Water Delivery System (District 2000)

Preliminary Evaluation of M&I Water Requests in Draft Plan Formulation Report

The M&I water requests were evaluated as to their individual justification and overall effect on plan formulation. The results of the evaluation, described in the *Draft Plan Formulation Report,* used average annual amounts of water and did not address shortages that could arise from seasonal peak demands, seasonal timing of water availability, and geographic distribution of sources and facilities to obtain and distribute water. For example, while groundwater may be regionally available, some communities may not be able to fully develop groundwater within their incorporated boundaries. The *Draft Plan Formulation Report* anticipated that new population projections would become available in the late spring of 2002, and that they would be used to make more detailed analysis of M&I water needs in Utah County and Salt Lake County.

Water Conservation in the Draft Plan Formulation Report

In the *Draft Plan Formulation Report* the assumption was made that measures would be taken to be sure that each entity requesting ULS water would meet the target conservation goals established by the State, which provide for reductions in per-capita water use of 12 ½ percent by year 2020 and 25 percent by the year 2050. Upon further analysis it was concluded that the most practical means to meet these conservation goals would be to have agreements with the entities that contract for ULS water stipulating that they would be responsible for achieving the goals. For southern Utah County this would be the South Utah Valley Municipal Water Association (SUVMWA). In northern Utah County, because the communities are not represented by an umbrella organization, it would be the individual cities that contract for the ULS water. In Salt Lake County the responsible agencies would be the Jordan Valley Water Conservancy District (JVWCD) and the Metropolitan Water District of Salt Lake and Sandy (MWDSLS).

Accounting of Local Water Supplies in the Draft Plan Formulation Report

In estimating future demands for M&I water from the ULS Project, an accounting of potential water supplies from local sources to meet these projected needs was made. As noted above, the preliminary results presented in the *Draft Plan Formulation Report* were based on average annual amounts of water and did not address shortages that could arise from seasonal peak demands, seasonal timing of water availability, and geographic distribution of sources and delivery systems. And, among other things, the accounting did not include the following water supply aspects:

- Recognition of approximately 4,900 acre-feet of Strawberry Valley Project (SVP) water presently used as irrigation water within incorporated city boundaries in southern Utah County. This amount is projected to increase to approximately 10,200 acre-feet by the year 2050.

- Limitations on future conversion of SVP irrigation water. Any water above the 10,200 acre-feet per year from future urbanization of agricultural lands in southern Utah County would supply supplemental water to the remaining SVP agricultural lands, which presently experience a shortage of irrigation water.

- Firm reliable amount of Utah Lake Basin surface water that could be used for M&I purposes when the seasonal variability in flow was considered for streams such as the Spanish Fork River, Peteetneet Creek, and Summit Creek

- Limitations on the amount of groundwater that could be pumped.

- Limitations on the amount of the Districts' Utah Lake rights that would be acquired by the U.S. Department of Interior.

- The potential volume of Central Utah Project (CUP) return flows that may reach the Jordan River in Salt Lake County. The use of these return flow rights is subject to approval by the State Engineer. The revised assessment of M&I water needs in this *Supplemental Report* addresses the projected return flows.

Population Projections in the Draft Plan Formulation Report

The population projections in the *Draft Plan Formulation Report* of February 2002 were based on projections released in 2000 by the Governor's Office of Planning and Budget (GOPB). The projections were published to year 2030 for each community in the five planning areas. The GOPB made countywide population growth projections for the decades between 2030 and 2050, but did not publish them. Although not published, the data was made available to the countywide Associations of Governments (AOG) for their local planning purposes. The AOG's representing counties in ULS planning area are as follows:

- Utah and Wasatch Counties - Mountainland Association of Governments (MAG);
- Juab County - Six County Association of Governments; and
- Salt Lake County - Wasatch Front Regional Council

An AOG may, upon request by local communities, extend community population projections beyond 2030 to a longer planning horizon, such as the year 2050. To do this the local AOG disaggregates the GOPB county population among its communities subject to these general constraints; (1) the total county population projected by the GOPB may not be exceeded, and (2) the populations for communities must be reasonable compared to historical growth trends. Thus, for the *Draft Plan Formulation Report* the community population projections for the ULS service area were extended to 2050.

The *Draft Plan Formulation Report* anticipated that the community projections to 2050 would be updated in the late spring of 2002 based on the data from the 2000 census, and that a more detailed analysis of M&I water needs would then be made. Accordingly, the various chapters of this M&I Water Needs Appendix present updated community population projections prepared for use in estimating the water needs. An aspect of population growth that was not addressed in earlier projections is the build-out population of communities, considering geographical and other constraints. The estimation of M&I water needs takes into consideration that some communities would achieve build-out prior to the 2050 planning horizon, while other communities, particularly in southern Utah County, would achieve build-out after 2050.

REVISED POPULATION PROJECTIONS

In 2001, the GOPB furnished community population counts based on the 2000 census data.

Utah County. Using such information, MAG conducted a more in-depth review of Utah County population and prepared community projections to 2050. In conducting this review MAG worked closely with mayors, Utah County commissioners, other county officials, and the staff of

the GOPB to include a comprehensive growth perspective. The resulting projections recognized that build-out would occur in some communities prior to 2050, while for others build-out would occur after 2050.

Salt Lake County. Data from updated population projections, were used by the Jordan Valley Water Conservancy District and the Metropolitan Water District of Salt Lake and Sandy to revise their need for M&I water. These results are documented in Chapter 7 - Salt Lake County (Jordan Valley Water Conservancy District), Chapter 8 – Salt Lake County (Metropolitan Water District of Salt Lake and Sandy).

Juab and Wasatch County. While updated county projections had been made, revisions had not been released as of the date of the revised M&I Water Needs Assessment in January 2003. However, due to the small population base of these counties and the availability of local water supplies to meet needs, the updated population projections did not result in any demand for ULS water.

Community Growth in Utah County

The updated projections by MAG are presented below in Table 1-2. Additional details of these projections are presented in Attachment A. For several communities in Utah County, MAG estimated "build-out populations" that could be supported by available space and other resources. These communities are noted on Table 1-2, with their 2050 population projections and the projected build-out populations.

TABLE 1-2
Year 2050 and Build-out Population Projections for Utah County Communities

City	2050 Population	Build-out Population
Southern Utah County		
Elk Ridge	6,000	Same as year 2050
Genola	18,191	Projections beyond 2050 not made
Goshen	3,251	Projections beyond 2050 not made
Mapleton	34,024	Projections beyond 2050 not made
Payson	80,763	Projections beyond 2050 not made
Salem	31,409	Projections beyond 2050 not made
Santaquin	62,621	Projections beyond 2050 not made
Spanish Fork	66,028	Projections beyond 2050 not made
Springville	59,658	Same as year 2050
Woodland Hills	4,793	Same as year 2050
Northern Utah County [1]		
Alpine	18,900	Same as year 2050
American Fork	56,433	82,509
Cedar Fort	1,127	Same as year 2050
Cedar Hills	12,300	Same as year 2050
Eagle Mountain	53,644	190,000
Highland	28,163	Same as year 2050
Lehi	89,098	146,941
Pleasant Grove	40,700	Same as year 2050
Saratoga Springs	53,762	121,803

[1]Information on build-out populations are from both MAG and the "North Utah County Water Needs Study", dated October 9, 2001

Growth in Unincorporated Areas of Utah County

The projections by MAG included four newly listed unincorporated areas with significant growth potential. Three of the areas are in southern Utah County and one in northern Utah County. Growth in these unincorporated areas will accelerate overall county growth. Their year 2050 populations are listed in Table 1-3. The location of these unincorporated areas is shown on Figure 1-1 and on maps in Attachment A.

TABLE 1-3 Year 2050 Population Projections for Unincorporated Areas of Utah County	
Unincorporated Area	**2050 Population**
Southern Utah County	
Goshen Valley	48,114
West Shore Area	13,061
West Mountain Area	14,525
Northern Utah County	
Cedar Valley	33,666

REFINEMENTS IN METHODOLOGY

Following the completion of the Draft Plan Formulation Report of February 2002, planning efforts continued to refine the methods and underlying assumptions for computing M&I water demand. The more significant refinements are:

- Refinements in local responsibility to achieve water conservation goals;
- More in-depth analysis of the availability of local water supplies, particularly from agricultural conversion of Strawberry Valley Project (SVP) water in southern Utah County;
- Utilization of Utah Lake water rights through reverse osmosis treatment in Salt Lake County; and
- Analysis of the potential use of return flows through water recycling.

Table 1-4 summarizes the methodology and assumptions previously presented in the Draft Plan Formulation Report, together with the refinements used in this M&I Water Needs Appendix. The following paragraphs discuss these various refinements.

TABLE 1-4 Refinements in Methodology and/or Assumptions	
Assumptions Used in the Draft Plan Formulation Report	**Refinements To Assumptions**
1. Communities will be able to meet water conservation goals to reduce consumption 12 ½ percent by 2020 and 25 percent by 2050.	1. This assumption was refined to apply the conservation goals to the entities that contracted for ULS water. For southern Utah County this would be the Southern Utah Valley Municipal Water Association. In northern Utah County it would be the individual cities and in Salt Lake County it would be the Jordan Valley Water Conservancy District and the Metropolitan Water District of Salt Lake and Sandy.
2. An acre of irrigated land would be converted for every six new residents on the newly developed lands.	2. The following modifications were made: In Utah County, the State of Utah uses 9 people per acre for rate of urbanization of agricultural lands. An estimate was made of the percent of growth that would occur on agricultural lands and the percent of growth on non-agricultural lands. For example, if 50% of the growth is on non-agricultural lands then the net result is 1 acre of agriculture for each increase of 4.5 people.

TABLE 1-4
Refinements in Methodology and/or Assumptions

Assumptions Used in the Draft Plan Formulation Report	Refinements To Assumptions
3. Agricultural conversion could meet a significant portion of M&I demand, particularly in southern Utah County. The dry-year supply for the converted irrigated land (e.g., 1961) would be available for conversion to M&I.	3. The following modifications were made: a) Recognition of 10,200 acre-feet of SVP irrigation water used within city boundaries with the remainder of the SVP water which amounts to 50,800 acre-feet (minus stream conveyance and canal seepage losses) to be used to meet needs of the other remaining agricultural lands. b) As lands are urbanized SVP water presently used on irrigated lands would be transferred to other SVP lands for use as a water supply to supplement late season irrigation needs on the remaining SVP agricultural lands. c) As irrigated lands are urbanized, up to 50 percent of Spanish Fork River water located within the declaration boundaries of the cities could become available for M&I use within the SUVMWA area. Competing demand for water rights would limit the supply available to SUVMWA. d) Up to 50 percent of Summit Creek water could be converted to M&I in Santaquin on irrigated lands urbanized. e) No further Salem Pond shares (22 shares) are obtained by Salem. The location of the remaining shares makes acquisition by the city unlikely. f) The entire yield of Peteetneet Creek, Spring Lake, Maple Creek and Hobble Creek becomes available to the cities as lands on which the shares are located are urbanized. g) Spanish Fork Southeast Irrigation Company lands have been designated as open space by Spanish Fork City and will continue to be irrigated in the city's plan for growth.
4. Communities would be able to fully develop their current groundwater rights.	4. No change

TABLE 1-4 Refinements in Methodology and/or Assumptions	
Assumptions Used in the Draft Plan Formulation Report	**Refinements To Assumptions**
5. Conjunctive use opportunities would eventually be realized in some communities to firm up or increase the yield of groundwater supplies.	5. No change
6. Distributing, transferring or exchanging the available M&I water supplies from one community to another could decrease the projected M&I shortages. This may particularly work for the South Utah Valley Municipal Water Association (SUVMWA), which is a legal entity comprised of the 10 communities in southern Utah County to promote development and financing of municipal water resources.	6. Based upon further review it was determined that this distribution would not be practical because of the lack of infrastructure to convey water from one community to another and the need to retain water by each community to meet its build-out population.
7. Utah Lake water compared to other water sources is not a feasible water supply because of the cost of demineralizing the water for culinary, outdoor or ornamental plant use.	7. The following modifications were made: In recognition of comments received from the public, scoping meetings of February 27th and 28th, 2002, the feasibility of using Utah Lake water through reverse osmosis treatment should be evaluated.

Refinements in Local Responsibility to Achieve Water Conservation in Southern Utah County

The initial ULS water demand sheets, based on meeting the State water conservation goals, were provided to the communities for review. Several communities in southern Utah County expressed concern over what they perceived as unrealistic water conservation projections. Representatives stated that the majority of existing homes located in some of the southern Utah County communities are situated on lots that are substantially larger than those found in more urban areas. Some communities such as Spanish Fork City have established large areas as green belts. The cities' representatives contend the higher per capita water usage rates in southern Utah County are more likely due to this factor than to over-consumption. SUVMWA, while acknowledging the validity of this argument, determined that an *average* 25% conservation goal could indeed be reached across its service area. This was reflected in the computations of water

demands for southern Utah County presented in Chapter 5 and in the detailed water demand sheets in Attachment D to this M&I Water Needs Appendix.

Local Water Supplies

Communities in the ULS service area generally have water rights to obtain their M&I supply from wells, springs, streams, and as holders of irrigation company stock. However, the dry-year yield from various water rights may be significantly less than the amount of the water right. Consequently water supply data from 1961 (a dry year), which is about 50% of the annual average streamflow, was used in order to approximate the reliable volume of water supplies.

As indicated above in Table 1-4, assumptions were adopted which more realistically represent the volume of water that would be available from the SVP, Spanish Fork River, and local irrigation companies. The following assumptions were made regarding the conversion of SVP water.

1. Recognition of 10,200 acre-feet of SVP water as existing irrigation water within city boundaries.

2. The portion of the SVP water that would become available through conversion of agricultural lands would become part of the irrigation water supply for the remaining SVP lands.

3. The irrigation water available from urbanization of lands with rights to Spanish Fork River water and other surface streams would become part of the water supply for the city in which the lands were urbanized. This water would supply needs of some of the communities in meeting the M&I demands for their build-out populations.

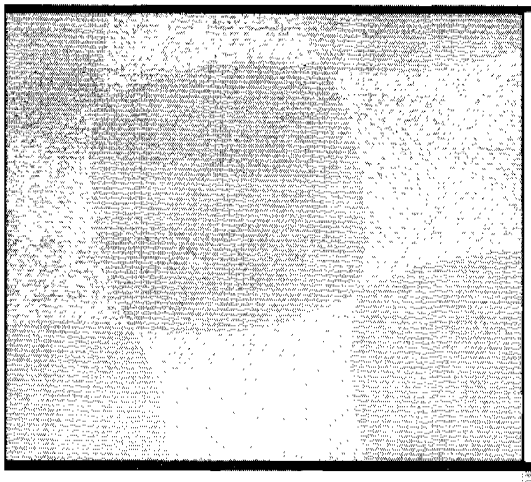
Utah Lake Water Rights

The water rights and operation of Utah Lake are key elements of the Bonneville Unit water supply. The lake's water was originally used solely for irrigation in Utah and Salt Lake counties. As agriculture in Salt Lake County declined, a significant portion of the irrigation rights have been purchased by other entities for industrial purposes and as a future potential municipal water supply after treatment such as reverse osmosis. Water rights, such as those held by the District and the Jordan Valley Water Conservancy District, will be used in a manner to meet the M&I needs of their service areas. A discussion has been included in Chapter 2 of this M&I Water Needs Appendix to illustrate the means whereby the waters of Utah Lake may be used for M&I purposes.

Return Flows and Water Recycling

Public Law 107-366, signed into law by President Bush on December 19,2002 amends the Central Utah Project Completion Act (CUPCA) to include funds for implementing conservation measures in a manner consistent with the intent of the amended CUPCA. The conservation measures include the use of reverse osmosis membrane technology, which is a key to direct use of water from Utah Lake and the Jordan River, and water recycling of return flows from wastewater treatment plants. Consequently, this M&I Water Needs Appendix contains an assessment of the potential for recycling water from wastewater treatment plants and reverse osmosis treatment of water from Utah Lake and the Jordan River for M&I use.

Central Utah Project Completion Program



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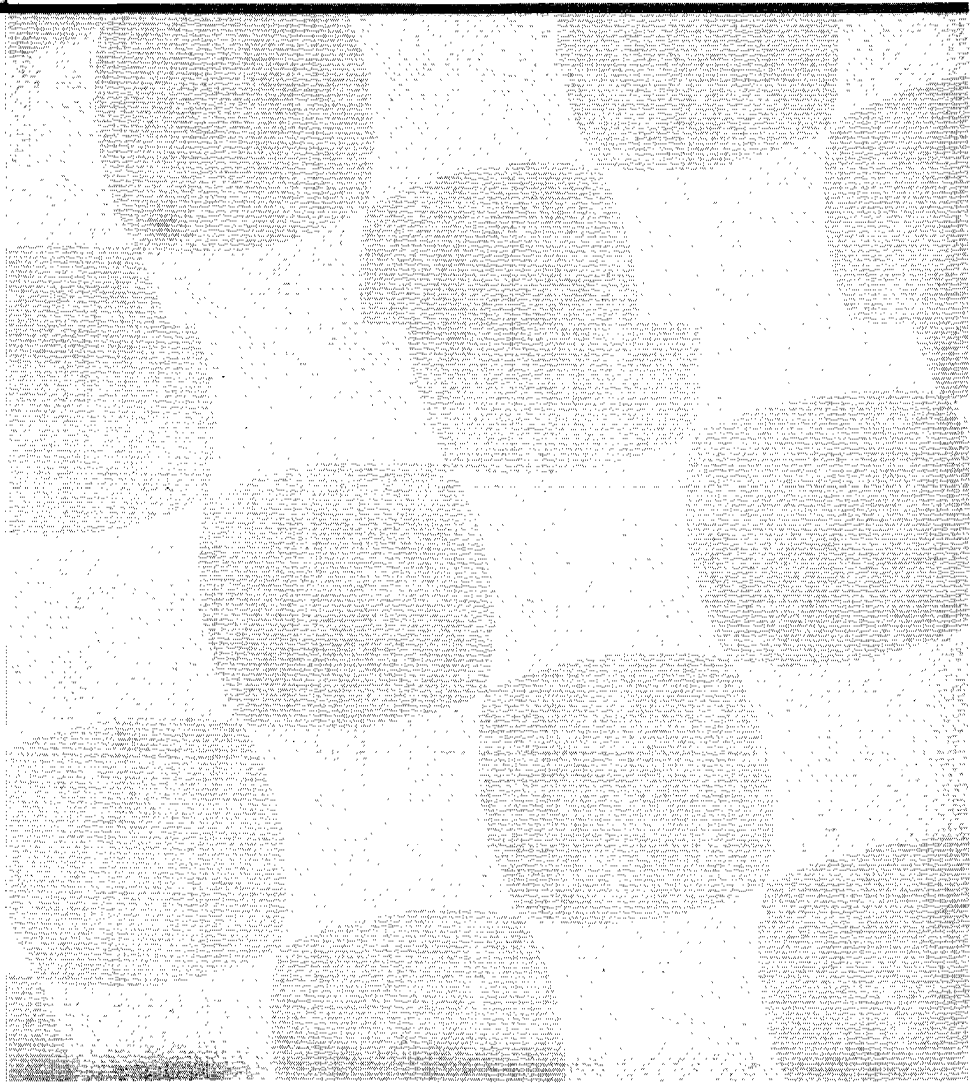

UTAH RECLAMATION
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Utah Lake is an operational segment of the Bonneville Unit. This Chapter describes the way Utah Lake water rights would contribute to the water supply of the Bonneville Unit under the proposed Utah Lake Drainage Basin Water Delivery System (ULS).

HISTORICAL PERSPECTIVE ON UTAH LAKE WATER DEVELOPMENT

Utah Lake is a shallow, semi-saline remnant of ancient Lake Bonneville. The lake's inflow comes from the Spanish Fork, American Fork, and Provo rivers, various smaller streams, and surface and subsurface irrigation return flows. The lake's outlet discharges water to the Jordan River, which flows through Salt Lake County on its way to the Great Salt Lake. Because of its geographic situation, the lake can receive trans-basin imported water from Strawberry Reservoir through the Spanish Fork River, and from Jordanelle and Deer Creek reservoirs through the Provo River. The natural lake has been transformed into a storage reservoir through structural modification of its outlet beginning in 1872. A low dam was constructed at the Jordan River outlet to increase storage volume. A radial gate structure was constructed to control releases to the Jordan River. A high capacity pumping plant was added to discharge water when the lake level is too low for gravity release through the radial gate structure.

Water has historically been stored in Utah Lake to provide a regulated water supply in the Jordan River for diverters in Salt Lake County, and to provide water for certain irrigators in Utah County who pump directly from the lake. Since the Bonneville Unit M&I System became operational, the lake has become a key element in the operation of the Bonneville Unit. For example, under the Bonneville Unit the lake serves as a link for exchanges of storage with Jordanelle Reservoir, including conveyance of water released from Strawberry Reservoir. The lake captures return flows from M&I System water used in northern Utah County. In the future, the lake will also capture return flows from the Bonneville Unit which will deliver water through ULS project features to communities in southern Utah County. Under the completed Bonneville Unit, the lake will serve as a common operational interface between the Strawberry Collection, Diamond Fork, M&I, and ULS systems.

The water rights in Utah Lake are not defined by the storage capacity of Utah Lake. Instead, the water rights are defined in terms of quantities of water to satisfy beneficial uses and exchanges, and in terms of controlling water surface elevations that affect releases and exchanges on a monthly basis, as discussed in this chapter.

The maximum Utah Lake operational water surface elevation has been set at 4489.045 feet as a compromise between the need for storage and the need to avoid inundation of shoreline properties. The total storage capacity of the lake at the compromise elevation is approximately 870,000 acre-feet, of which 710,000 acre-feet is the active storage capacity. Approximately 160,000 acre-feet is inactive storage. The minimum operational water surface elevation of the lake (top of inactive pool) is 8.7 feet below the compromise elevation, or approximately elevation 4480.3 feet. This elevation has been set by the Utah State Engineer's Distribution Plan, which is described below Section 2.1.2 of this chapter. This minimum elevation corresponds approximately to the minimum water surface elevation at which the outlet pumps can operate.

The average annual inflow (1951-1999) to Utah Lake from all sources is about 726,000 acre-feet, including precipitation gains of more than 100,000 feet. Of this, approximately half is discharged to the Jordan River and the remainder is lost to evaporation from the lake surface. The average outflow is strongly affected by spills during very wet years. The average amount of the outflow that goes to meet demands is estimated to be about 266,000 acre-feet.

Review of Utah Lake Water Rights

The water rights in Utah Lake were set forth in the Morse (1901) and Booth (1909) decrees. The Morse decree identified two groups of water rights: 1) Direct flow rights on the Jordan River; and 2) Water rights in Utah Lake. The Booth decree allowed for additional appropriations of water from Utah Lake and set a maximum limit of 185,000 acre-feet on the diversions under the storage rights set forth in the Morse decree. In the State Engineer's interim distribution plan, the rights defined in the Morse decree are referred to as primary storage rights, and all subsequent rights established under applications to appropriate water are referred to as secondary storage rights.

The water supply for the primary rights is 192,906.15 acre-feet while the water supply for the secondary rights is 112,738.90 acre-feet, for a combined amount of 305,645.05 acre-feet. This amount includes carrier water of 3,600 acre-feet which must remain in the Jordan River. The total volume of divertable right, is 302,045.05 acre-feet.

The ULS project team recently investigated Utah Lake water rights to determine the following three items:

1. Verification of the volume of water covered by the Utah Lake rights

2. Estimation of the volume of potential deliveries that could be called for from the lake by current diverters and whether those deliveries are being called upstream or downstream of the lake; and

3. Determination of ownership of large blocks of water still available for call from the lake.

Two critical assumptions were made prior to the research. The first assumption was that the entire appropriation of Utah Lake water was originally owned by eight right-holders under eleven original rights. The second assumption deduced that all-subsequent assignments of rights stemmed from the subdivision of the eleven original rights. These assumptions were confirmed with staff of the State Engineer's office.

Table 2-1 summarizes the volume and current ownership of the eleven original Utah Lake water rights, as well as the volume of the annual yield presently remaining in the right. Detailed information relating the original rights and the corresponding subdivisions can be found in Attachment B.

TABLE 2-1
Summary of Utah Lake Water Rights

Water Right Number	Owner of Record	Amount of Original Right ac-ft	Amount Exchanged Upstream of Utah Lake ac-ft	Amount Exchanged Downstream of Utah Lake ac-ft	Amount of Remaining Right ac-ft
59-3500	South Jordan Canal Co.	29,634.85	6,265.97	6,589.95	16,778.93
59-3499	Utah and Salt Lake Canal Co	45,673.30	2,813.67	14,743.08	28,116.55
59-3496	North Jordan Irrigation Co	15,848.00	10,498.60	0	5,349.40
59-3517	Kennecott Utah Copper Corp	13,750.00	0	5,000.00	8,750.00
57-7637	East Jordan Irrigation Co.	48,400.00	11,194.51	9,096.78	28,108.71
57-7624	Salt Lake City	39,600.00	0	25,000.00	14,600.00
57-23	Sandy & Draper Irrigation Co	12,500	6,004.40	2,000.00	4,495.60
59-13	Utah Lake Distributing Co	43,165.9	3,267.24	39,898.66	0
	Subtotal	**248,572.05**	**40,044.39**	**102,328.47**	**106,199.19**
59-14,15,20	Central Utah Water Cons. District	57,073.00[1]	0	0	(1)

[1] This water right, purchased by the District from Kennecott Utah Copper Corporation, may be acquired by the U.S. Department of Interior to become part of the Bonneville Unit water supply.

Once the amount of water in the rights had been established, the next task was to establish whether the water covered by the rights was being diverted upstream or downstream from the Utah Lake. This determination is instrumental in refining the demand figures to be used in the hydrological modeling for the ULS project. The point of diversion determination was made using the State Engineer's water rights area map and the corresponding area prefix on the change application for each segregation. All area prefixes except 57 and 59 were assumed to be diversions upstream of the lake; prefixes 57 and 59 were assumed to be diversions downstream of the lake. Table 2-2 summarizes the results of this task.

TABLE 2-2 Point of Diversion Summary of Utah Lake Water Rights			
	Primary Storage Rights (acre-feet)	**Secondary Storage Rights (acre-feet)**	**Total Storage Rights (acre-feet)**
Diverted Upstream of Lake	30,772.76	9,271.64	40,044.40
Diverted Downstream of Lake	162,133.39	103,467.26	265,600.65
Total in Lake	**192,906.15**	**112,738.90**	**305,645.05**

State Engineer's Distribution Plan

The State Engineer has received various requests in recent years to make decisions on matters that significantly affect water distribution in the Utah Lake drainage basin. In 1992 the State Engineer issued the Interim Water Distribution Plan for the Utah Lake Drainage Basin that addressed Utah Lake water rights, the relationships between storage rights in the lake and upstream reservoirs, and other related water distribution issues. The interim distribution plan was issued under authority of the Utah Code Annotated 1953. The plan was intended to establish a general framework within which the respective rights can be administered. The distribution guidelines follow the priority doctrine of "first in time, first in right"; and where rights are equal in priority, each of those rights receives a proportionate share of the total water available for diversion under that priority.

The interim distribution plan specifies the volume of Utah Lake storage associated with the primary and secondary water rights. The first 125,000 acre-feet of storage is dedicated to providing sufficient water to meet the primary rights during dry years. The remaining 585,000 acre-feet of storage is referred to as system storage, and is used to meet the diversion requirements associated with both the primary and secondary rights. System storage may be held in Utah Lake or upstream (in Jordanelle or Deer Creek reservoirs). System storage held upstream is subject to call by Utah Lake water users when the Utah Lake level falls below the uppermost 125,000 acre-feet of active storage. On the other hand, when Utah Lake is above a predefined target level or conversion line, upstream system storage may be converted to priority storage according to the priority of the upstream rights. Once converted, priority storage is under the full control of the owner and is not subject to call by Utah Lake rights holders. Additional details regarding the interim distribution plan are found in Volume V of the Draft Water Supply Appendix to the March 1998 Supplement to the 1988 Bonneville Unit Definite Plan Report.

In issuing the interim distribution plan, the State Engineer observed that in order for the river commissioners to properly administer the numerous diversions, the amounts of the water rights and the relationships among them need to be fully understood by everyone involved. In simple terms, the water rights on the Provo River, Spanish Fork River, Utah Lake, Jordan River, and other sources in the basin need to be managed as one system. The objective visualized was not to remove local control or involvement in the management of the waters, but to provide for the

equitable distribution of water, according to the respective water rights, and to address problems from a more regional point of view.

UTILIZATION OF UTAH LAKE RIGHTS UNDER ULS PROJECT

Certain Utah Lake water rights will augment the supply of water available for the Bonneville Unit, either for release or to facilitate exchanges. Both the CUWCD and the Federal government hold water rights that may be useable for these purposes. In addition, the Jordan Valley Water Conservancy District has Utah Lake/Jordan River water rights.

Rights of Central Utah Water Conservancy District

The Central Utah Water Conservancy District has acquired two water rights that provide for diversion of water from Utah Lake and the Jordan River. These rights are described as follows:

- Water Right No. 57-7624 provides for diversion of 39,600 acre-feet of water, including 3,600 acre-feet of carrier water, which must remain in the Jordan River. This water right was acquired by the Central Utah Water Conservancy District on August 16, 1988. This is a primary storage right. Of the 39,600 acre-feet, Salt Lake City owns 14,600 acre-feet including the carrier water. The U.S. Department of Interior owns 7,900 acre-feet, the community of Elk Ridge in southern Utah County was assigned 237 acre-feet by the Central Utah Water Conservancy District, and the Central Utah Water Conservancy District owns the remaining 16,863 acre-feet. This is a decreed right granted by the Booth Decree of June 5, 1909.

- Water Right Nos. 59-14, -15, and -20 provide for diversion of 57,073 acre-feet and have a priority date of August 6, 1909, and February 28, 1911. The water right certificates were issued on March 27, 1969. This is a secondary water right. The diversion right was acquired from Kennecott Copper Corporation on December 31, 1987.

The District owns primary and secondary water rights in Utah Lake. Under the ULS System Proposed Action, the DOI would acquire all of the remaining District's secondary rights. These rights would amount to approximately 57,000 acre-feet and would yield at least 34,540 acre-feet. The acquired water rights would be used to convert or exchange water to Jordanelle Reservoir under approved water rights used in conjunction with the State Engineer's Utah Lake Distribution Plan.

Rights of Jordan Valley Water Conservancy District

The Jordan Valley Water Conservancy District has a goal for purchasing between 50,000 and 70,000 acre-feet of water rights from Utah Lake and the Jordan River. At the present time, JVWCD has purchased approximately 16,736 acre-feet of rights as tabulated on Table 2-3. Of the 16,736 acre feet, Jordan Valley anticipates 2,000-3,000 acre feet will be used to replace Utah County return flows associated with their Jacob-Welby exchange. In addition, losses and inefficiency associated with membrane treatment of Utah Lake water will reduce the useable

water under these rights. The JVWCD anticipates their total usable water supply, resulting from their tabulated Utah Lake rights, may be 9,000 acre-feet annually.

TABLE 2-3
Jordan Valley Water Conservancy District
Utah Lake and Jordan River Water Rights
(As of October 16, 2002)

Utah Lake Rights (Acquired as Irrigation Stock Rights from Local Water Companies)	Number of Shares Acquired	Unit Yield (AF/Share)	Total Yield (Acre-Feet)
Draper Irrigation Company	327.00	1.00	327.00
East Jordan Irrigation Company	1.00	4.84	4.84
North Jordan Irrigation Company	154.00	1.72	264.88
South Jordan Canal Company	217.50	4.94	1,074.45
Utah and Salt Lake Canal Company	652.00	4.59	2.992.68
Utah Lake Distributing Company	85.00	5.11	434.35
Welby Jacob Water Users Company	6,606.00	1.00	6,606.00
Subtotal, Utah Lake Rights	**8,042.50**		**11,704.20**
Jordan River Rights			**5,031.50**
Total	**8,042.50**		**16,735.70**

The U.S. Department of the Interior has acquired 7,900 acre-feet of the primary rights of the Central Utah Water Conservancy in order to complete the Indian Ford Exchange of the Bonneville Unit. These water rights will be operated to benefit the water supply of the M&I System. By holding this water in Utah Lake and/or exchanging it up to Jordanelle Reservoir the water supply of the M&I System is completed. In addition, the District proposes to use its secondary rights, as necessary, to make up for deliveries of ULS water above the 15,800 acre-feet that is currently available as additional Strawberry deliveries. As noted above, the historical use of the District's secondary water rights would yield at least 34,540 acre-feet on an annual average basis.

FUTURE AVAILABILITY OF UTAH LAKE WATER FOR M&I USE

Population projections indicate that urbanization will continue in Salt Lake County. In order to accommodate this population growth, land use will continue to shift from irrigated agriculture to residential and commercial use. Necessarily, water use will shift from agricultural to municipal and industrial as this growth continues. As the remaining agricultural lands in Salt Lake County are urbanized it is estimated that a water supply of approximately 75,000 acre-feet (on an average annual basis) would be made available for other use. This would essentially use all remaining Utah Lake irrigation rights in Salt Lake County.

Historically, the major use of Utah Lake water has been for irrigation of alfalfa, corn, barley, wheat and oats in the Salt Lake Valley. Other uses include industrial purposes such as mining and ore processing. In recent years, as Salt Lake County has continued to urbanize, communities in the county have developed pressurized irrigation systems for watering lawns and gardens. These communities have received complaints from residents that the Utah Lake water has damaged and killed many of the ornamental plants and shrubs used in landscaping. Although other communities are considering the installation of pressurized irrigation systems, they are studying the water quality aspect of using Utah Lake water on residential landscaping prior to plan implementation.

The conversion of agricultural lands in Salt Lake County is discussed in Chapter 7 in connection with the assessment of M&I demand in Salt Lake County and water rights aspects as noted above in this chapter. If such water were diverted directly from the lake or the Jordan River for culinary use, it would require treatment including membrane desalting. To the extent that such water can be obtained by exchange through groundwater pumping by exchange, treatment needs could be reduced.

To a much smaller extent in Utah County, a limited M&I use of the Utah Lake water resulting from agricultural conversion involves the change of diversion point from Utah Lake to groundwater pumping at other locations tributary to the lake. Some Utah County entities have done this by purchasing irrigation stock of 400 acre-feet from the East and South Jordan Canal Company that is located in Salt Lake County and which diverts water from the Jordan River downstream of the outlet of Utah Lake. However, further opportunities are becoming more difficult to arrange as the groundwater pumping throughout the Utah County area increases in response to the growing M&I needs of the municipalities.

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UTAH RECLAMATION
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Return flows from the use of M&I water could, with appropriate treatment, provide additional water to help meet growing needs along the Wasatch Front. As noted in Chapter 1, Public Law 107-366 amended CUPCA to include authorization to implement measures for water conservation and reuse, including the application of reverse osmosis membrane technology and water recycling. The chapter identifies the potential volumes of wastewater that may be available for water recycling.

THE ROLE OF RETURN FLOW IN THE ULS

Occurrence and Use of Return Flow

Return flow from M&I water provided by the Bonneville Unit M&I System (Jordanelle Reservoir) occurs as municipal wastewater in Salt Lake, Utah, and Wasatch counties. Return flow from the use of M&I water from the Bonneville Unit's Utah Lake Drainage Basin Water Delivery System (ULS System) would occur as municipal wastewater in southern Utah County and Salt Lake County. The treatment and reuse of municipal wastewater could provide an additional water resource in the ULS project planning area.

Return flow from the M&I use of Bonneville Unit water is considered by the Department of the Interior (DOI) to be Bonneville Unit water, and thus available for reuse as a federal water supply. In the case of Salt Lake County, an official estimate of the amount of Bonneville Unit return flow that can be credited to the DOI is pending a ruling by the State Engineer.

Wastewater reuse can be divided into two categories:

1. "Direct reuse" refers to the intentional re-utilization of wastewater flows by, or in connection with, the agency providing or treating the wastewater flow. Such reuse occurs prior to the wastewater being released to surface waters or to groundwater aquifers where they are commingled with downstream water supplies.

2. "Downstream reuse" refers to the utilization of discharged wastewater after it has been discharged to and commingled with downstream water supplies. Downstream reuse is usually indirect and "unintentional," i.e., not specifically under the direction of the agency providing the treatment services.

Downstream reuse of wastewater already occurs in the Bonneville Unit area. Various municipal wastewater discharge points are located upstream of other water diversion points, and after discharge the treated wastewater commingles with streamflow and becomes available for downstream reuse. Utah Lake is a notable example of such reuse, in that treated Utah County wastewater entering the lake becomes part of the water supply of water right holders in Utah Lake. A portion is released to the Jordan River for crop irrigation in Salt Lake County.

The more significant potential for direct reuse of treated municipal wastewater effluent along the Wasatch Front includes the following opportunities.

1. Use in pressurized irrigation systems in the western portion of Salt Lake County

2. Use for wetlands habitat enhancement in the wildlife area around the south shore of the Great Salt Lake

3. Use for wetlands habitat enhancement in Benjamin Slough area of Utah Lake

4. Use for certain municipal purposes in Salt Lake County following membrane treatment and purification.

Approach to Determining Bonneville Unit Return Flows

The potential water supply to be provided by the ULS project includes return flows resulting from current and future use of Bonneville Unit M&I water. In order to integrate the reuse of return flows into the ULS water supply the following questions must be answered:

- How much Bonneville Unit water is delivered for M&I use in various locations?
- Where do municipal wastewater discharges occur in the Bonneville Unit and where and how are they measured?
- How much of the municipal wastewater discharge is Bonneville Unit return flow?
- What is the capability of local wastewater treatment plants to treat Bonneville Unit wastewater?
- For what purposes may the treated Bonneville Unit wastewater be used?

BONNEVILLE UNIT RETURN FLOWS IN SALT LAKE COUNTY

This section addresses the estimation of the quantities of municipal wastewater that can be expected to occur from the use of Bonneville Unit M&I water in Salt Lake County.

Bonneville Unit M&I Water Use in Salt Lake County

The use of 70,000 acre-feet of M&I water in Salt Lake County from the completed Bonneville Unit M&I System (Jordanelle Reservoir) would produce return flows to the Jordan River. A ruling by the State Engineer is pending regarding the amount of such return flows that could be credited to the Bonneville Unit of Central Utah Project. The ruling will determine the conditions under which water agencies in Salt Lake County may intercept and reclaim these return flows under agreements with the Secretary of the Interior. In absence of this ruling, a conservative estimate of 15% of the diversion of 70,000 acre-feet was made which equates to 10,500 acre-feet of return flow that may possibly be credited to the Bonneville Unit.

The use of 30,000 acre-feet of water in Salt Lake County from the proposed ULS System would produce additional return flows to the Jordan River. These return flows are not under the same State Engineer rules as those of the Bonneville Unit's Municipal and Industrial System because the water supply comes from outside the Jordan River/Utah Lake Drainage Basin. Return flow factors are administratively determined by the Utah Division of Water Rights based on best

scientific and professional judgment. The State Engineer's Office has indicated to the District that a 35 percent return flow factor from imported water would be appropriate for ULS operations. For the ULS System a return flow factor of 35% of the 30,000 acre-feet was used as an estimate of the return flow. This would amount to 10,500 acre-feet. Combined with the use of Jordanelle Reservoir water as noted above, the total amount of Bonneville Unit M&I water delivered to Salt Lake County would be 100,000 acre-feet per year with projected return flow of approximately 21,000 acre-feet that could be credited to the Bonneville Unit.

Approximately 18,000 acre-feet of the 21,000 acre-feet would return to the South Valley and Central Valley wastewater treatment facilities. Recycling of this water would help meet the municipal and industrial needs in the Jordan Valley Water Conservancy District service area. Recycling would involve the DOI, District, District's petitioners, and the owners of the wastewater treatment plants. The remaining 3,000 acre-feet of the 21,000 acre-feet would return to the Salt Lake City Wastewater Treatment Plant, which is located on the south shore of the Great Salt Lake at a point too far below the M&I service area to be economically recycled. The 18,000 acre-feet to be recycled would not be part of the ULS supply per-se but would be included in the overall Bonneville Unit water supply.

BONNEVILLE UNIT RETURN FLOWS IN UTAH COUNTY

In northern Utah County, the delivery and use of 20,000 acre-feet of Bonneville Unit M&I water for municipal and secondary system use would produce a return flow of 7,000 acre-feet to Utah Lake, based on a return factor of 35%. In previous Bonneville Unit documents, it was stated that this return flow to Utah Lake would be credited and exchanged to Jordanelle Reservoir. However, the State Engineer issued a decision in November 2002 that return flows from in-basin water would accrue to the Utah Lake as part of the water rights of those individuals and entities that have Utah Lake water rights. Consequently, return flows from the 20,000 acre-foot delivery in northern Utah County are not available to the project.

In southern Utah County the use of 30,000 acre-feet of Bonneville Unit water from Strawberry Reservoir for M&I purposes will return a portion of the indoor culinary, commercial and industrial uses to wastewater treatment plants located near the edge of Utah Lake. Of the 30,000 acre-feet, an estimated 3,000 acre-feet would be conserved under Section 207 projects, and assigned to DOI. Of the 1,590 acre-feet already under contract to SUVMWA, 590 acre-feet would be used by SUVMWA member cities as secondary M&I water. The remaining 1,000 acre-feet has been assigned to DOI. This leaves 27,590 acre-feet of M&I water to southern Utah County (30,000 + 1,590 – 3,000 – 1,000 = 27,590 acre-feet).

Based on a return flow percentage of 35%, the water delivered for these M&I purposes in southern Utah County would produce an estimated 9,660 acre-feet per year of additional return flow, which will become part of the Utah Lake water supply for exchange with Jordanelle Reservoir.

BONNEVILLE UNIT RETURN FLOWS IN WASATCH COUNTY

In the Heber Valley of Wasatch County, the Bonneville Unit will provide 12,100 acre-feet of irrigation water and 2,400 acre-feet of M&I water. Return flow from these uses, estimated to be 5,900 acre-feet annually, will be captured in Deer Creek Reservoir, from which they will be released as part of the Bonneville Unit M&I water supply.

POTENTIAL FOR UTILIZATION OF RETURN FLOWS

Figure 3-1 shows the location of existing wastewater treatment facilities in Salt Lake and Utah counties.

Salt Lake County

Salt Lake County Wastewater Treatment Plants. Table 3-1 contains a listing of municipal wastewater treatment plants, along with the design capacity of the respective plants.

TABLE 3-1
Wastewater Treatment Plants in Salt Lake County
(Source: Water Management Improvement Studies, "Report on the Study of Coordinated Operations," October 1995, CUPCA, Central Utah Water Conservancy District)

Location	Design Capacity (MGD)	Average Flow (MGD)	Provides Discharge	Current Reuse
Central Valley	62.50	58.92	Yes	Downstream
Magna	3.30	2.08	Yes	None
Salt Lake City	45.00	35.43	Yes	Downstream
South Valley	38.0	20.75	Yes	Downstream
Total (MGD)	**148.8**	**117**		
Total (acre-feet)	**168,000**	**132,000**		

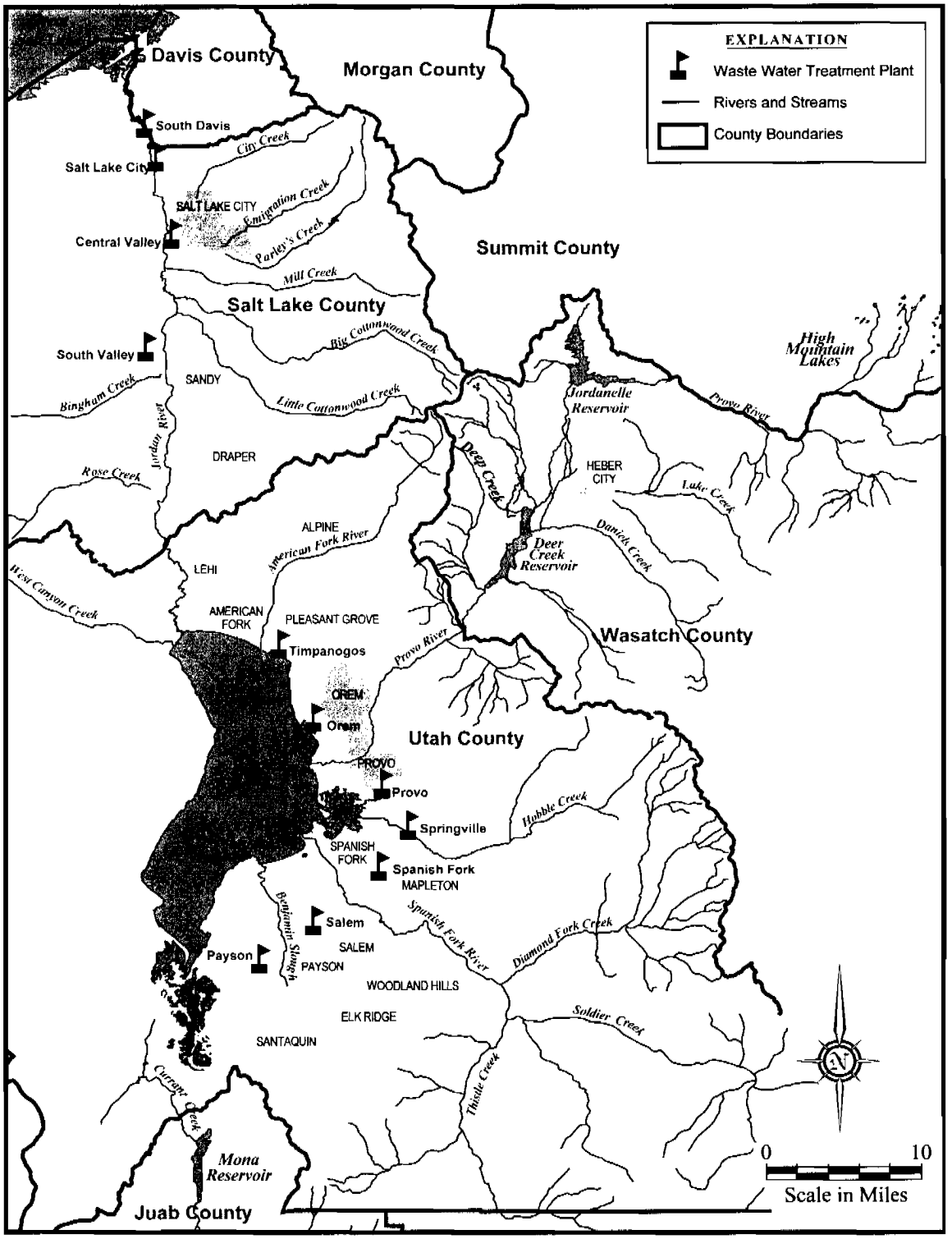


Figure 3-1
Wastewater Treatment Plants in Salt Lake and Utah Counties

Combined CUP and Non-CUP Return Flows. In order to place the CUP return flow amounts in perspective with other water supply aspects of Salt Lake County, a compilation was made of the combined amounts of return flows from the Bonneville Unit and from their other sources of water. Table 3-2 presents the estimates of the combined flows from the various wastewater treatment plants for selected future years.

TABLE 3-2
Projections of Salt Lake County Return Flows from CUP and Non-CUP M&I Water Use

	Bonneville Unit Return Flows (Distribution of 21,000 acre-feet Return Flow)						Non-Bonneville Unit Return Flows		
	Existing CUP (70,000 AF Delivery) (15% return flow)			ULS (30,000 AF Delivery) (35% return flow)					
	Wastewater Treatment Plants			Wastewater Treatment Plants			Wastewater Treatment Plants		
	Central Valley	South Valley	Salt Lake	Central Valley	South Valley	Salt Lake	Central Valley	South Valley	Salt Lake
2010	5,000	4,000	1,500	4,250	4,750	1,500	55,106	26,674	31,087
2020	5,000	4,000	1,500	4,250	4,750	1,500	56,000	27,000	33,067
2030	5,000	4,000	1,500	4,250	4,750	1,500	57,318	28,068	35,046
2040	5,000	4,000	1,500	4,250	4,750	1,500	61,743	30,856	37,025
2050	5,000	4,000	1,500	4,250	4,750	1,500	70,000	36,000	39,000

Table 3-3 summarizes the combined flows from the various Salt Lake County wastewater treatment plants for 2050. A comparison of the total CUP and non-CUP return flows from M&I use is presented in Table 3-3.

TABLE 3-3
Summary Projection of Salt Lake County Return Flows in 2050 From CUP and Non-CUP M&I Water Use

Wastewater Plant	CUP	Non-CUP	Total
South Valley	9,250	36,000	45,250
Central Valley	8,750	70,000	78,750
Salt Lake	3,000	39,000	42,000
Magna	0	350	350
Total	**21,000**	**139,350**	**166,350**

Note: Not all of the return flows could be used because of requirements in the wildlife refuge along the south shore of the Great Salt Lake. Water supply requirements for the refuge have not been defined.

Potential Uses of Recycled Water in Salt Lake County. An overview of the potential use of recycled water for outdoor uses is described below. Chapters 7 and 8, respectively present a more in-depth discussion of the plans of Jordan Valley Water Conservancy District and the Metropolitan Water District of Salt Lake and Sandy to recycle water in Salt Lake County.

Secondary Systems. Heretofore, the use of recycled wastewater for M&I purposes in Utah has been limited to the watering of parks, golf courses, and cemeteries. However, projects are in the planning stage that would use recycled water for lawns. This use requires separate distribution systems commonly referred to in Utah as secondary systems. The State of Utah is in the process of revising the regulations governing reuse of wastewater to allow for its use in secondary systems but only under stringent management systems. The technology, although costly, is currently available to treat the wastewater to a level that is required for the secondary systems.

As a first step, Salt Lake County could use recycled water exclusively on current and future parks and golf courses. If all of the current and future open space area was irrigated with recycled water, approximately 59,000 acre-feet of the future demand (2050) in Salt Lake County could potentially be met by recycled water. This scenario is obviously an over simplification of the many obstacles there are to be overcome in using this water, but it does indicate the magnitude of the potential for recycled water.

Currently two projects are being investigated that would use approximately 18,000 acre-feet recycled wastewater from WWTPs in the western portion of Salt Lake Valley for secondary irrigation systems (see Figure 3-2).

Wetlands. Another potential use of the return flow is to provide a firm water supply for the bird refuge along the south shore of the Great Salt Lake. Refer to Figure 3-3 for the location of this bird refuge. Although outside the ULS planning area, the South Davis Wastewater Treatment Plant in Davis County could provide a portion of the firm water supply. The Utah Division of Wildlife Resources has 250 cfs of water rights in the Farmington Bay Wildlife Refuge (FBWLR). In conversations with officials of the DWR, it is clear the FBWLR could use much more water for wetlands than is available on an average annual basis. Currently all of the effluent from the primary WWTPs in Salt Lake County ends up in the FBWLR.

Utah County

Figure 3-1, presented previously in this Chapter, shows the location of existing wastewater treatment plants in Utah County.

The wastewater treatment facilities in Utah County are grouped together according to the following regions:

- North Utah County (Timpanogos Regional WWTP)
- Central Utah County (Orem WWTP and Provo WWTP)
- Southern Utah County (Payson, Salem, Spanish Fork, and Springville WWTPs)

North Utah County

Existing Wastewater Treatment Plants. Table 3-4 displays information on the existing water treatment plant in north Utah County.

TABLE 3-4
Wastewater Treatment Plant in North Utah County
(Source: Annual Report 2002, Timpanogos Special Service District)

Location of Plant	Design Capacity (MGD)	Average Flow (MGD)	Provides Discharge	Current Reuse
Timpanogos	18	9.1	Yes	Wetlands enhancement and downstream
Total (MGD)	**18**	**9.1**		
Total (acre-feet)	**20,367**	**10,297**		

Potential Uses of Return Flows. The Parsons report for northern Utah County, identified a possible use of the return flow following tertiary treatment for watering of large urban open spaces used as green belts in the Eagle Mountain and Saratoga Springs area. (North Utah County Water Needs Study, Parsons Engineering, October 2001) This may require an exchange of Utah Lake water rights with Eagle Mountain and Saratoga Springs in order to not impair Utah Lake water right holders. The potential as identified in that study is further presented in Chapter 6 on northern Utah County.

Central Utah County

Existing Wastewater Treatment Plants. Table 3-5 displays information on the existing waste water treatment plants in central Utah County

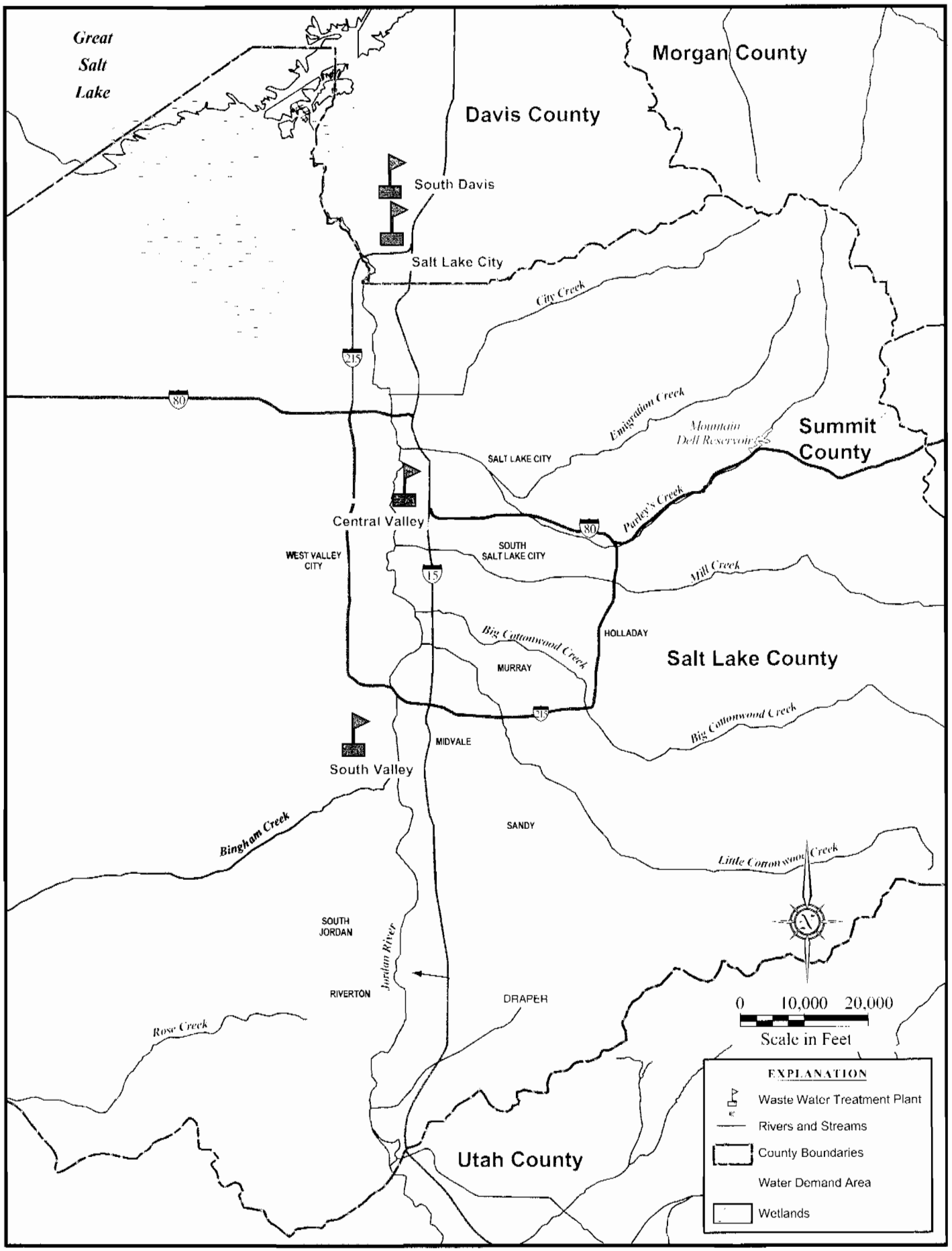


Figure 3-2
Potential Secondary System Water Demand Areas

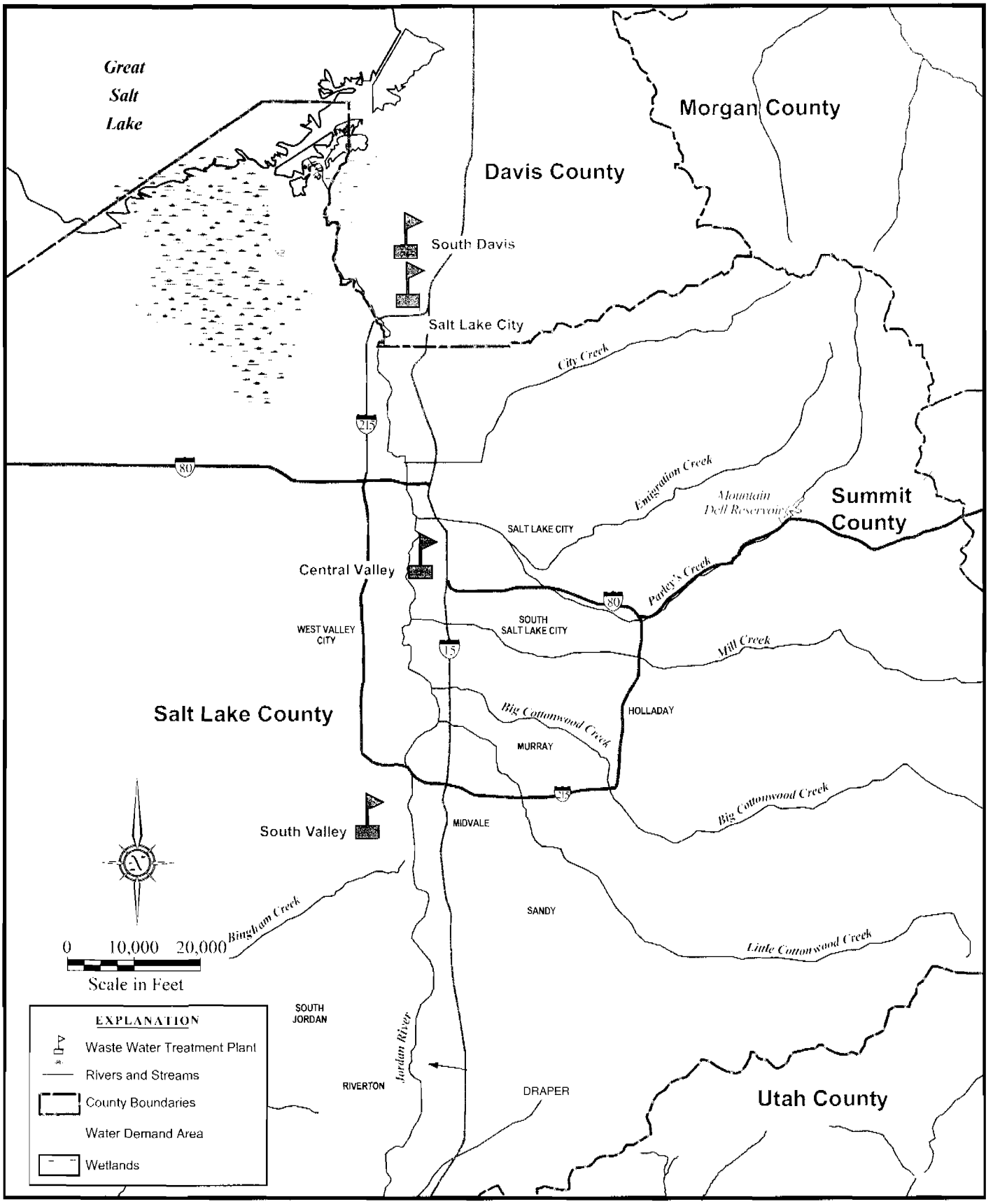


Figure 3-3

Potential Use of Return Flows for Wildlife Refuge

TABLE 3-5
Wastewater Treatment Plants in Central Utah County
(Source: Water Management Improvement Studies, "Report on the Study of Coordinated Operations", October 1995, CUPCA, Central Utah Water Conservancy District)

Location Of Plant	Design Capacity (MGD)	Average Flow (MGD)	Provides Discharge	Current Reuse
Orem	12.3	7.94	Yes	Downstream
Provo	21.0	15.66	Yes	Golf course irrigation and Utah Lake
Total (MGD)	**33.3**	**23.6**		
Total (acre-feet)	**37,679**	**26,703**		

Potential Uses of Return Flows. Due to the capability of existing water supplies to meet the long term needs of the residents of the Orem and Provo area there is limited reason for these two communities to pursue any ambitious plans for water recycling within the cities. In addition, re-use potential may be limited in order to not impair downstream Utah Lake water right holders.

Southern Utah County

Existing Wastewater Treatment Plants. Table 3-6 displays information on the existing water treatment plants in southern Utah County. In January 2001, the South Utah Valley Municipal Water Association completed a report on the possibilities of constructing regional wastewater reclamation treatment facilities in southern Utah County. This concept is discussed in Chapter 5 on southern Utah County.

TABLE 3-6
Wastewater Treatment Plants in Southern Utah County
(Source: Water Management Improvement Studies, "Report on the Study of Coordinated Operations", October 1995, CUPCA, Central Utah Water Conservancy District)

Location of Plant	Design Capacity (MGD)	Average Flow (MGD)	Provides Discharge	Current Reuse
Payson	1.25	0.81	Yes	Downstream
Salem	1.50	0.71	Yes	Downstream
Spanish Fork	5.0	2.64	Yes	Downstream
Springville	6.48	3.03	Yes	Downstream
Total (MGD)	**14.23**	**7.19**		
Total (acre-feet)	**16,101**	**8,135**		

Potential Uses of Return Flows. The southern Utah County cities are projecting the need for regional wastewater treatment plants around year 2020. Possible locations of such plants are shown in Figure 3-4. The effluent from such plants could be used for the following:

1. Flow into Utah Lake and become a part of the overall Utah Lake water supply,

2. Be used in secondary water systems for some of the areas in southern Utah County; and

3. Be used for wetlands enhancement in wildlife preserves around the southern boundaries of Utah Lake.

However, these uses would be only on a limited basis resulting from State of Utah water right laws that limit the water exchange to only the consumptive use so as to not adversely impact downstream water right holders.

Wasatch County

In Heber Valley, the Heber Valley Special Services District presently uses wastewater treatment plant flows for raising alfalfa hay for sale to local dairies. The Jordanelle Special Services District is investigating a recycling plant that would deliver treated effluent to other irrigated lands in Heber Valley.

Juab County

Juab County has a small urban population in relation to the larger communities in Utah and Salt Lake counties. The water needs assessment in Chapter 4 on Juab County determined that the communities would have adequate long term M&I water supplies through the conversion of agricultural to M&I in the Mona area and Nephi City has adequate groundwater rights to meet its M&I water supply for the ULS planning horizon of year 2050. Due to these factors, there are no present plans to pursue water recycling. Rocky Ridge, a community of only 404 residents, is not likely to consider water recycling because of the high cost of recycling and its limited financial base.

SUPPLEMENTAL INFORMATION TO CHAPTER 3

The following information was the first approach used in determining M&I return flows. Subsequent to this it became evident that the State Engineer's position on return flows associated with the Bonneville Unit's Municipal and Industrial System (Jordanelle Dam and Reservoir) would be different than the results for this analysis. The analysis is included here as part of data preservation and for future studies that may have application to this approach. An example would be the M&I return flow from non-Bonneville Unit water.

ESTIMATION OF UNIT RATES OF M&I RETURN FLOW IN SALT LAKE COUNTY

This section describes, for future reference, the process of estimating what percentage of the M&I water used is captured by municipal sewer systems and conveyed to wastewater treatment plants (WWTPs) where it may be treated for reuse on landscaping, golf courses and other related outdoor uses which have limited contact with people.

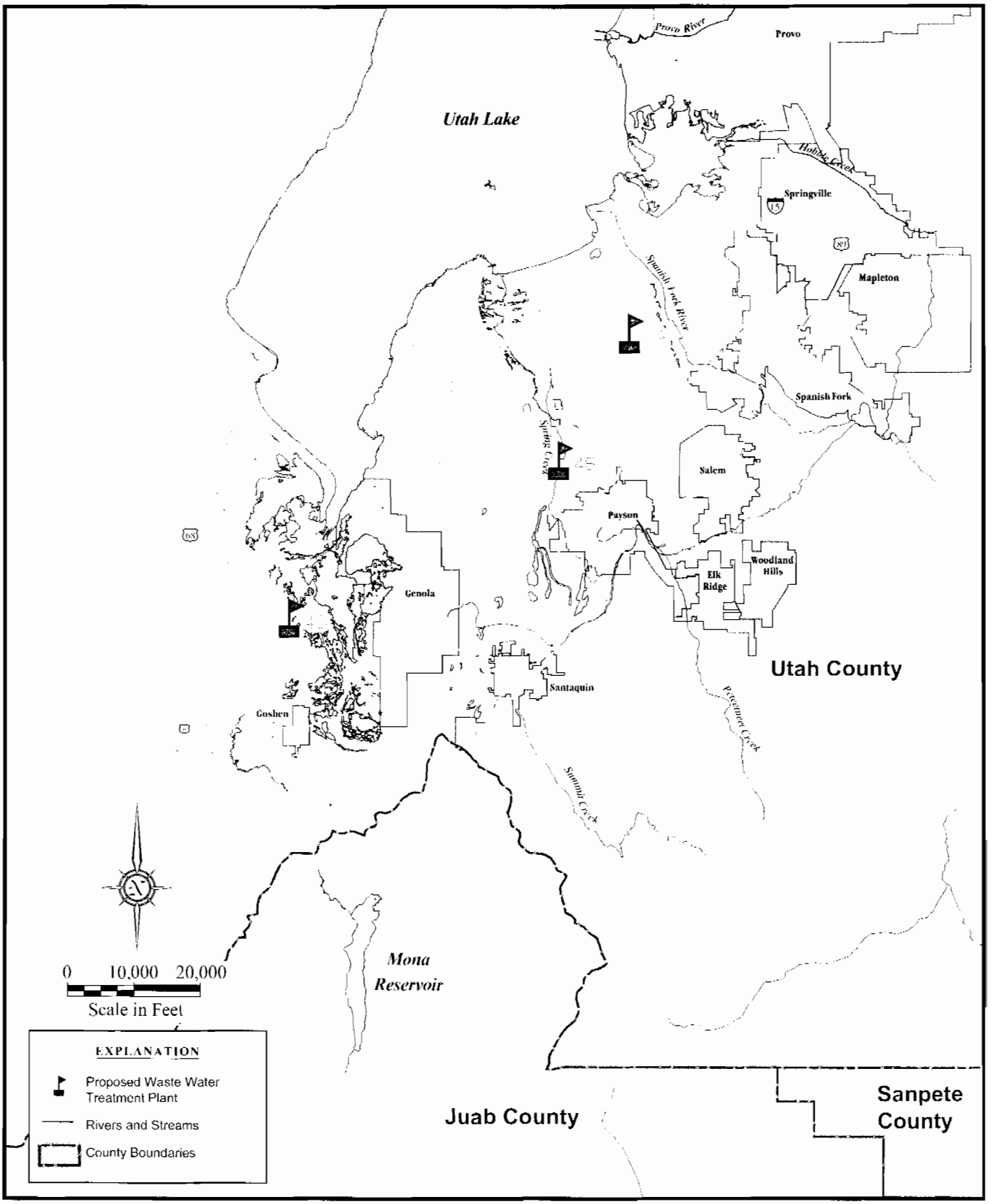


Figure 3-4
Potential Regional Waste Water Treatment Plants

Estimation of Water Use Rates by Category

In order to estimate the amount of return flow from M&I water use, it is necessary to divide the per capita water use into various categories (e.g., residential indoor use, residential outdoor use, institutional use and so forth). Then it is necessary to determine the percentage of water in each category that will be collected as municipal wastewater and piped to WWTPs.

The per capita use of M&I water in Salt Lake County is estimated to decline over time from 256 gallons per capita per day (gpcd) in 2000 to 192 gpcd in 2050. This estimate is based on the application of State requirements for M&I water conservation. As noted in Chapter 1, these requirements provide that between year 2000 and year 2020 the per capita water use will be reduced by 12 ½ % through conservation, and then another 12 ½ % between 2020 and 2050 for a total of 25% for the planning period. The daily use rates cited above were then distributed among types of uses as noted above. Table 3-7 below presents the estimated distribution of M&I water use over the planning period horizon at year 2050.

TABLE 3-7
Distribution of M&I Water Use by Category
(Use in gpcd)

	Residential Indoors	Residential Outdoors	Institutional	Commercial	Industrial	Total
Year	Assumed Percentage of Distribution [1]					
	66%		17%	12%	5%	Total (gpcd)
	33%	67%				
2000	56	113	44	31	13	256
2010	52	106	41	29	12	240
2020	49	99	38	27	11	224
2030	46	94	36	26	11	213
2040	44	89	34	24	10	202
2050	42	85	33	23	10	192

[1]For Salt Lake County only the total per capita use was readily available. To break this down into categories the total amount (for example 256) was multiplied by the following percentages: for residential (66%) of which 33% is indoors and 67% is outdoors; institutional 17%; commercial 12%; and industrial 5%. The source of these percentages are from, Utah Division of Water Resources, Utah State Water Plan, "Utah's Water Resources, Planning for the Future", May 2001.(page 28, Figure 11 of the referenced report)

Determination of Return Flow Percentage

The next step in estimating return flows from M&I use was to determine the percentage of the water used in each category (e.g., residential indoor use, residential outdoor use, institutional use and so forth) that is subject to collection in sewer systems and delivery to municipal wastewater treatment plants (WWTP). Table 3-8 following shows the percentages of return flow from each

category of use identified in Table 3-7. The resulting wastewater volumes are also calculated and expressed in terms of gallons per capita per day.

As an example of the calculation, the 56 gpcd for year 2000 residential indoor use on Table 3-7 is multiplied by the 90% return flow factor on Table 3-8 to produce 50 gpcd as the amount of return flow that would return to a wastewater treatment plant.

TABLE 3-8
Determination of Overall M&I Return Flow Percentage
(Return Flows in GPCD)

Year	Residential Indoors	Residential Outdoors	Institutional	Commercial	Industrial	Total GPCD	Percent Return Flow
		Assumed Percent That Returns from Each Category					
	90%	0%	70%	75%	0%		
2000	50	0	31	23	0	104	41%
2010	47	0	31	22	0	100	41%
2020	44	0	29	20	0	93	41%
2030	42	0	27	20	0	89	41%
2040	40	0	26	18	0	84	41%
2050	38	0	25	17	0	80	41%

A "reality check" on the estimated volume of wastewater delivered to a WWTP was made by comparing the computations of return flows in this chapter with the historical flow records from existing wastewater treatment plants in Salt Lake County. From these records, the recent historical flow to WWTPs' was 122,775 acre-feet. This amount was then divided by the present population of Salt Lake County, which is approximately 800,000 people. The result was 0.145 acre-feet per person per year, which equates to 129 gallons per capita per day. The State of Utah Department of Environmental Quality has a design standard of 100 gallons per capita per day for peak design flow periods in the wastewater treatment plant. The 129 gpcd from historical records is about 20% to 30% greater than the design standard which would indicate there is a significant amount of seepage of groundwater and possibly storm water runoff that is included in the 122,775 acre-feet. Assuming that 80% of the 129 gpcd is return flow from municipal use, the gallons per capita per day would be about 103 gpcd which compares well with the 104 gpcd at year 2000 in Table 3-8.

Central Utah Project Completion Program

Chapter 4

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Chapter 4

The area of Juab County that has historically been involved with the potential water supply from the Bonneville Unit is the northeastern part of the county lying along the Interstate 15 corridor. Geographically, this part of Juab County, which lies in the Utah Lake drainage basin, occupies the northern half of Juab Valley. The valley lies between the southern extension of the Wasatch Range and a low ridge of hills known as the West Hills. The area contains three communities, which are, from north to south, Rocky Ridge, Mona, and Nephi. The first is a growing residential community just south of the Utah/Juab county line. The latter two communities are the centers of agricultural areas of the same names. The town of Levan and areas south of the Levan Ridge (located between Nephi and Levan) geological feature are not located within the Utah Lake Drainage Basin and therefore are not within the ULS planning area.

POPULATION PROJECTIONS

At present, the only change in population projections from the February 2002 Plan Formulation Report is the replacement of the year 2000 population with year 2000 census data. Using the census date, the GOPB has set new Juab County population totals for the period of years 2000 to 2030. However, because of the small change, city populations for the various communities have not been adjusted by the Six-County Association of Governments to reflect the updated projections. The data recently available for year 2000 census populations and the population projections contained in the Draft Plan Formulation Report are presented in Table 4-1.

TABLE 4-1
Population Projections
Eastern Juab County

		Projections as Presented in Draft Plan Formulation Report					
Area	**2000 Census**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
Mona	850	1,004	1,386	1,790	2,139	2,716	3,293
Nephi	4,733	5,016	6506	7,870	9,052	11,002	12,952
Rocky Ridge	404	354	465	505	540	598	655
Balance of County	2,251	1,958	2,215	2,424	2,607	2,907	3,207
Total	**8,238**	**8,332**	**10,572**	**12,589**	**14,338**	**17,223**	**20,107**

It should be noted that a population "spill over" from the Santaquin area of Utah County could occur in the next 50 years. This potential "spill over" would be facilitated by the ease of access to I-15 for commuting and other travel. Such a development could, in the long term, result in the need for greater quantities of M&I water than are shown in Table 4-1. In this event, it is possible that additional M&I water could be needed along the I-15 corridor from the Utah/Juab County line southward to the town of Nephi. However, all ULS planning is based on GOPB county totals as currently established.

TOTAL M&I DEMANDS WITH CONSERVATION

The future projection of M&I demand for the year 2050 has not changed from that presented in the Draft Plan Formulation Report of February 2002. The population change was only minor and the results of the analysis indicate that the communities have ample existing and potential future water to meet needs until year 2050. The in-depth analysis for each community in Juab County is presented in Attachment C in Table C-1 (Mona), Table C-2 (Nephi), and Table C-3 (Rocky Ridge).

Projected Water Use with Conservation in Gallons per Capita per Day

Table 4-2 presents the projected M&I water demands in gallons per capita per day (gpcd) for the three communities in eastern Juab Valley. The projections assume that the State's water conservation goals would be met, which call for reductions in per capita use of 12 ½ percent by year 2020 and 25 percent by the year 2050.

TABLE 4-2
Projected Juab Valley Per Capita M&I Water Use
With Conservation Element Included
(12 ½ % by year 2020 and 25% by year 2050)
(Units: Gallons per Capita per Day)

Area	2000	2010	2020	2030	2040	2050
Mona	260	244	227	216	206	195
Nephi	266	251	234	223	212	201
Rocky Ridge	70	70	70	70	70	70

Projected M&I Water Demands in Acre-Feet

The projected M&I water demands of the three communities in Juab Valley were calculated by multiplying the population projections in Table 4-1 with the per-capita water use values presented in Table 4-2. The resulting projections of M&I demands in acre-feet are projected to year 2050 in Table 4-3.

TABLE 4-3
Total M&I Water Demands in Northern Juab Valley
With Conservation Element Included
(12 ½% by Year 2020 and 25% by Year 2050)
(Units: acre-feet)

Area	2000	2010	2020	2030	2040	2050
Mona	247	378	456	519	626	719
Nephi	1,420	1,830	2,066	2,263	2,613	2,914
Rocky Ridge	32	37	40	43	48	52
Total	**1,699**	**2,245**	**2,562**	**2,825**	**3,287**	**3,685**

CAPABILITY OF EXISTING SUPPLIES TO MEET M&I DEMANDS

M&I demands are currently being met by groundwater pumping in the vicinities of the communities. Increased future demand could be met by additional groundwater pumping, which typically would involve the purchase of groundwater pumping rights currently exercised for production of irrigation water. Such "conversion" of water would generally involve the urbanization of the agricultural lands and transfer of the water attached to that land under water right laws of the State of Utah.

Existing M&I Water Supplies in East Juab County

The existing M&I water supplies come from the following two water sources:

- Groundwater
- Springs

Groundwater. Table 4-4 presents the groundwater rights, present yield of wells and the projected use of groundwater by the year 2050. The reason that groundwater pumping in the case of Nephi seems rather low for a community of its size, is that Nephi has a M&I water supply of 2,752 acre-feet from springs which essentially meets all of Nephi's M&I demands. Due to the low cost of conveying the spring water and the minimal water treatment costs, a city will utilize its springs to the maximum extent prior to pumping their groundwater supply.

TABLE 4-4
Yield and Utilization of Northern Juab Valley Groundwater Wells in Meeting M&I Demand
(Units: acre-feet)

Community	Water Right (acre-feet)	Present Yield of Wells (acre-feet)	Total Groundwater Projected to be Used in Meeting Needs at Year 2050 (acre-feet)	Present Utilization of Groundwater Rights (%)
Mona	11	11	11	100%
Nephi	5,000	5,000	584	12%
Rocky Ridge	115	115	52	45%

Springs. As shown in Table 4-5, all of the communities will utilize 100% of their water supply from springs by the year 2050. After this the cities will either begin to pump their groundwater supplies or provide water through secondary irrigation systems from water obtained through urbanization of irrigated lands.

TABLE 4-5 Spring Water Available to Northern Juab Valley Communities (Units: acre-feet)				
Community	**Water Right (acre-feet)**	**Present Yield (acre-feet)**	**Amount of Springflow Projected to Be Used to Meet 2050 Needs (acre-feet)**	**Percent Utilization of Springs (%)**
Mona	339	339	339	100%
Nephi	2,752	2,752	2,752	100%
Rocky Ridge	0	0	0	0

Aggregate Capability of Existing Supplies

The aggregate capability of existing supplies to meet projected M&I water demands in northern Juab Valley is presented in Table 4-6.

TABLE 4-6 Aggregate Capability of Existing Northern Juab Valley Water Sources to Meet M&I Demand (Units: acre-feet)				
Community	**Groundwater Wells**	**Springflow**	**Total Available Supply**	**Year 2050 Needs**
Mona	11	339	350	719
Nephi	5,000	2,752	7,752	2,914
Rocky Ridge	115	0	115	52
Total	**5,126**	**3,091**	**8,217**	**3,695**

A comparison of the available supplies for each community with the projected needs that were presented in Table 4-3 indicates that the Mona area would need to develop additional M&I water supply, whereas the Nephi and Rocky Ridge areas would not. A potential source of additional water would be the conversion of irrigation water to M&I use through urbanization of irrigated land or through acquisition of irrigation water rights from lands not urbanized. That potential is discussed in the following sections of this chapter.

OTHER POTENTIAL SOURCES OF WATER FOR M&I USE

The greatest potential for additional water supplies to meet M&I water needs is through either or both of the following two processes:

- The urbanization of irrigated land with groundwater or surface water rights that can be converted for M&I use.
- The purchase of irrigation water rights from other irrigated lands not urbanized.

The following subsections discuss the general location of irrigated lands, their water supplies, and the potential amount of water made available through the two processes listed above.

Irrigated Land in Northern Juab Valley

Agricultural land lies more or less continuously between the Juab County-Utah County line on the north and the Levan Ridge south of Nephi, a distance of some 21 miles, with a width of 2 to 4 miles. Agricultural production is currently based on about 26,000 acres of land, of which 15,500 acres are irrigated at least partially. For planning purposes the north Juab Valley is divided into two separate agricultural areas--the Nephi and Mona areas.

The Nephi area has approximately 7,800 acres of irrigated land within the Nephi Irrigation Company, most of which is irrigated by diversions from Salt Creek, and supplemented by groundwater pumping. Adjacent to the irrigated lands are about 6,360 acres of currently developed but non-irrigated agricultural land that are "dry-farmed."

In the Mona area, about 4,700 acres are irrigated by water diverted from creeks originating in the mountains east of Mona and by groundwater pumping. The existing irrigation distribution system consists primarily of open ditches and lacks flexibility in irrigation deliveries. The system is also subject to seepage loss, evaporation, and operational spill losses. Two irrigation companies located in the Mona area are the Mona Irrigation Company near Mona and the North Canyon Irrigation Company between Mona and Rocky Ridge.

Existing Irrigation Water Supply in Northern Juab Valley

The major stream flowing into the valley is Salt Creek, which flows through the community of Nephi. Several smaller streams also enter the valley from the east and are utilized for irrigation. Winter and spring flows of Salt Creek and other streams reach Currant Creek or its tributary West Creek, and accumulate in Mona Reservoir at the northern end of Juab Valley. West Creek and Currant Creek are fed by adjacent perennial springs. Mona Reservoir was constructed to provide irrigation water for the Goshen Valley in Utah County and regulation of flows on Currant Creek as the stream flows northward into Utah Lake. Irrigators in the Goshen Valley of Utah County hold the rights to storage in Mona Reservoir. The surface water supplies vary from year to year depending on the amount of natural runoff occurring in Currant Creek and the other minor creeks entering the valley.

Table 4-7 shows the existing irrigation water supply in relation to the agricultural acreage served by irrigation water supplies.

TABLE 4-7
Existing Irrigation Water Supplies in Northern Juab Valley
(Average Annual Values)

Area	Irrigated Acreage (acre-feet)	Existing Supply (acre-feet)
Mona	4,700	8,100
Nephi	7,800	20,700
Total	**12,500**	**28,800**

The East Juab County Water Conservancy District and Central Utah Water Conservancy District, co-sponsored the East Juab Water Efficiency Project to improve the efficiency of water use for approximately 5,300 acres of irrigated land in the Nephi Irrigation Company. The project replaced canals and ditches with a pipeline irrigation system that conserves over 5,000 acre-feet of water on an annual average basis.

Urbanization of Irrigated Lands

There are two likely scenarios for urban growth in northern Juab Valley. One is the gradual in-filling and expansion of existing communities. The Juab County Commission currently favors such residential development within existing cities. From a standpoint of water supply, such urban growth would occur partially on subdivided land in communities with the remainder on irrigated land. The other scenario, although discouraged by the Juab County Commissioners, is the creation of isolated residential developments on valley land that is favorably located for development purposes and water availability. A likely manifestation of this scenario would be the development of residential subdivisions on irrigated land with ready access to I-15 and secondary roads, where groundwater of good quality is available.

For the purpose of estimating the amount of water that would become available through urbanization of irrigated acreage, a value of 6 persons per acre has been applied to the population projections to determine the acreage involved. This valued is slightly lower than the 9 people per acre used by the Utah Division Water Resources in estimating population and the resulting land requirements to urban growth in Utah County. The average annual water yield of agricultural water in acre-feet per was used to estimate the amount of water that potentially would be converted. This value is the average water use of agricultural land, counting both irrigated and non-irrigated land. This approach reflects the probability that urbanization would occur on non-irrigated land as well as on irrigated land. Table 4-8 presents the resulting projections of irrigation water that could be made available as the population moves onto irrigated land in northern Juab Valley. These projections may be on the high side, inasmuch as some of the growth would occur within existing city subdivisions.

TABLE 4-8
Potential Water Made Available from Agricultural Conversion
(Source: Water Demand Sheets in Attachment D)
(Units: acre-feet)

Community	2000	2010	2020	2030	2040	2050
Mona	0	126	221	303	439	575
Nephi	0	496	878	1,209	1,755	2,301
Rocky Ridge	0	0	0	0	0	0

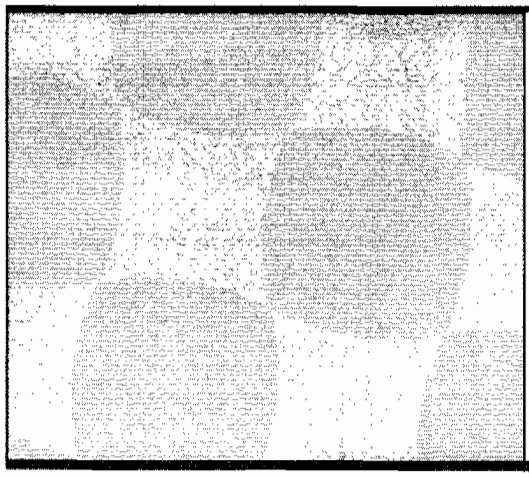
Purchase of Irrigation Water Rights

A second category of potential M&I water supplies is the purchase of irrigation water rights from willing sellers who own lands that are not projected to be urbanized by the year 2050. In such cases the sale of the water rights could be accompanied by a reversion to dry-farming on the lands involved, with appropriate equities established through the water rights sale.

SUMMARIZATION OF EASTERN JUAB COUNTY M&I WATER SITUATION

This analysis shows that in general the M&I water supply for the GOPB projected population of the northern Juab Valley can be met through existing M&I water supplies and in case of the town of Mona, the conversion of irrigation water for M&I use. The conversion of irrigation water would involve the cost of purchasing water rights, either in conjunction with the purchase of irrigated land for development or separately from urbanization of the irrigated land.

Central Utah Project Completion Program



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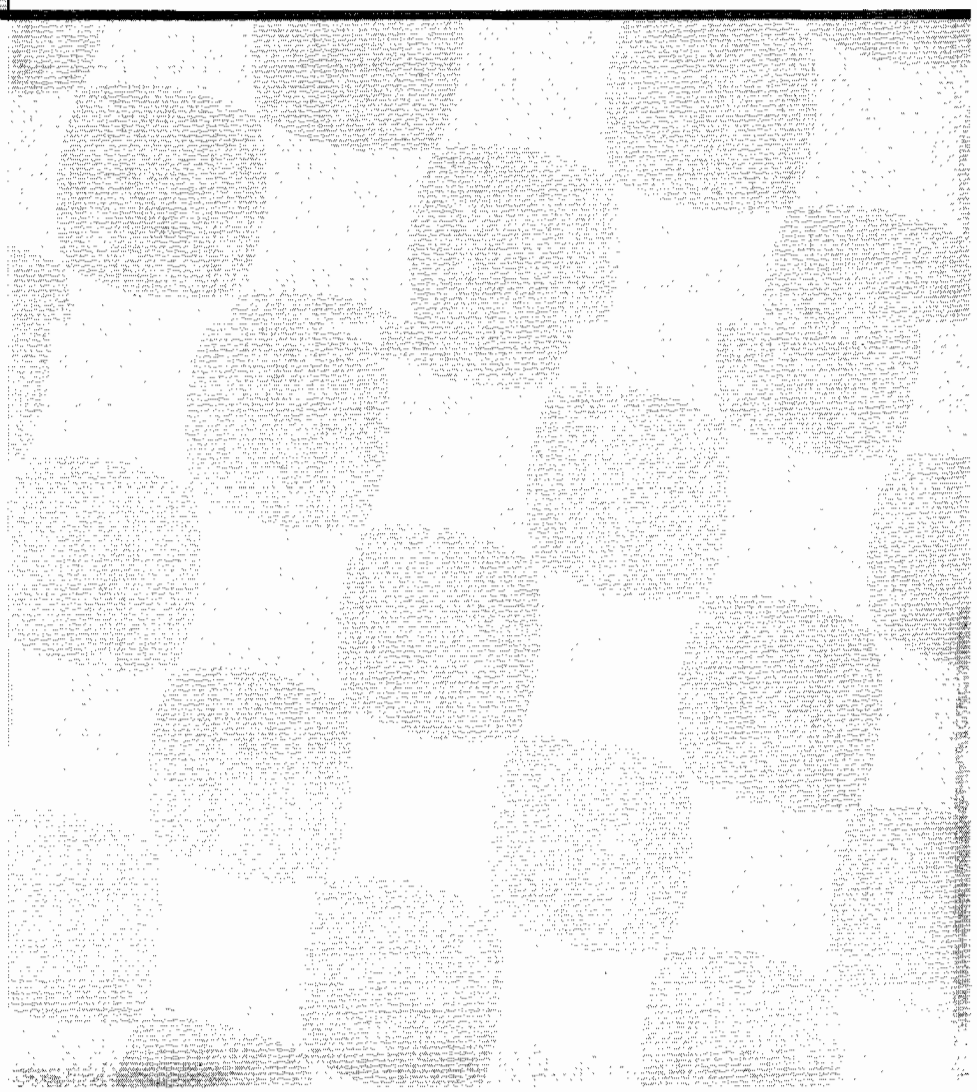


UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Chapter 5

This chapter presents the water needs and supply of southern Utah County. Specific aspects addressed are the projected M&I water demand, local supplies currently available to meet M&I demand, and potential new supplies that may be developed to meet future needs, consisting primarily of conversion of irrigation water to M&I use and recycling municipal wastewater. The analysis includes a determination of the return flow from Bonneville Unit M&I water.

The population of southern Utah County lies primarily in the 10 cities that are members of the Southern Utah Valley Municipal Water Users Association (SUVMWA). When Mountainland Association of Governments (MAG) revised population projections during the summer of 2002, MAG identified three unincorporated areas in southern Utah County with significant potential for growth. These unincorporated areas are West Mountain, Goshen Valley and West Shore. Their locations are shown on the maps in Attachment B while their population growth and water needs are discussed in the remaining sections of this chapter.

The finding of this analysis is that the total M&I water deficit in 2050 under existing supplies is projected to be 32,000 acre-feet. The communities facing the greatest future shortages under existing supplies are located in the southern part of the Utah County, namely south of Utah Lake where little or no natural stream flow is available for M&I diversion, and where groundwater supplies tend to be relatively low. The most pressing examples are 1) the Goshen Valley Area with low amounts of ground water rights and spring water, and no CUP or SVP water, and where the only stream flow consists of Currant Creek and Warm Springs; and 2) Santaquin with moderate amounts of groundwater and stream flow (already heavily used), little CUP water, and no SVP water. The water supply of Warm Springs is being sought by the Utah Reclamation Conservation and Mitigation Commission for a local wetlands project and may not be available for municipal use.

Another important conclusion is there would not be any excess of Strawberry Valley Project (SVP) water that could meet M&I demands in southern Utah County other than the 10,200 acre-feet of SVP water that is anticipated being used within the communities.

REVISED POPULATION PROJECTIONS

The population projections, revised in 2002, for cities and unincorporated areas of southern Utah County are presented below in Table 5-1. The projections were prepared by MAG based upon the county total and are presented in Attachment B. As noted above, three new places have been added to the population table, namely the unincorporated areas of West Mountain, Goshen Valley and West Shore. The shaded areas on Table 5-1 for Elk Ridge, Springville, and Woodland Hills represent build-out populations, which are expected to occur prior to 2050. Build-out in many of the other communities will not occur until after the year 2050.

The revised population projections at year 2050 in southern Utah County is approximately 190,000 greater than the 2050 projection contained in the *Draft Plan Formulation Report*. This is a significant factor in the increase in M&I water needs in southern Utah County, presented later in this chapter. Beyond that, the projected build-out population for all cities combined is expected to be significantly greater than the 2050 population.

TABLE 5-1
Revised Population Projections for Southern Utah County

Community	Year					
	2000 Census	2010	2020	2030	2040	2050
Elk Ridge	1,838	3,093	4,391	5,024	6,000	6,000
Genola	965	1,565	2,392	4,744	11,467	18,191
Goshen	874	1,249	1,682	1,970	2,611	3,251
Mapleton	5,809	9,403	14,928	20,990	27,507	34,024
Payson	12,716	20,606	27,750	30,583	55,673	80,763
Salem	4,372	7,351	12,101	17,016	24,212	31,409
Santaquin	4,834	9,822	16,865	24,263	43,442	62,621
Spanish Fork	20,246	27,693	32,745	35,771	50,900	66,028
Springville	20,424	28,866	34,132	37,286	59,658	59,658
Woodland Hills	941	1,891	3,247	4,014	4,793	4,793
Goshen Valley	415	4,129	4,278	4,787	17,581	48,114
West Mountain	2,026	5,065	7,598	8,357	10,865	14,525
West Shore	44	438	454	508	1,866	13,061
TOTALS	75,504	121,171	162,563	195,313	316,575	442,438

TOTAL M&I DEMANDS WITH CONSERVATION

Projected Water Usage with Conservation in Gallons per Capita per Day

In the Draft Plan Formulation Report of February 2002, the analysis of future M&I water demands was prepared assuming that each city in southern Utah County would achieve a 12 ½ percent reduction by the year 2020 and a 25 percent reduction in water demand by the year 2050. When these initial water demand estimates were provided to the communities for review, several communities in southern Utah County expressed concern over what they perceived as unrealistic water conservation projections. Representatives stated that the majority of existing homes located in southern Utah County communities are situated on lots that are substantially larger than those found in more urban areas.

The cities' representatives contend the higher per capita water usage rates in southern Utah County are more likely due to this factor than to over-consumption.

The SUVMWA, acknowledging the validity of this argument, determined that an average 25% conservation goal could be reached on average within its service area. Table 5-2 shows the percent reduction necessary between years 2000 and 2050 to enable the presently incorporated communities of southern Utah County collectively to achieve the State's conservation goals cited above.

For the water needs analysis it was necessary to estimate per capita water use occurring within the 50-year planning horizon to 2050. In the process, the change in per capita use in each city

was estimated at 10-year intervals, based on the overall 50-year change listed in Table 5-2. The estimated 10-year values are presented in Table 5-3 on the next page.

TABLE 5-2
Achievement of SUVMWA Area-Wide Water Conservation of 25%

Community	2000 Per Capita Use (gpcd)	2050 Per Capita Use (gpcd)	Percent Reduction
Elk Ridge	256	220	- 14%
Genola	234	220	- 6%
Goshen	413	220	- 47%
Mapleton	536	220	- 59%
Payson	275	220	- 20%
Salem	230	220	- 4%
Santaquin	344	220	- 36%
Spanish Fork	233	220	- 6%
Springville	311	220	- 29%
Woodland Hills	151	190	+ 26%
Average Reduction in Water Use for the Ten Communities			**25%**

TABLE 5-3
Projected Water Usage in Gallons per Capita per Day with Conservation Element Included (12 ½% by year 2020 and 25% by year 2050)

Community	Year					
	2000	2010	2020	2030	2040	2050
	Gallons per capita per day (gpcd)					
Elk Ridge	256	245	240	235	230	220
Genola	234	231	228	225	222	220
Goshen	413	380	340	300	260	220
Mapleton	536	448	371	291	260	220
Payson	275	265	256	248	229	220
Salem	230	228	226	224	222	220
Santaquin	344	319	294	269	244	220
Spanish Fork	233	230	227	224	221	220
Springville	311	300	280	260	240	220
Woodland Hills	151	177	181	186	190	190

Note: A demand of 220 gpcd was assumed for the unincorporated areas of Goshen Valley, West Mountain, and West Shore in southern Utah County.

Projected M&I Water Demands in Acre-Feet

The projected volumes of M&I water demands for the ten cities and the three unincorporated areas of southern Utah County are presented on Table 5-4. These amounts were computed using the populations in Table 5-1 and the projected water use rate in gallons per capita per day in Table 5-3. As shown in Table 5-4, southern Utah County will have a water demand of 88,953 acre-feet by the year 2050 with conservation. This is an increase of 68,122 acre-feet over the requirements at year 2000. By the year 2070 when build-out may occur in other communities the total demand would be higher than the amounts shown in Table 5-4.

TABLE 5-4
Total M&I Water Demands in Southern Utah County
with Conservation Element Included
(12 ½% by year 2020 and 25% by year 2050)

Community	Year					
	2000	2010	2020	2030	2040	2050
	Acre-Feet					
Elk Ridge	527	849	1181	1323	1420	1479
Genola	253	405	611	1,196	2,852	4,483
Goshen	404	532	640	663	760	800
Mapleton	3,488	4,718	6,203	6,842	8,014	8,381
Salem	1,126	1,877	3,074	4,288	6,053	7,727
Santaquin	1,863	3,510	5,554	7,311	11,874	15,433
Spanish Fork	5,284	7,135	8,327	8,976	12,601	16,272
Springville	7,115	9,701	10,706	10,860	16,039	14,702
Woodland Hills	159	375	658	836	1,020	1,020
Goshen Valley Area	102	289	426	595	6,226	11,857
West Mountain Area	499	1,410	2,079	2,905	3,242	3,580
West Shore Area	11	31	45	63	1,641	3,219
Total	**20,831**	**30,832**	**39,504**	**45,858**	**71,742**	**88,953**

CAPABILITY OF EXISTING SUPPLIES TO MEET M&I DEMANDS

Existing Water Supplies in Southern Utah County

Existing water supplies include:

- Groundwater
- Springs
- 1,590 acre-feet of CUP water from Strawberry Reservoir.
- 10,200 acre-feet of Strawberry Valley Project (SVP) water
- Existing M&I rights on local surface streams

In addition to these sources that currently supply water to south Utah County, there are two other potential long term sources of water for M&I use. These sources are conversion of irrigation

water to M&I use and recycling of municipal wastewater, both of which are discussed later in this chapter. Recycling of municipal wastewater would likely occur after the ULS planning horizon at year 2050. Even then, limitations on its use would need to be dealt with such as downstream water right holders of Utah Lake water and the requirements of limiting the exchange to net consumptive use.

Groundwater

Table 5-5 presents the present groundwater rights, present yield of wells and the projected use of groundwater by the year 2050. The information in the table demonstrates that in order to meet their projected M&I needs most of the communities will need to increase their groundwater pumping significantly by the year 2050. The groundwater pumping of 31,291 acre-feet at year 2050 would be the amount that is projected to occur even with the ULS M&I water supply of 30,000 acre-feet to southern Utah County. Without the ULS water supply, the groundwater pumping would need to increase significantly beyond the year 2050 estimate of 31,291 acre-feet. With the existing groundwater rights being at 45,121 acre-feet, any additional groundwater pumping would undoubtedly be difficult to achieve because of impacts on other well owners and the general overall decline in the groundwater table and potential impacts on wetlands in southern Utah County.

TABLE 5-5
Yield and Utilization of Southern Utah County Groundwater Wells in Meeting M&I Demand
(Pumping is With 30,000 acre-feet of ULS Project Water)

Source	Water Right (acre-feet)	Present Yield of Wells (acre-feet)	Total Groundwater Projected to be Used in Meeting Needs at Year 2050 (acre-feet)	Percent Utilization of Groundwater Rights (%)
Elk Ridge	643	643	643	100%
Genola	161	161	161	100%
Goshen	188	188	188	100%
Mapleton	7,097	5,323	3,610	51%
Payson	7,057	3,300	7,057	100%
Santaquin	3,844	414	3,844	100%
Salem	3,592	3,344	3,592	100%
Spanish Fork	10,467	10,467	5,922	57%
Springville	10,816	8,246	2,968	27%
Woodland Hills	456	456	456	100%
Goshen Valley Area	0	0	0	N/A
West Mountain Area	500	500	500	100%
West Shore Area	300	0	300	100%
Total Within Existing Rights	**45,121**	**33,042**	**31,291**	**69%**

Springs. The utilization of water from springs is the first priority of communities in meeting their culinary water needs. This is because of the very limited water treatment requirements for culinary water supplies originating from springs. As shown in Table 5-6, in nearly every community the present use of springs is at 100% except for the community of Goshen, which is at 72%. The overall percent of utilization is 98% for southern Utah County.

TABLE 5-6
Spring Water Available
to Southern Utah County Communities
(Units: in acre-feet)

Community	Water Right	Present Yield	Amount of Spring Water Projected to be Used to Meet 2050 Needs	Percent Utilization of Springs (%)
Elk Ridge	0	0	0	N/A
Genola	2,915	240	2,915	100%
Goshen	1,086	1,086	778	72%
Mapleton	1,904	1,904	1,904	100%
Payson	1,448	1,448	1,448	100%
Santaquin	1,158	1,158	1,158	100%
Salem	200	200	200	100%
Spanish Fork	1,591	1,591	1,591	100%
Springville	8,000	8,000	8,000	100%
Woodland Hills	28	28	28	100%
Goshen Valley Area	0	0	0	0
West Mountain Area	0	0	0	0
West Shore Area	0	0	0	0
Total	**18,330**	**15,655**	**18,022**	**98%**

Existing CUP Water. Water from the CUP is used for M&I purposes in a number of southern Utah County communities. The annual amount of such water used in this analysis is 1,590 acre-feet, distributed as shown in Table 5-7. This information was obtained from the report, *Water Supply Planning for Southern Utah Valley Municipal Water Association*, prepared by Carl H. Carpenter, P.E, June 1996.

TABLE 5-7
CUP Water Use Within the Existing
City Limits of Southern Utah County Communities
(Units: acre-feet)

Source of Information: Report entitled, "Water Supply Planning for Southern Utah Valley Municipal Water Association", prepared by Carl H. Carpenter, P.E., June 1996.

Community	CUP M&I Water
Elk Ridge	34
Genola	24
Goshen	18
Mapleton	114
Payson	316
Salem	86
Santaquin	84
Spanish Fork	429[1]
Springville	463
Woodland Hills	22
TOTAL	1,590

[1] In the year 2003, Spanish Fork City was award partial funding for a secondary water system under the CUPCA Section 207 Water Conservation Credit Program. As part of the funding agreement the city will transfer its existing CUP water supply of 429 acre-feet to the District as part of the water conserved by the project.

Existing Strawberry Valley Project Water Current and Future Deliveries to the Cities. The amount of water provided by the SVP to communities is presented in Table 5-8. Additional detail regarding this water supply is shown in Attachment D. In the water demand sheets in Attachment D, the 4,749 acre-feet is shown as the existing SVP supply used by the cities, with an additional 5,427 acre-feet of SVP water being used by the cities over the ULS planning horizon.

TABLE 5-8
SVP Water Use
Within Southern Utah County Communities
(Units: acre-feet)

Community	Used By City	Used By Individual Shareholders	Total SVP Water (Rounded)
Elk Ridge	0	0	0
Genola	0	0	0
Goshen	0	0	0
Mapleton	31	1,796	1,827
Payson	1,840	1,917	3,758
Salem	124.63	0	125
Santaquin	0	0	0
Spanish Fork	1,703	1,714	3,417
Springville	1,051.00	0	1,051
Woodland Hills	0	0	0
Total	**4,750**	**5,427**	**10,177**
		Rounded to	**10,200**

Existing M&I Supplies from Local Surface Streams. Local stream flow available to southern Utah County communities is shown in the water demand sheets in Attachment C. As agricultural lands with water supply from local surface streams are annexed into the cities, the water is converted to urban use within those communities. As discussed in Section 5.4, the exception to this is that SVP irrigation water from urbanized lands could be transferred for use as agricultural water on other SVP lands to reduce irrigation shortages.

OTHER POTENTIAL SOURCES OF WATER FOR M&I USE

This section addresses local waters that are currently unavailable for M&I use, but that may have the potential for conversion to M&I use through institutional arrangements and/or appropriate treatment. Such waters might become available through these two types of actions:

- Conversion of irrigated lands to urban use
- Recycling of M&I wastewater at treatment plants

Conversion of Irrigated Lands to Urban Use

A general rule for urbanization of irrigated lands, is that as the irrigated lands are converted to community development, the irrigation water allocated to the irrigated lands must be made available to the cities for reallocation to other purposes, including M&I use. However, in southern Utah County the analysis of how much irrigation water may become available for their use is a complicated process. Included in this complexity is the fact that some lands receive only SVP water, others receive only Spanish Fork River water, and some lands receive a combination

of both SVP and Spanish Fork River water. These lands are scattered throughout the southern Utah County area. The intermixing of irrigation water from different sources, and the geographic distribution of agricultural lands with potential for urbanization makes estimating the potential for such conversion a complex process.

Since section 5.3.1.4 has already addressed existing and projected use of SVP water by the cities in south Utah County, this section will address conversion and use of other water supplies by the cities. The detailed analysis of the rate of agricultural conversion in southern Utah County is presented in Attachment C. The following sections of this chapter present the more important conclusions from the tables in Attachment C.

Reduction of Irrigated Land in Southern Utah County. Table 5-9 shows the historical and projected irrigated acreage remaining after the urbanization of irrigated lands for the Spanish Fork subarea in southern Utah County. This subarea is defined as irrigated lands under the following canals – Highline, Mapleton, Salem, East Bench, Spanish Fork Southfield, Spanish Fork Southeast, Spanish Fork Westfield, and Lake Shore. The amount of acreage reduction from the present irrigated acreage to the year 2050 is about 12,985 acres (45,668 minus 32,683) which when rounded to the nearest one thousand acres is 13,000 acres that is projected to be urbanized in southern Utah County. This estimate is based on the population growth needs, assuming one acre of land (combination of irrigated and non-irrigated) for each 9 person increase in population is required to accommodate the urban growth.

TABLE 5-9
Historical and Projected
Irrigated Acreage in Spanish Fork Subarea
of Southern Utah County
(Units: acres)

Historical		Projected Irrigated Acreage				
Year 1964	Year 1996	Year 2010	Year 2020	Year 2030	Year 2040	Year 2050
53,817[1]	45,668[2]	43,731	41,299	39,973	36,332	32,683

[1] This is the amount of acreage presented in the 1964 Bonneville Unit water supply appendix.
[2] This is the amount of acreage presented in the SFN System 1998 water supply appendix.

Amount of Spanish Fork River Water Converted to Use by the Cities. The cumulative average amount of Spanish Fork River water projected for conversion to use by the cities is presented in Table 5-10. As presented in the table, the overall projected average amount of Spanish Fork River water converted to the cities' use is 6,147 acre-feet with the largest portion of this amount occurring within the declaration boundaries of Spanish Fork City. The firm yield (or the water supply in a dry year) would be about one-half of that amount or 3,074 acre-feet. While Spanish Fork City is not projected to have a shortage of water during the ULS planning horizon of 2050, it is expected that Spanish Fork River water made available through urbanization will become part of the water supply required by the city during the period of time when build-out population will be achieved. This water converted to the cities' use is an input into the water demand sheets in Attachment D.

TABLE 5-10
Cumulative Average Spanish Fork River Water Converted from Irrigated Lands to Use
(Units: acre-feet)

Community	2010	2020	2030	2040	2050
Genola	1	3	7	19	32
Mapleton	3	13	17	16	21
Payson	14	26	31	76	120
Salem	122	316	517	811	1,106
Spanish Fork	631	1,059	1,316	2,598	3,880
Springville	0	0	0	0	0
West Mountain (Lakeshore)	109	282	462	725	988
Average Annual	880	1,700	2,351	4,246	6,147
M&I Firm Yield	440	850	1,176	2,123	3,074

Note: As shown the M&I firm yield (yield in a dry year) is approximately 50% of this average annual amount of converted water.

Recycling of M&I Return Flows

As was discussed in Chapter 3 of this report, following appropriate treatment, recycling of return flows from M&I water use could contribute to the future water supply of the area. This potential applies equally to return flows from the use of local and SVP waters, and from the use of Bonneville Unit M&I water. In southern Utah County the most likely use of recycled water is the demand for M&I water beyond the ULS planning horizon of the year 2050.

The discussion in the following sections is presented to illustrate the potential amounts of return flow recognizing there are constraints to using this return flow.

Limitations on Use of Return Flows. Any future use of return flows will need to consider the fact that return flows from M&I or temporary use of Bonneville Unit water for irrigation uses in southern Utah County contribute to the water supply of Utah Lake. Any potential impact on the downstream users of Utah Lake waters would need to be fully assessed before the State Engineer would approve the use of the return flow. Another limiting factor regarding Utah water right laws, would be the amount of net consumptive use that would be allowable. Another factor to consider is that return flows from the ULS project return to Utah Lake as part of the requirements to satisfy the M&I exchange to Jordanelle Reservoir that was briefly discussed in Chapter 2 on Utah Lake.

Accounting for M&I Return Flows. A distinction is drawn between M&I return flows from the use of local waters, and return flows from the use of Bonneville Unit M&I water. These two categories of return flow are accounted for differently because the water is supplied under different authorities.

Local Return Flows. Return flows from local sources that may be reclaimed are subject to local management arrangements. Generally, the wastewater-managing agency would make arrangements for recycling and reuse of this return flow with potential users of the recycled wastewater, under negotiated financial arrangements. The purchasers might be local, county, or federal agencies (e.g., federal purchase of wastewater for wildlife habitat maintenance).

Bonneville Unit Return Flow. The recycled return flows from Bonneville Unit M&I water could continue to be part of the Bonneville Unit water supply that are necessary for the exchange to Jordanelle Reservoir. Therefore, such return flows would not be available for redistribution before they reach Utah Lake.

Wastewater Treatment Facilities. Wastewater recycling would depend on configuring a wastewater treatment plant to provide sufficient treatment to meet the State quality requirements for the intended uses of the wastewater. Little of the wastewater in southern Utah County is currently being recycled and reused. This section discusses the existing and proposed wastewater treatment facilities that may provide for wastewater recycling.

Southern Utah County currently has five wastewater treatment plants, which are listed in Table 5-11. Most of the wastewater treated by the existing plants is disposed of in evaporation ponds. On average, the plants in combination are operating at approximately 63 percent of capacity. Considering the projected growth in the county reported at the beginning of this chapter, it is evident that increases in wastewater treatment plant capacity will be needed in the next decade or two.

TABLE 5-11
Wastewater Treatment Plants in Southern Utah County

Location of Plant	Design Capacity (MGD)	2000 Average Flow (MGD)	2000 Percent of Capacity
Payson	3.0	0.81	50%
Salem	1.25	1.02	82%
Santaquin	0.5	0.3	60%
Spanish Fork	5.0	3.53	70%
Springville	5.2	3.80	73%
Total (MGD)	14.95	9.46	63%
Total (acre-feet)	16,760	10,600	63%

In anticipation of increased future wastewater quantities in southern Utah County, SUVMWA is interested in promoting regionalization of wastewater treatment for reasons of economy and recycling potential. In October 2001, SUVMWA issued a report entitled *Wastewater Regionalization Feasibility Study for Southern Utah Valley Municipal Water Association* (Brown & Caldwell 2001). The report evaluated various alternatives for regionalizing the area's wastewater treatment through the construction of treatment plants at various locations that would serve two or more urban areas in common. The alternative recommended for further investigation featured the construction of three new regional plants, to be located west of Spanish Fork (west of the existing wastewater plant), northwest of Payson, and at the center of Goshen Valley. In addition, the existing Springville wastewater treatment plant would be expanded and

upgraded as needed to meet Springville's growing needs. Wastewater from cities not cited in the preceding sentences would be piped to one of the new wastewater plants. Table 5-12 summarizes the locations and capacities of the new plants identified in the report. The locations of these potential new plants were previously illustrated on Figure 3-4 in Chapter 3.

TABLE 5-12
Potential Return Flows from Regional Wastewater Treatment Plants for Southern Utah County
(Based on 2001 Feasibility Study. Subject to Consideration by Affected Cities)

Plant Designation	Plant Location	Cities Served	Year 2050	Buildout Design Capacity (MGD) [1]
WWTF 4A	West of Spanish Fork	Spanish Fork, Mapleton	Total M&I Demand Of 88,953 AF	16.2
WWTF 4B	Northwest of Payson	Payson, Salem, Woodland Hills, Elk Ridge		21.6
WWTF 4C	Goshen Valley	Goshen Valley, Genola		2.1
Springville	Springville	Springville		8.8
Total (MGD)				48.7
Total (acre-feet)			32,347 AF [2]	

[1]Source: *Wastewater Regionalization Feasibility Study for Southern Utah Valley Municipal Water Association,* October 2001. (Brown & Caldwell 2001)
[2]The 32,347 acre-feet is derived as shown in Table 5-13.

The plan described above is subject to refinement through the individual decision-making processes of the cities involved. Changes may occur in the locations and capacities of the three new wastewater treatment plants and the expansion of the existing Springville plant. However, the plan portrayed above indicates the potential amounts and locations of municipal wastewater that may become available.

Estimation of Unit Rates of M&I Return Flow in Southern Utah County. The M&I return flow discussed here is defined as that which would be collected and conveyed to wastewater treatment plants where it may be treated for reuse. This section deals with 1) estimating what percentage of the M&I water used is collected and conveyed to wastewater treatment plants (WWTPs), and 2) estimating the proportion of wastewater that is CUP water. It should be noted that the estimates described are approximations based on the imprecise information available.

The first item enumerated, wastewater conveyed to treatment plants, stems from the amount of M&I water delivered to municipal users and the percentage of that which is used in indoors. As shown in Table 5-2, the per capita use of M&I water in southern Utah County is estimated to decline to 220 gallons per capita per day (gpcd) by 2050. As noted there, the 2050 value is based on the application of State requirements for M&I water conservation, which provide that between 2000 and 2020 per capita water use will be reduced by 12 ½ % through conservation, and then another 12 ½ % between 2020 and 2050 for a total of 25% for the planning period. There is uncertainty about the percentage of the M&I water that would be collected as

wastewater that is related to uncertainty in geographic dispersal of growth in the county by 2050. However, a calculation was made for Salt Lake County that produced a value of 41 percent of delivered M&I water collected as municipal wastewater (see Chapter 3). However, in southern Utah County the plans are for the Bonneville Unit water to be delivered through secondary water systems. The return flow will contribute to the groundwater system and will reappear as water contributed to the water supply of Utah Lake. The return flow percentage for this water is assumed to be 35% of the water delivered. This is considered a conservative estimate of the amount of return flow from Bonneville Unit water.

The resulting percentages of CUP and non-CUP water used in 2050, summarized on Table 5-13, indicate that approximately 32,347 acre-feet of water would return in Southern Utah County in year 2050. Approximately 9,660 acre-feet would be CUP water returning to Utah Lake.

TABLE 5-13
Approximate Southern Utah County M&I Return Flow in 2050 and Division Between Non-Bonneville Unit and Bonneville Unit Waters (Units: acre-feet except where noted otherwise)

Element	Attributed to Both Sources	Attributed to Non-Bonneville Unit Water	Attributed to Bonneville Unit Water
1. Water Supply Situation in 2050			
M&I water use in 2050	88,953	55,335	31,590
3. Estimated Return Flow			
Less Conserved Water			4,000
Total M&I Water		55,335	27,590
Assumed % as return flow		41%	35%
Approximate Return Flow in Acre-feet		**22,687**	**9,660**
		Total Return Flow	**32,347**

Potential Uses of Recycled Wastewater. Assuming that constraints relating to return flows were resolved, the treated effluent from such plants could be used for the following:

1. Flow into Utah Lake and become a part of the overall Utah Lake water supply,
2. Be used in secondary water systems for some of the areas in southern Utah County;
3. Be used for crop irrigation as part of an exchange for irrigation water from the Spanish Fork River, and
4. Be used for wetlands enhancement in wildlife preserves around the southern boundaries of Utah Lake.

The potential uses above would probably require exchange of water rights to offset increased consumption.

POSSIBLE SEQUENCE OF DEVELOPMENT OF WATER SUPPLIES

The sequence of development of additional water supplies is dependent on several factors among which are patterns of population growth, ease of converting irrigation water to the cities' use, locations of wastewater treatment plants, limitations on use of recycled water, cost, and environmental and political issues.

Probable Cost Range

Detailed cost estimates for developing local sources of water are beyond the scope of this water needs analysis. However, experience gained by the District and other agencies with various methods of treating water permit the identification of approximate unit costs of providing water. Table 5-14 presents approximate costs for the potential sources of water discussed above. It should be noted that the tabulated costs should not be used to determine the feasibility of the sources; inasmuch as physical facilities are not well defined, and the economics of water treatment processes change with time.

TABLE 5-14
Probable Cost Range
for Developing New Water Sources for Southern Utah County

Water Source	Present Worth Cost ($/AF)	Annual Cost ($/AF)	Potential Use and Anticipated Limitation on Use
Conversion of irrigation water to M&I use	$600 to $1000 per acre-feet for distribution system facilities	Variable [1]	Culinary
ULS	Secondary systems at $600 to $1000 per acre-foot	$300 to $400 for the ULS water plus conveyance and/or distribution system OM&R	Culinary and industrial
Wastewater Recycling	$3,000 to $5,000 for recycling plant plus $600 to $1,000 per acre-foot for distribution system facilities	Dependent on end use and would vary (plus or minus) from a value of $300 per acre-foot	Limited to golf courses, other green spaces, and crop land

[1]Costs associated with water conversion would depend on the current mode of community domestic water supply. For communities that already treat surface water the cost could vary from only the cost of making legal and contractual arrangements, to expansion of domestic water treatment facilities. For communities that currently obtain their water from wells, the use of converted irrigation water could involve construction of domestic water treatment facilities.

Projected Sequence of Development

Generally, the lowest cost new sources available to the cities are developed first. Figure 5-1 shows a likely sequence of utilization of the ULS water supply.

Summary and Conclusions

Based on the considerations discussed in this chapter, it is concluded that a ULS supply of 30,000 acre-feet of M&I water for southern Utah County would be gradually utilized and be an essential new supply for the area after 2030. This would provide the area with an M&I water supply up to and beyond 2050. Flexibility is needed because the existing supply is not distributed evenly among cities and other growth centers in southern Utah County. The build-out population of the area will likely exceed the 2050 projections by a considerable amount. This will require that additional water be secured (see Table 5-15).

TABLE 5-15
Southern Utah County
Municipalities and Areas With M&I Shortages
(Units in acre-feet)

Area	Yr-2000	Yr-2010	Yr-2020	Yr-2030	Yr-2040	Yr-2050
Elk Ridge		164	496	638	735	794
Genola						1,307
Payson						4,350
Salem					1,722	3,365
Santaquin					3,187	6,271
Woodland Hills			174	352	536	536
Goshen Valley	102	237	335	456	4,978	10,609
West Mountain		554	960	1,465	1,670	1,877
West Shore					1,341	2,919
Total	**102**	**1,025**	**1,965**	**2,911**	**14,169**	**32,028**
					Rounded to	**30,000**

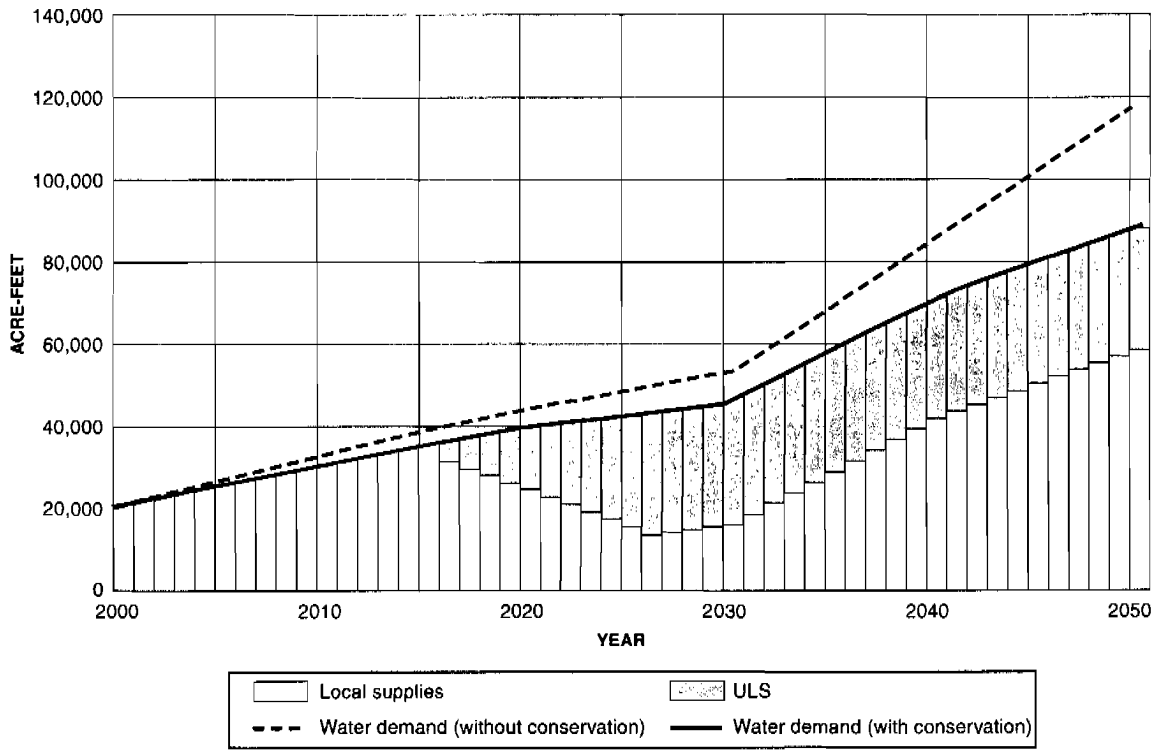


Figure 5-1

South Utah County M&I
Water Demand and Supply With and Without Conservation

Central Utah Project Completion Program

Chapter 6

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

The *Draft Plan Formulation Report of February 2002* addressed M&I water needs for the following communities in northern Utah County: Alpine, American Fork, Cedar Fort, Cedar Hills, Eagle Mountain, Highland, Lehi, Pleasant Grove, and Saratoga Springs. When MAG revised the population projections during the summer of 2002, they identified two unincorporated areas in northern Utah County with significant growth potential. One of these is the extension of Draper City into Utah County. Draper City is located in southern Salt Lake County immediately adjacent to the boundary with Utah County. The second area of potential growth is the unincorporated area of Cedar Valley west of Utah Lake. Significant growth in the incorporated areas would occur in Lehi, Saratoga Springs, and Eagle Mountain.

In this M&I Water Needs Appendix, only two incorporated communities, (Saratoga Springs and Draper) and one un-incorporated community (Cedar Valley) in Northern Utah County may have a need for assistance in meeting future water demands. However, these demands are not projected to occur until the time frame of 2040 to 2050. This is much later than the needs in Salt Lake County where significant water shortages will begin to occur starting around year 2015. There are, however, ways to meet needs in these areas in absence of any direct deliveries from the ULS project. Due to the small water demand and alternate opportunities, the ULS project alternatives have not focused on water deliveries to these northern Utah County communities.

The incorporated communities with potential shortages are Saratoga Springs (1,554 acre-feet) and Draper City (2,980 acre-feet). Draper City's needs would be met through deliveries from the Jordan Valley Water Conservancy District. The potential needs of Saratoga Springs could be met though local cooperative efforts with the District's remaining Utah Lake rights, a conjunctive use program in northern Utah County, and water recycling. Water for the conjunctive use program would be become available as significant blocks of irrigated lands are converted to urban use.

The un-incorporated area of Cedar Valley could experience a shortage of about 3,000 acre-feet if the projected growth at year 2050 were to occur. However, in the case of Cedar Valley there are no elected representatives that have petitioned for water. Because of this, there is not a foreseeable need to deliver water through either direct deliveries or through exchanges. The most likely scenario for any growth to occur in Cedar Valley would be for developers to purchase agricultural groundwater rights within Cedar Valley or irrigation rights outside the valley that with approval from the State Engineer could be transferred for M&I use. With growth from this water supply a small scale water recycling project would meet the remaining demands.

Another area that is likely to experience water shortages during the build-out phase of their population growth would be the city of Lehi. This growth would occur after the ULS planning horizon of the year 2050. Although the needs are not specifically addressed in this M&I Water Needs Appendix, it is likely some of the opportunities discussed in Section 6.4 of this chapter would be a means to supply M&I water to Lehi City.

POPULATION PROJECTIONS

The population projections for Utah County have been revised since the preparation of the Draft Plan Formulation Report to reflect the results of the 2000 census. As discussed in Chapter 1 of

this M&I Water Needs Appendix, the revisions were prepared by MAG in consultation with local communities and the GOPB. Additional details are contained in Attachment A. Table 6-1 presents the revised projections for northern Utah County. The shaded areas for Alpine, Cedar Hills, Draper, Highland and Pleasant Grove indicate build-out populations. Planning activities to address water needs during the build-out phase are beyond the scope of the ULS project.

Build-out populations for communities not shaded at year 2050 in Table 6-1 were presented previously in Chapter 1, Table 1-3. The communities with significant potential for growth and which will achieve build-out after the year 2050 planning horizon include American Fork, Eagle Mountain, Lehi and Saratoga Springs. Of these four communities only American Fork would have sufficient water to meet its build-out population needs. The increase in build-out population over the year 2050 projections for Eagle Mountain, Lehi and Saratoga Springs would be about 262,244.

TABLE 6-1
Population Projections for Northern Utah County
Revised to Reflect the 2000 Census

Community	Year					
	2000 CENSUS	2010	2020	2030	2040	2050
Alpine	7,146	9,874	11,752	15,675	18,900	18,900
American Fork	21,941	27,787	32,573	35,583	46,008	56,433
Cedar Fort	341	500	632	738	932	1,127
Cedar Hills	3,094	6,807	9,663	10,132	12,300	12,300
Draper	0	4,758	7,833	10,448	14,000	14,000
Eagle Mountain	2,157	9,758	16,756	22,770	38,207	53,644
Highland	8,172	14,940	20,120	23,564	28,163	28,163
Lehi	19,028	31,302	44,437	48,975	69,036	89,098
Pleasant Grove	23,468	27,334	30,415	33,226	40,700	40,700
Saratoga Springs	1,003	8,993	18,005	23,450	38,606	53,762
Cedar Valley	510	5,075	5,258	5,884	21,609	33,666
Totals	**86,860**	**147,128**	**197,444**	**230,445**	**328,461**	**401,793**

Notes:
1. The shaded areas for Alpine, Cedar Hills, Draper, Highland, and Pleasant Grove indicate build-out populations.
2. The community of Draper is centered in Salt Lake County. The population listed on this table is in the extension of Draper City across the county line into Utah County.

TOTAL M&I DEMANDS WITH CONSERVATION

Projected Unit Water Usage with Conservation Element

The projection of future unit water usage in gallons per capita per day to the year 2050 for northern Utah County is presented in Table 6-2. Northern Utah County has no overall umbrella organization that represents the communities such as SUVMWA in southern Utah County.

Therefore each community would have the responsibility to meet the water conservation goals of a 12½ percent reduction in water demand by the year 2020 and a 25 percent reduction in demand by year 2050.

TABLE 6-2
Projected Unit Water Usage in Northern Utah County with Conservation Element Included (12 ½% by year 2020 and 25% by year 2050)

Community	Year					
	2000	2010	2020	2030	2040	2050
	Water use in gallons per capita per day (gpcd)					
Alpine	322	302	282	269	255	242
American Fork	265	249	232	221	210	199
Cedar Fort	224	210	196	190	190	190
Cedar Hills	232	218	203	193	190	190
Cedar Valley	190	190	190	190	190	190
Draper	190	190	190	190	190	190
Eagle Mountain	256	240	224	213	203	192
Highland	241	226	211	204	197	190
Lehi	347	287	226	211	211	211
Pleasant Grove	170	170	170	170	170	170
Saratoga Springs	403	310	223	214	203	192

Projected M&I Demands

Projected M&I water demands are shown in Table 6-3. The demands were computed using the projected population on Table 6-1 and the projected water use rates in gallons per capita per day shown in Table 6-2. As shown in Table 6-3 northern Utah County will have a water demand of 91,285 acre-feet by the year 2050 with conservation. This is an increase of 66,038 acre-feet over the requirements at year 2000. A detailed water demand analysis is contained in Attachment D of this M&I Water Needs Appendix.

TABLE 6-3
Total M&I Water Demands in Northern Utah County with Conservation Element Included (12 ½% by year 2020 and 25% by year 2050)

Community	Year					
	2000	2010	2020	2030	2040	2050
	Acre-Feet					
Alpine	2,580	3,181	3,722	4,305	4,999	5,596
American Fork	6,519	8,246	9,447	10,670	12,390	13,872
Cedar Fort	86	192	294	454	734	1,181
Cedar Hills	804	1,659	2,198	2,195	2,617	2,617
Cedar Valley	109	306	453	9632	3,899	7,165
Draper	0	1,013	1,668	2,225	2,982	2,982
Eagle Mountain	619	2,625	4,206	5,442	8,674	11,538
Highland	2,206	3,782	4,753	5,383	6,213	5,993
Lehi	7,402	10,048	11,243	11,558	16,292	21,027
Pleasant Grove	4,469	5,205	5,792	5,756	7,751	7,751
Saratoga Springs	453	3,123	4,498	5,621	8,779	11,563
TOTAL	**25,247**	**39,380**	**48,274**	**63,241**	**75,330**	**91,285**

CAPABILITY OF EXISTING SUPPLIES TO MEET M&I DEMANDS

The bulk of the following information, previously used for the *Draft Plan Formulation Report of February 2002*, was abstracted from the report, *North Utah County Water Needs Study* of October 2001 by Parsons Engineering (the Parsons report) for the Central Utah Water Conservancy District.

Existing water supplies for northern Utah County communities include the following:

- Groundwater
- Springs
- Central Utah Project water (Jordanelle Reservoir); and
- Local surface streams, canals and storage water

Groundwater

In the Parsons report, one groundwater basin was assumed to exist in the area from Pleasant Grove to Lehi and a second groundwater basin to exist in the Cedar Valley area in which Eagle Mountain is located. The Cedar Valley groundwater basin is connected to both the Jordan Valley and Utah Valley groundwater basins. The southern portion of the groundwater basin in Cedar Valley discharges into Utah Valley while the northern portion drains into the Jordan Valley. The southern portion is significantly larger than the northern groundwater basin.

The average annual groundwater withdrawal from Pleasant Grove to the Lehi area of northern Utah County would be limited to 78,700 acre-feet[1]. The maximum one-year allowable withdrawal would be 98,400 acre-feet. However, pumping would be limited to the water rights that the cities have for groundwater pumping which presently total approximately 53,000 acre-feet. Table 6-4 presents the present groundwater rights, present yield of wells and the projected use of groundwater by the year 2050. The information in the table demonstrates that in order to meet their projected M&I needs most of the communities will need to maximize their groundwater pumping capabilities by the year 2050.

According to the Parsons report, the current groundwater usage for the northern Utah County communities is about 27,047 acre-feet per year. To meet the M&I demand of 91,285 acre-feet at year 2050, this would require that approximately 20,286 acre-feet of additional groundwater would need to be pumped to meet demand at year 2050. Overall this would require pumping at a capacity of 82 percent of their groundwater rights.

Groundwater in Cedar Valley has not been extensively studied. However reports cited in the Parsons study estimate that the groundwater recharge to Cedar Valley is approximately 24,000 acre-feet and that the discharge from Cedar Valley is approximately 22,000 acre-feet, of which about 15,000 acre-feet leaves Cedar Valley as subsurface flow to Utah Valley. It would seem likely that a portion of the 7,000 acre-feet not returning to Utah Valley would return to the Jordan Valley and could be utilized through purchase of irrigation rights in the Jordan Valley and exchanged to groundwater pumping in Cedar Valley.

[1] Information is taken from the report, "*North Utah County Water Needs Study, October 9, 2001*, by Parsons Engineering, Page 10.

TABLE 6-4
Yield and Utilization of Groundwater Wells to Meet M&I Demand in Northern Utah County

Source	Water Right (ac-ft)	Present Yield of Wells (ac-ft)	Groundwater Availability Projected to Meet Needs at Year 2050 (ac-ft)	Percent Utilization of Groundwater Rights (%)
Alpine	4,716	4,716	4,495	95%
American Fork	15,559	15,559	13,872	89%
Cedar Fort	62	62	62	100%
Cedar Hills	2,328	2,328	2,328	100%
Cedar Valley	620	620	620	100%
Draper(Utah Co.)	0	0	0	0%
Eagle Mountain	2,901	2,901	2,901	100%
Highland	4,006	4,006	4,006	100%
Lehi	11,554	11,554	11,554	100%
Pleasant Grove	14,716	14,716	6,517	44%
Saratoga Springs	1,598	1,598	1,598	100%
Total	**57,440**	**57,440**	**47,333**	**82%**

Springs

The utilization of water from springs is the first priority of communities in meeting their culinary water needs. This is because of the low level of water treatment required for culinary use. Unlike southern Utah County, the availability of water from springs in northern Utah County for use as an M&I water supply is very limited. The total amount of M&I water from springs in northern Utah County is about 1,926 acre-feet. As shown in Table 6-5, only four communities have a water supply from springs with 100% utilization by these communities.

TABLE 6-5
Spring Water Available to Northern Utah County Communities
(Units: acre-feet)

Source	Water Right (ac-ft)	Present Yield of Springs (acre-feet)	Total Springs Projected to Meet Needs at Year 2050 (acre-feet)	Percent Utilization of Springs (%)
Alpine	292	292	292	100%
American Fork	0	0	0	0
Cedar Fort	62	62	62	100%
Cedar Hills	0	0	0	0
Cedar Valley	0	0	0	0
Draper Extension	0	0	0	0
Eagle Mountain	0	0	0	0
Highland	0	0	0	0
Lehi	338	338	338	100%
Pleasant Grove	1,234	1,234	1,234	100%
Saratoga Springs	0	0	0	0
Total	**1,926**	**1,926**	**1,926**	**100%**

Existing CUP Water

Central Utah Project water is allocated to some of the communities within northern Utah County. This water is provided from storage in Jordanelle Reservoir and its use is limited by capacity in the Alpine Aqueduct. The allocation of CUP water among northern Utah County communities is as listed on Table 6-6.

TABLE 6-6
Allocation of CUP Water in Northern Utah County
(Units: acre-feet)

Community	Allocation (acre-feet)	Less Conservation Credit Program Turnback Water	Net Allocation After Turnback of Water
Alpine	1,645	875	770
American Fork	2,095	N/a	2,095
Cedar Hills	710	N/a	710
Highland	1,415	1,000	415
Lehi	1,145	N/a	1,145
Pleasant Grove	2,120	500	1,620
Others (Orem, i.e)	10,870	500	10,370
Totals	**20,000**	**2,375**	**17,125**

M&I Supply from Local Streams, Canals and Storage Water

Table 6-7 shows local stream flow, canal and storage water within incorporated boundaries of the northern Utah County communities. The amounts of water shown are not necessarily useable for M&I purposes because of seasonal flow variation. In other words, stream flow is high in the late spring and early summer as snowmelt occurs and tapers down to low flows in the late summer. Another characteristic of local surface streams is that their discharges tend to vary from year to year depending on winter snowfall, which is also variable from year to year. Thus the firm yield of the streams would be lower than the annual discharge amounts. To account for this seasonal variation, it has been assumed that 50 percent of the local stream flow would be useable for M&I purposes either directly in secondary water systems or for culinary use with suitable treatment. Some of the remainder could be used under a conjunctive use program to recharge local groundwater and thereafter be used indirectly by well pumping.

TABLE 6-7
Local Streams, Canals and Storage Water
Potentially Available to Northern Utah County Communities

Community	Surface Water Within Community's Incorporated Boundaries (acre-feet)	Average Annual Amount Through Agricultural Conversion at Year 2050 (acre-feet)	Percent That Would Potentially Be Available (%)	Estimate Of Firm Yield
Alpine	3,882	1,998	51%	Firm yield would be comprised of an amount that could be used directly in secondary systems plus the amount available through a conjunctive use program.
American Fork	15,639	7,665	49%	
Cedar Fort	2,268	969	43%	
Cedar Hills	1,283	289	23%	
Cedar Valley	0	11,442	0	
Draper City	0	0	0	
Eagle Mountain	0	0	0	
Highland	6,463	1,986	31%	
Lehi	15,366	12,558	82%	
Pleasant Grove	12,028	2,809	23%	
Saratoga Springs	8,411	8,069	96%	
Total	**65,340**	**49,835**		

POTENTIAL FOR OTHER WATER SUPPLIES TO MEET NEEDS

An analysis of the following water supplies is presented to determine the amount, if any, that could be used in meeting future M&I water demands in northern Utah County.

- Conversion of agricultural lands to urban use in northern Utah County
- Conjunctive use of surface water and groundwater

- Utilization of a portion of District's Utah Lake rights
- Purchase of irrigation company stock from canals having Utah Lake/Jordan River water
- Wastewater recycling and reuse (non-CUP return flow)

The focus of discussion on evaluation of other water supplies is the potentially water short areas of Saratoga Springs, Cedar Valley and Eagle Mountain, to assess the supplies which could meet the needs of these areas. As noted earlier, the portion of Draper City that will grow into Utah County will be served by the Jordan Valley Water Conservancy District.

Conversion of Agricultural Lands to Urban Use

Projected Urbanization of Irrigated Lands. In northern Utah County, surface water is currently used to irrigate approximately 21,500 acres. Water supply to this land comes from the following principal sources: Provo River, American Fork River, Battle Creek, Grove Creek, Dry Creek, and Utah Lake.

The Saratoga Springs area contains approximately 8,000 acres of irrigated land that receives its water supply from the Utah Lake Distributing Canal, which transports Utah Lake water. In the Draft Plan Formulation Report this supply was not considered as being useable for M&I because of the high total dissolved solids of the lake's water. The conversion of irrigation water from part of this area is included in this M&I Water Needs Appendix as a potential new M&I water supply, requiring treatment for such use.

Table 6-8 shows a summary of the projected amount of irrigated lands to be urbanized in northern Utah County. The majority of this would be in the general area of Eagle Mountain, Lehi, and Saratoga Springs, which would comprise 16,428 acres of the 27,906 acres projected for urbanization.

TABLE 6-8
Projected Amount of Irrigated Acreage Converted to Urban Use in Northern Utah County
(Source of Data: Attachment D, Table D- 18 through Table D- 28)

City	2000	2010	2020	2030	2040	2050
	Acres					
Alpine	0	303	512	948	1,306	1,306
American Fork	0	650	1,182	1,516	2,674	3,832
Cedar Fort	0	0	0	0	0	0
Cedar Hills	0	0	0	0	0	0
Cedar Valley	0	153	227	316	1,791	1,791
Eagle Mountain	0	844	1,612	2,291	4005	5,721
Draper City	0	0	0	0	0	0
Highland	0	456	1,027	1,907	1,907	1,907
Lehi	0	1,364	2,823	3,327	5,557	5,924
Pleasant Grove	0	444	852	1,551	1,983	2,642
Saratoga Springs	0	888	1,889	2,494	4,178	4,783
Total	**0**	**5,102**	**10,124**	**14,350**	**23,401**	**27,906**

Projected Amount of Irrigation Water from Urbanization of Irrigated Lands. Table 6-9 shows the amount of irrigation water projected to be available from urbanization of irrigated lands.

TABLE 6-9
Projected Average Annual Amount of Water From Urbanization of Irrigated Lands and Other Urban Lands with Surface Water in Northern Utah County
(Source of Data: Attachment D, Table D- 14 through Table D- 22)

City	2000	2010	2020	2030	2040	2050
	Units in Acres					
Alpine	0	464	783	1,450	1,998	1,998
American Fork	0	1,299	2,363	3,032	5,348	7,665
Cedar Fort	0	78	161	306	554	969
Cedar Hills	0	0	0	0	0	0
Cedar Valley	0	306	453	632	3,582	3,582
Draper	0	0	0	0	0	0
Eagle Mountain	0	1,689	3,244	4,581	8,011	11,442
Highland	0	474	1,068	1,986	1,986	1,986
Lehi	0	2,891	5,985	7,054	11,780	12,558
Pleasant Grove	0	1,110	2,130	2,809	2,809	2,809
Saratoga Springs	0	1,498	3,187	4,208	7,048	8,069
Total	**0**	**9,809**	**19,374**	**26,058**	**43,116**	**51,078**

The irrigation water supplies cited on Table 6-9 would be only partially available as a firm yield for M&I use. As discussed above under local stream flow, these irrigation water supplies tend to vary seasonally and yearly, and much of the volume cited on the table would occur during peak runoff periods. To develop them for M&I use, the specific water sources would need to be analyzed to determine the dependable yield. Beyond the direct use of such water, there remains the possibility of recharging water from high flows periods to local groundwater aquifers, and pumping the recharged water from wells under a conjunctive use operation as discussed in the following sections of this chapter.

Conjunctive Use of Surface Water and Groundwater

Conjunctive Use Identified in the Northern Utah County Water Needs Study. The Parsons report assessed the potential for conjunctive use of surface water and groundwater in northern Utah County. As stated in that report, the waters of the American Fork River, Dry Creek, Fort Creek, Battle Creek, and Grove Creek are used primarily for crop irrigation and secondary water systems. Because of the existing cropping patterns the irrigated lands require higher early season delivery (for example, May and June) than are required by urban landscapes. The difference in the timing of consumption of these two slightly different uses could provide a water supply for conjunctive use through storage of the surplus water in the groundwater basin for later extraction. This would amount to an annual average of approximately 12,800 acre-feet under existing water rights as identified in the Parsons report.

Conjunctive Use under CUPCA. At the present time, the Central Utah Water Conservancy District has initiated a cooperative effort with the northern Utah County communities and the U.S Geological Survey to conduct a three- to four-year study of the conjunctive use potential in northern Utah County. The District and other local entities are planning to enter into a cooperative agreement with the U.S. Geological Survey to complete a groundwater model of the groundwater basin in northern Utah County. Potential sites for recharge are shown on Figure 6-1. The cities would then pump this water directly from the groundwater basin in northern Utah County.

Utilization of a Portion of District's Utah Lake Rights

The water demand sheets contained in Attachment D identified M&I demands in the Saratoga Springs area of approximately 1,554 acre-feet above the existing locally available water supplies. This amount could be met by the District assigning 1,554 acre-feet of its primary and secondary water rights in Utah Lake to the Saratoga Springs area. The cost for this water is estimated to be the cost of drilling a water well. One water well of approximately 10 cfs capacity would supply the 1,554 acre-feet on an average annual basis with sufficient capacity for peak day and peak monthly use. Alternate methods for meeting the 1,554 acre-feet would be for the city or developers to purchase irrigation company stock from companies that have Utah Lake water rights and/or participation with a regional water recycling project from entities such as the Timpanogos Regional Wastewater Treatment facility.

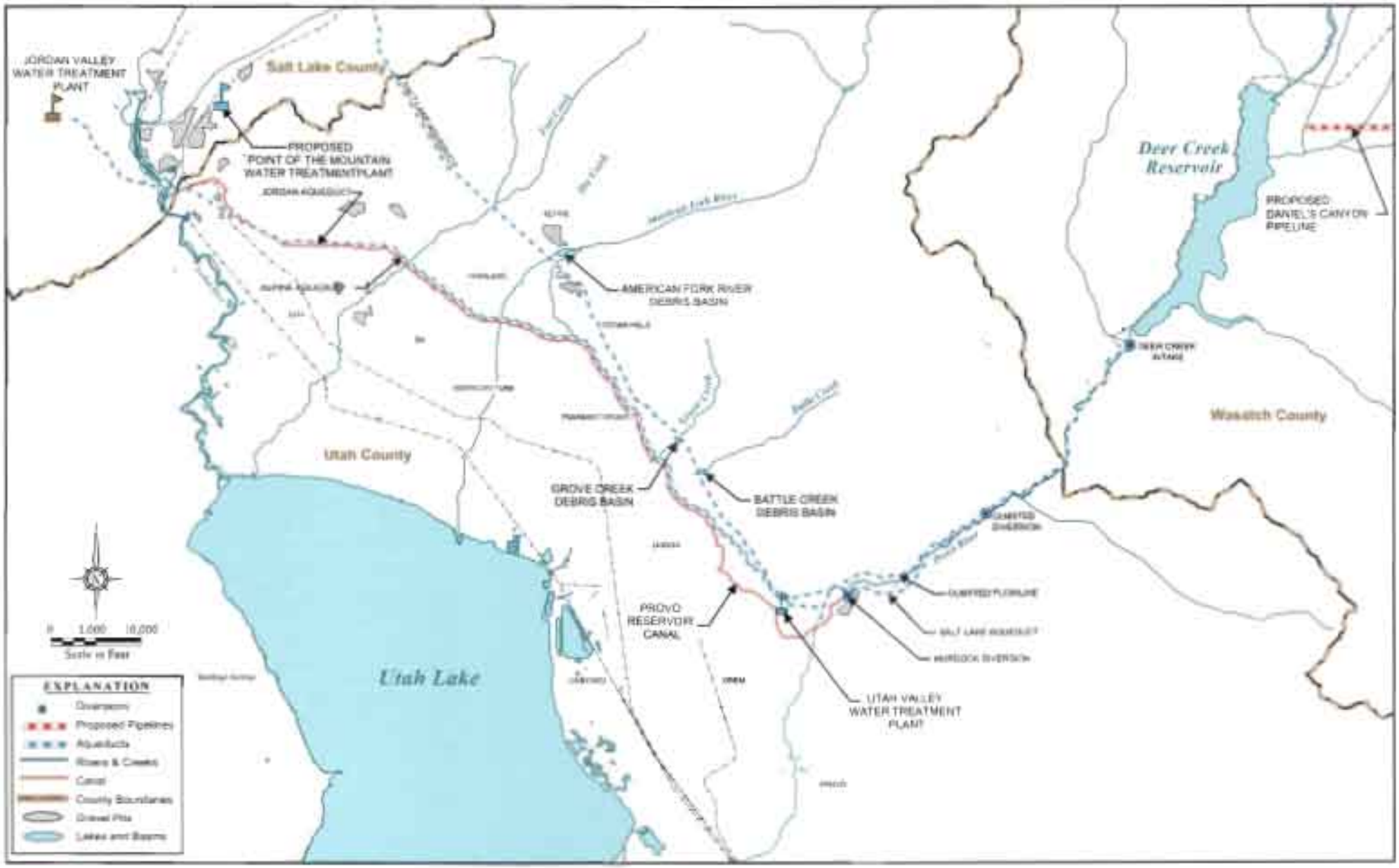


Figure 6-1
Conjunctive Use
Northern Utah County

Purchase of Irrigation Stock from Irrigation Companies in Salt Lake County

The Cedar Valley area is un-incorporated and without any elected representation. This area could realize about 3,000 acre-feet of demand above supplies at the year 2050, assuming the projected population growth occurs. The northern portion of the groundwater basin underlying Cedar Valley drains into the Jordan Valley. As stated in Section 6.3.1 of this chapter there would likely be a portion of the 7,000 acre-feet that discharges from Cedar Valley that would drain into Jordan Valley. Assuming 25 percent of this amount would drain through the subsurface to Jordan Valley there would be 1,750 acre-feet from purchase of irrigation stock to go toward meeting the remaining needs in Cedar Valley.

Recycling of Water from Wastewater Treatment Plants

Regional Use of Water Recycling. A significant benefit of using recycled water is that this source would be a firm water supply during periods of drought. Wastewater would still be available because indoor demands do not diminish significantly during drought periods. The information on water recycling for northern Utah County was addressed in the Parsons report. The report stated communities that could benefit from wastewater recycling from the Timpanogos Wastewater Treatment Plant are Lehi, Saratoga Springs, Eagle Mountain, and the commercial area of American Fork located south of Interstate 15 and the area surrounding the wastewater treatment plant. The amount identified in the Parsons report was 13,740 acre-feet.

Local Water Recycling in Eagle Mountain. Meetings were held during November 2002 between District staff and representatives of Eagle Mountain in which the representatives indicated that water recycling could become part of their long term water supply. Eagle Mountain plans to complete these efforts under its own initiative and funding.

Using a return factor of 41 percent as calculated for Salt Lake County and the projected water demand of 11,538 acre-feet at year 2050, there would be about 4,730 acre-feet that returns to the wastewater treatment facility which provides an opportunity for recycling.

Water Recycling in Cedar Valley. At the year 2050 the projected water demand in Cedar Valley would be 7,165 acre-feet. Using a return flow factor of 41%, 2,937 acre-feet that could potentially be recycled to meet a portion of the M&I needs associated with outdoor watering for areas which have minimal human contact.

POSSIBLE SEQUENCE OF DEVELOPMENT OF WATER SUPPLIES

The sequence of development of additional water supplies is dependent on several factors among which are patterns of population growth, ease of converting irrigation water to M&I use, locations of wastewater treatment plants, limitations on use of recycled water, cost, and environmental and political aspects.

Summary of Potential Undeveloped Water Supplies

Table 6-10 presents approximate costs for the potential sources of water discussed above.

TABLE 6-10
Summary of Potential for Undeveloped Water Supplies in Northern Utah County

Water Source	Average Annual Volume (acre-feet)	Potential Firm Yield Estimate (acre-feet)	Type of Use and Required Treatment	Likelihood Of Success
Pleasant Grove to Lehi Area				
Agricultural Conversion	38,393			
Secondary Systems		19,196	Outdoor	High
Conjunctive Use		12,800	Culinary	Moderate
Cedar Valley/Saratoga Springs				
Utah Lake Water Rights				
Districts rights (Saratoga Sps).	1,554	1,554	Culinary	High
Utah Lake Irrigation Stock	1,500	1,500	Culinary	Moderate
Water Recycling				
Timpanogos Regional WWTP		13,740	Secondary Systems	Moderate
Eagle Mountain	4,730	4,730		
Cedar Valley	2,937	2,937		

Probable Cost Range

Detailed cost estimates for developing potential sources of water are beyond the scope of this water needs analysis. Table 6-11 presents approximate costs for the various sources of water discussed above, and lists those sources in increasing order of cost. It should be noted that the tabulated costs should not be used to determine the feasibility of the sources; inasmuch as physical facilities are not well defined, and the economics of water treatment processes change with time.

TABLE 6-11
Probable Cost Range for Developing New Water Supplies for Northern Utah County

Water Source	Present Worth Costs ($/AF)	Annual Cost ($/AF)	Potential Use and Anticipated Limitations on Use
Conjunctive Use		Annual cost have not been computed for this M&I Water Needs Appendix since its primary focus is on water demands and likely sequence of development of water sources	Culinary/outdoors
Well Injection/spreading Basin	$2,000		
Main Trunk Line	Variable		
Secondary Systems	$600 to $1,000		
Agricultural Conversion			Outdoor
Secondary Systems	$600 to $1,000		
Utah Lake Water Rights	$2,000 to $2,500		Culinary
Districts Rights	N/a		
Irrigation Stock (in Salt Lake Co.)	$2,000 to $2,500		
Wastewater Recycling			Outdoors With minimal Human contact
Treatment Plant	$3,000 to $5,000		
Main Trunk Line	Variable		
Secondary Systems	$600 to $1,000		

Projected Possible Sequence of Development for Communities with M&I Shortages

The projected sequences of development for Cedar Valley and Saratoga Springs are listed in Table 6-12. In general, the lowest cost sources would be developed first while the more costly sources would be staged as later additions or new ventures.

TABLE 6-12
Possible Sequence of Water Development in Cedar Valley and Saratoga Springs

	2000	2010	2020	2030	2040	2050
Cedar Valley						
Water Demand	109	306	453	632	3,899	7,165
Existing Supplies	0	0	0	0	0	0
Shortage	109	306	453	632	3,899	7,165
Future Supplies						
Agricultural Conversion	109	306	453	632	3,582	3,582
Utah Lake Irrigation Stock					317	1,750
Water Recycling						1,833
Remaining Shortages	**0**	**0**	**0**	**0**	**0**	**0**

TABLE 6-12 (continued)
Probable Cost Range for Developing New Water Supplies for Northern Utah County

Saratoga Springs						
Water Demand	453	3,123	4,498	5,621	8,779	11,563
Existing Supplies						
Groundwater	453	1,283	1,755	2,285	3,685	3,685
Canals/storage water		342	342	342	342	342
Shortages	0	1,498	2,401	2,994	4,752	7,536
Future Supplies						
Agricultural Conversion	0	1,498	2,401	2,994	4,675	5,982
District's Utah Lake Rights	0	0	0	0	77	1,554
Remaining Shortages	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF M&I NEEDS

With diligent efforts, the Saratoga Springs and Cedar Valley area of northern Utah County would be able to meet their M&I needs without any deliveries from the ULS project. This may require use of a small portion of the District's Utah Lake rights, water purchase from irrigation stock of canal companies in Salt Lake County, and water recycling.

New M&I water from conversion of agricultural lands would be driven by population and community growth. The availability of new M&I water from this source would depend on the urbanization of agricultural land irrigated with lake/river water. While the locations of lands irrigated with this water are a matter of record, the tracts of irrigated land that will be urbanized are not known. In general, the conversion of irrigated lands will probably occur concurrently in communities throughout the area as the population projections are realized.

Central Utah Project Completion Program

Chapter 7

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

INTRODUCTION

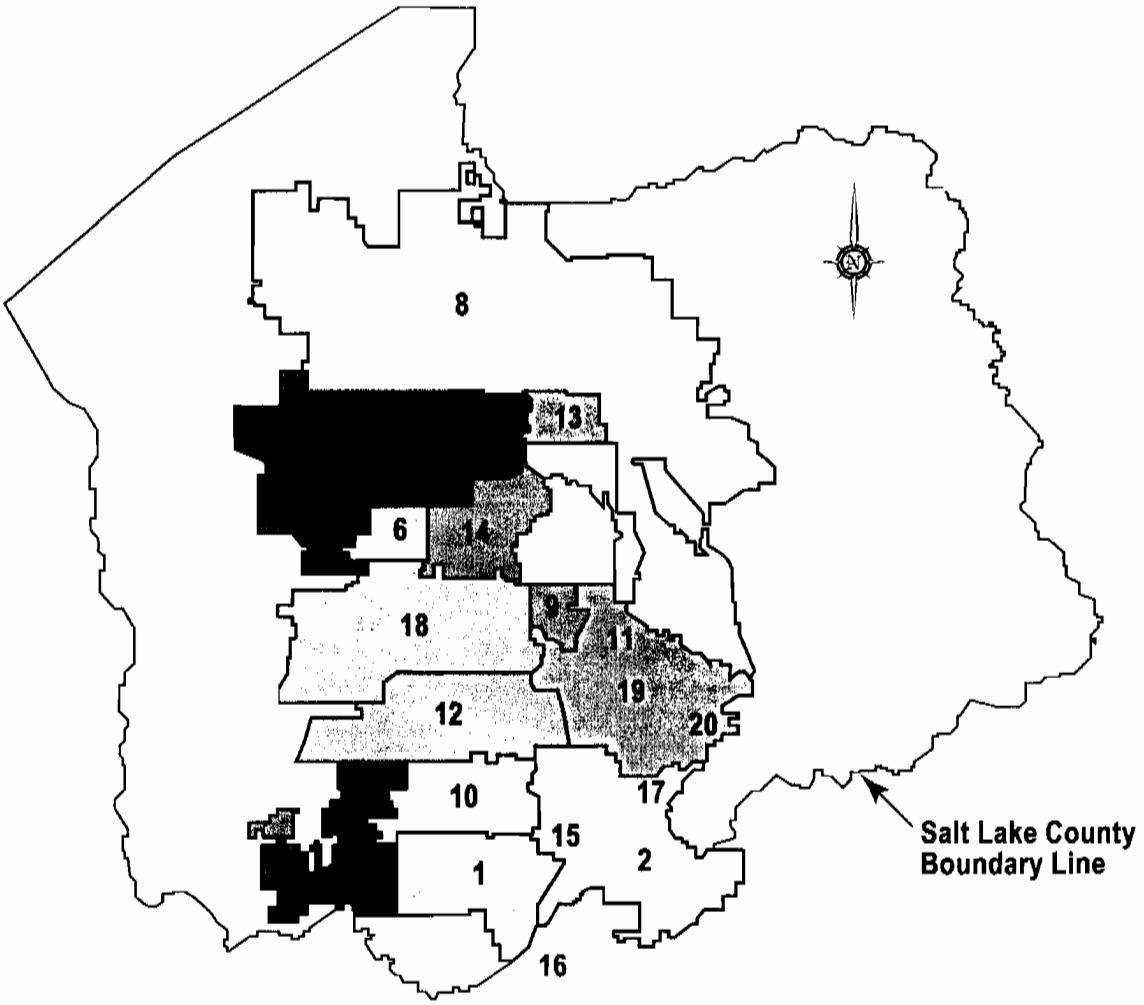
This Chapter was prepared by the Jordan Valley Water Conservancy District, as a result of a request by the Joint Lead Agencies for the Utah Lake Drainage Basin Water Delivery study. The Joint Lead agencies are comprised of the U.S. Department of Interior, Central Utah Water Conservancy District and the Utah Reclamation Mitigation and Conservation Commission. The information was needed for use by the Joint Lead Agencies in completing the supplement to the Definite Plan Report for the Bonneville Unit and for an environmental impact statement on the Utah Lake Drainage Basin Water Delivery System (ULS). Included in the report are Jordan Valley Water Conservancy District's water conservation and water recycling plans and the time frame to take delivery of the ULS water.

Description of Entity

Jordan Valley Water Conservancy District (JVWCD) was created in 1951 by the Utah legislature under the Water Conservancy Act. JVWCD was organized as a regional water supply agency to develop a water supply for rapidly growing areas in the south and southwestern portions of Salt Lake County. JVWCD is primarily a wholesaler of water to cities and improvement districts within the County. It has 19 member agencies that include cities, improvement districts, state agencies, and private water companies. In addition, JVWCD operates a direct retail system in certain portions of Salt Lake County. Retail deliveries constitute approximately 15% of JVWCD total municipal and industrial water deliveries. Figure 7-1 is a map showing the JVWCD service area and the general location of each of its customer member agencies. A short description of each incorporated municipality and unincorporated Census Designated Place (CDP) within the JVWCD service area is included in Attachment 7-A. JVWCD is the largest petitioner for Bonneville Unit M&I water.

Water Conservation

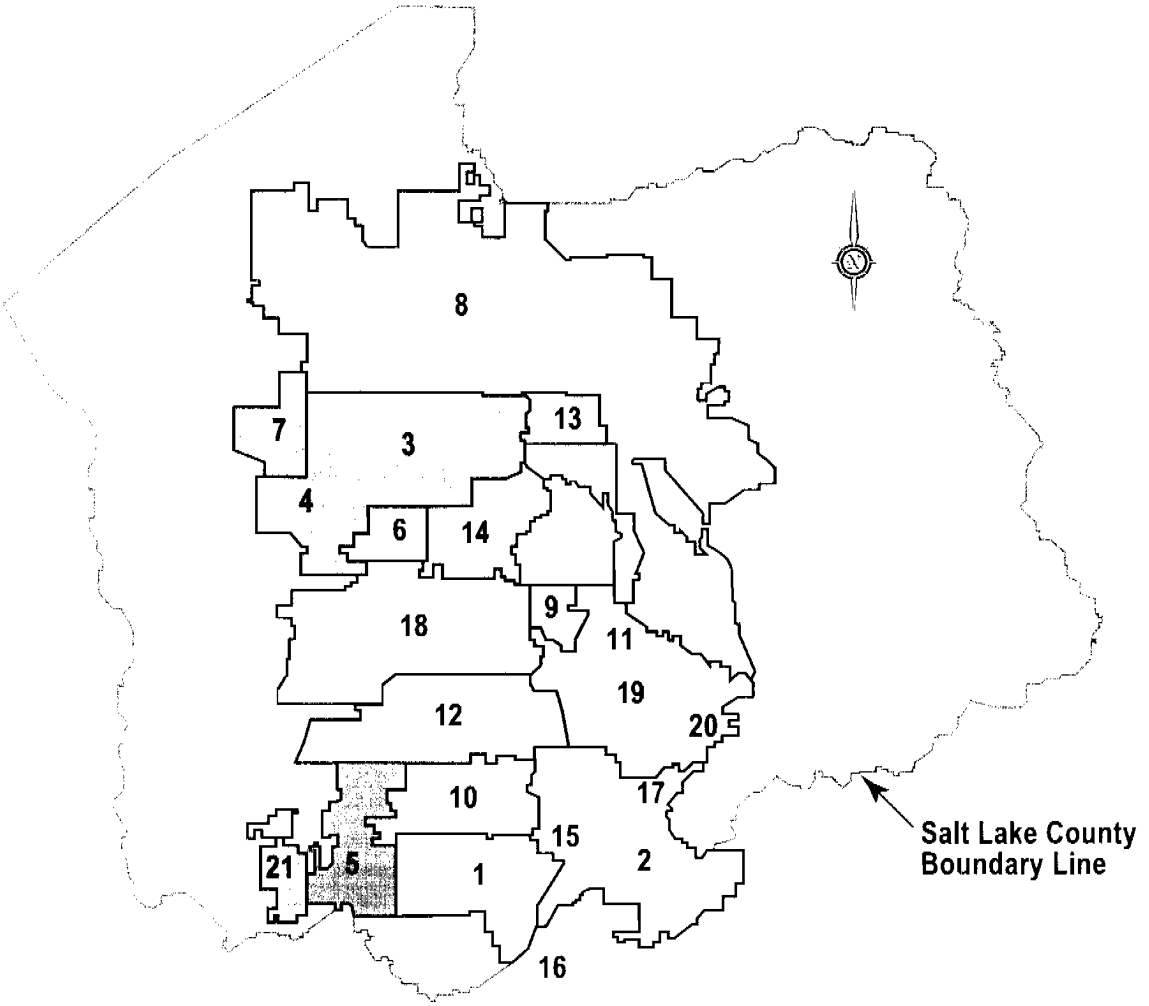
The Joint Lead Agencies have established for the ULS System an average daily M&I water usage ranging from 180 to 220 gallons per capita per day (gpcd) to be eligible for Bonneville Unit water. One of the criteria for entities requesting Bonneville Unit water under the ULS System is that entities requesting water must have an acceptable water conservation plan. JVWCD has substantial water conservation programs currently in effect, and substantial additional plans. These are fully described in Section 7.4 of this report.



Location of Member Agencies

1. Bluffdale City
2. Draper City
3. Granger-Hunter Improvement District
4. Hexcel Corporation
5. Herriman
6. Kearns Improvement District
7. Magna Water Company
8. Metropolitan Water District of Salt Lake & Sandy
9. Midvale City
10. Riverton City
11. Sandy City
12. City of South Jordan
13. City of South Salt Lake
14. Taylorsville-Bennion Improvement District
15. Utah State Department of Corrections
16. Utah State Department of Public Safety
17. WaterPro, Inc.
18. West Jordan City
19. White City Water Improvement District
20. Willow Creek Country Club
21. Hi-Country Estates Phase II

Figure 7-1
Jordan Valley Water Conservancy District Service Area



Location of Member Agencies

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11. Sandy City
12. City of South Jordan
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14. Taylorsville-Bennion Improvement District
15. Utah State Department of Corrections
16. Utah State Department of Public Safety
17. WaterPro, Inc.
18. West Jordan City
19. White City Water Improvement District
20. Willow Creek Country Club
21. Hi-Country Estates Phase II

Figure 7-1
Jordan Valley Water Conservancy District Service Area

Water Recycling

JVWCD has utilized fresh water supplies for its M&I water deliveries to date. Recycling of sewage effluent will become an integral part of future water supply planning for JVWCD. JVWCD has identified Bonneville Unit return flows as a potential water supply resulting from future water wastewater recycling.

Bonneville Unit return flows available for wastewater recycling involve Bonneville Unit water yielded from Jordanelle Reservoir and future Bonneville Unit water yielded from a ULS project. JVWCD estimates that the State Engineer will allow at least the following portions of Bonneville Unit waters for wastewater recycling applications:

- From Jordanelle Reservoir – 15%
- From ULS supplies – 35%

As a result, JVWCD estimates that a potential of 21,000 acre-feet can be recycled from Bonneville Unit water supplies delivered in Salt Lake County. Of this 21,000 acre-feet amount, JVWCD plans to recycle its corresponding 5/7 capacity share of these Bonneville Unit waters, or 15,000 acre-feet per year, in JVWCD's service areas.

JVWCD anticipates that it will begin recycling Bonneville Unit return flows from water yielded from Jordanelle Reservoir prior to taking delivery of ULS water supplies.

POPULATION PROJECTIONS

The Governor's Office of Planning and Budget (GOPB) released future population projection data in 2002 which utilized the results of the 2000 Census. The GOPB data provides County-wide population estimates for 2010, 2020, and 2030, and more detailed sub-county population estimates are made by regional planning organizations.

Population for Salt Lake County

In 2003, the Wasatch Front Regional Council, in coordination with GOPB, released sub-county population estimates for each incorporated area and the balance of unincorporated Salt Lake County. Table 7-1 shows the population projections for each incorporated community in Salt Lake County and the entire unincorporated area.

TABLE 7-1
Salt Lake County Population

Community Name	Year							
	2000	2002	2005	2010	2020	2030	2040	2050
Alta Town	370	368	397	461	560	631		
Bluffdale City	4,700	5,230	6,723	10,591	28,282	46,279		
Draper City	25,220	28,555	32,185	40,719	47,208	51,309		
Herriman City	1,523	3,223	9,097	15,000	28,307	37,415		
Holladay City	19,246	19,328	19,403	19,736	22,526	24,696		
Midvale City	27,029	27,698	28,558	29,581	31,310	32,270		
Murray City	34,024	34,718	35,908	38,146	39,778	39,465		
Riverton City	25,011	28,935	37,046	56,167	63,298	65,195		
Salt Lake City	181,743	184,092	185,336	187,259	193,130	197,079		
Sandy City	88,418	93,399	99,967	108,000	119,292	122,357		
South Jordan City	29,437	32,218	37,689	48,118	68,610	92,474		
So. Salt Lake City	22,038	22,190	22,252	23,240	25,903	26,829		
Taylorsville City	58,764	59,656	60,001	63,876	72,134	74,996		
West Jordan City	78,714	83,577	96,310	126,021	144,941	152,393		
West Valley City	108,896	112,168	116,496	124,621	135,354	140,904		
Remainder of Salt Lake County	193,254	188,576	180,022	186,020	263,153	327,550		
Total	**898,387**	**923,931**	**967,390**	**1,077,556**	**1,283,784**	**1,431,843**	**1,625,103**	**1,866,299**

Source of data:
2000 – Census 2000 as revised by the Utah Population Estimating Committee
2010, 2020, 2030 – (for Countywide total only), Governor's Office of Planning & Budget (GOBP)
2002, 2005, and all sub-county community projections – Wasatch Front Regional Council in coordination with GOPB (released in 2003)
2040, 2050 – GOPB (release in 2000)

Population for JVWCD Service Area

Many of Utah's fastest growing communities are located in the JVWCD service area. Table 7-2 shows the population projections for those communities in the JVWCD service area. A brief description of each community in the JVWCD service area is included in Attachment 7-A.

TABLE 7-2
Population in JVWCD Service Area

	Year							
Community Name	**2000**	**2002**	**2005**	**2010**	**2020**	**2030**	**2040**	**2050**
Bluffdale City	4,700	5,230	6,723	10,591	28,282	46,279		
Draper City	25,220	28,555	32,185	40,719	47,208	51,309		
Herriman City	1,523	3,223	9,097	15,000	28,307	37,415		
Holladay City [a)]	1,050	1,050	1,075	1,100	1,150	1,200		
Midvale City [a)]	16,500	16,500	16,700	17,000	18,000	19,000		
Riverton City	25,011	28,935	37,046	56,167	63,298	65,195		
Sandy City [b)]	1,000	1,000	1,000	1,000	1,000	1,000		
South Jordan City	29,437	32,218	37,689	48,118	68,610	92,474		
So. Salt Lake City	22,038	22,190	22,252	23,240	25,903	26,829		
Taylorsville City	58,764	59,656	60,001	63,876	72,134	74,996		
West Jordan City	78,714	83,577	96,310	126,021	144,941	152,393		
West Valley City	108,896	112,168	116,496	124,621	135,354	140,904		
Remainder of Salt Lake County [c)]	91,910	84,859	81,010	83,709	118,419	147,397		
Total population in JVWCD service area	**464,763**	**479,161**	**517,584**	**611,162**	**752,604**	**856,392**	**975,062[d)]**	**1,119,779[d)]**

Notes:
a) Population shown is only for that portion of the community within the JVWCD service area.
b) Virtually all of Sandy City was removed from the JVWCD service area December 31, 2001. JVWCD does maintain a small (315 AF per year) contract with Sandy City which will not increase in the future (indicated with the constant population of 1000. In order to provide a common reference for water usage rates, the Sandy City population is also (except 1000) omitted from year 2000 data.
c) Kearns, Magna, Oquirrh and White City are unincorporated communities in the service areas of JVWCD wholesale customers. JVWCD provides retail service in portions of Cottonwood West and Little Cottonwood Creek Valley unincorporated communities.
d) Calculated estimate assuming JVWCD service area population remains at 60% of total population in Salt Lake County.

Urbanized Lands

Most of the lands within JVWCD's service area are still urbanizing. Infill development is typical in these areas. Population densities vary from rural densities below 1.0 person per acre to a well-developed density of 8.4 people per acre. Table 7-3 shows current population densities for communities in JVWCD, and projected population densities for the year 2030. Details for this information are located in Attachment 7-A. Note that there is room for substantial infill development within JVWCD, all occurring within boundaries of the communities.

TABLE 7-3
Population Density of Communities in JVWCD Service Area

Community	Population Density (People per acre)		Benchmark density for highly urban area
	Year 2000	Year 2030	
Bluffdale	0.4	4.4	9 to 11
Draper City	1.3	2.6	9 to 11
Herriman City	0.3	6.5	9 to 11
Holladay City	4.3	10.5	9 to 11
Midvale City	7.3	8.7	9 to 11
Riverton City	3.1	8.0	9 to 11
Sandy City	6.2	8.6	9 to 11
South Jordan City	2.2	6.9	9 to 11
South Salt Lake City	5.0	6.1	9 to 11
Taylorsville	8.3	10.9	9 to 11
West Jordan City	3.5	7.7	9 to 11
West Valley City	4.8	6.2	9 to 11
Unincorporated	n/a	n/a	9 to 11

EXISTING WATER USAGE RATE (GPCD)

In 2000, the water usage rate within the JVWCD service area was approximately 250 gallons per capita per day (gpcd). There is insufficient data to categorize the use accurately, but it is estimated that approximately 70% is consumed for residential use, and 30% is consumed for commercial, industrial, and institutional uses.

JVWCD has implemented conservation programs that are beginning to yield promising results. In 2002, the water usage rate within the JVWCD service area was calculated to be 224 gpcd.

CONSERVATION PLANS

Introduction

Jordan Valley Water Conservancy District (JVWCD) has made a long term commitment to water conservation. JVWCD recognizes that the tremendous projected growth cannot be sustained without a reduction in per capita water use. Water conservation will not only extend limited water supplies, but have the added benefit of deferring costly infrastructure and future water development projects.

The State of Utah has recently undergone a five year drought cycle from 1999 to 2003. The drought has exposed many limitations of existing water supplies. As rapid growth along the Wasatch Front and in the State of Utah continues, JVWCD's fear is that the next drought cycle will have far reaching and much greater impacts on the citizens of the state. Water conservation is not only important in response to this drought cycle, but will be essential in providing for the future health of the state.

Water Conservation Master Plan

In 1999 JVWCD adopted a water conservation plan in response to the "Water Conservation Plan Act" which was signed into State law in 1998. The objectives of the plan were as follows:

1. To become a leader in the implementation of water conservation programs and activities and in the dissemination of water conservation educational information.

2. To gain public recognition and support for meaningful water conservation programs and efforts.

3. To reduce the demand for water and delay costly water infrastructure and development projects.

4. To extend limited water supplies to provide for future growth in JVWCD's service area.

The plan focused on demand-side conservation. An inventory of water conservation activities implemented by comparable water agencies elsewhere in the Western United States was prepared and 37 conservation measures were subsequently evaluated based on water savings, benefits and costs. Eleven measures were determined to have potential for significant water savings and cost effectiveness. These eleven conservation measures were further evaluated based on their benefits and costs, affordability and other non-quantifiable impacts. As a result, the plan recommended four water conservation measures to be implemented in 1999, including:

1. A public education/information program.

2. A water conservation demonstration garden.

3. The development of model landscape ordinances.

4. A residential water auditing program ("Water Check" Program).

Following adoption of the Water Conservation Plan in March 1999, JVWCD immediately implemented these programs, hired a full time water conservation programs coordinator and submitted a conservation programs funding request to the Central Utah Water Conservancy District under Section 207 of CUPCA, Conservation Credit Program.

JVWCD has continued to develop and build on these initial programs since implementation in 1999. Additional programs have also been developed and implemented and a Water Conservation Programs cost effectiveness evaluation performed as further described herein.

Water Conservation Goal

As part of the 1999 Water Conservation Plan, JVWCD's Board of Trustees adopted a conservation goal of reducing total water demand by 10% by the year 2020. This was based on a 20% savings in outdoor water use which would be approximately equivalent to a 10% overall savings. JVWCD's Board of Trustees subsequently adopted the State of Utah's goal of reducing water consumption statewide by 25% by the year 2050.

More recently, due to additional studies in year 2002, JVWCD's Board adopted a new and more aggressive water conservation goal of reducing water demand within JVWCD's service area by 25% by year 2025. This goal would be measured in terms of per capita water use reduction beginning in year 2000. The water use per capita in year 2000 was calculated to be 250 gpcd. Therefore, in order for JVWCD to meet this goal, District-wide water use will need to be reduced to 188 gpcd by 2025.

Current Water Conservation Programs and Activities

Public Education and Information Campaign. With the adoption of the District's Water Conservation Plan in 1999, JVWCD retained a public relations/media consultant to assist in developing a water conservation information/education program. Working with JVWCD staff, the "Slow the Flow, Save H_2O" campaign was created. Since that time, the campaign has continued to be developed, receiving significant recognition and market penetration statewide. The "Slow the Flow, Save H_2O" public education and information campaign represents the core of all District conservation programs and activities.

The campaign includes the development and dissemination of water conservation educational information through printed materials, radio and television advertisements, and media and community events in order to create heightened public awareness of the benefits of reduced water use. JVWCD has been involved with this campaign for four years and plans to continue developing and building on this campaign in the future.
In August of 2001, the Governor of the State of Utah met with water and other governmental officials across the State to develop a statewide water conservation initiative. The purpose of this initiative was twofold as follows:

- To immediately increase public awareness and educate the citizens of the state on water saving measures to address the current drought;
- To generate a long-term water conservation ethic to address Utah's rapid population growth.

A water conservation team was formed to develop a statewide water conservation campaign. The funding members of the team include the State Division of Water Resources, JVWCD, Central Utah Water Conservancy District, Metropolitan Water District of Salt Lake & Sandy, Weber Basin Water Conservancy District, Washington County Water Conservancy District, and more recently the Utah Water Users Association and the Rural Water Association of Utah.

The team agreed that the statewide initiative should broaden the "Slow the Flow, Save H_2O" campaign created by JVWCD and expand the campaign statewide. This would provide for greater market penetration and greater awareness of water conservation on a statewide basis and provide an umbrella campaign for local conservation activities throughout the state.

The main focus of this campaign is to create a long-term conservation ethic through television and radio advertisements and dissemination of educational materials on water conservation, in order to meet the long-term water conservation goal of 25% reduction in water use.

Water Conservation Demonstration Garden. JVWCD recognized that the greatest potential for water conservation is through a reduction in outdoor water use. This reduction can take place through efficient irrigation systems, correct watering schedules and planting design and other principles of water-efficient landscaping. JVWCD designed and constructed a water conservation demonstration garden to show waterwise alternatives to the traditional landscape. The Garden demonstrates water conservation principles by emphasizing proper landscape design, irrigation technologies, the use of hardscape and mulches, and a wide variety of low water use plants. The basic premise behind the garden is to show how to create an attractive landscape suited to the Utah climate which will save water by using alternatives to the traditional blue grass lawn landscape.

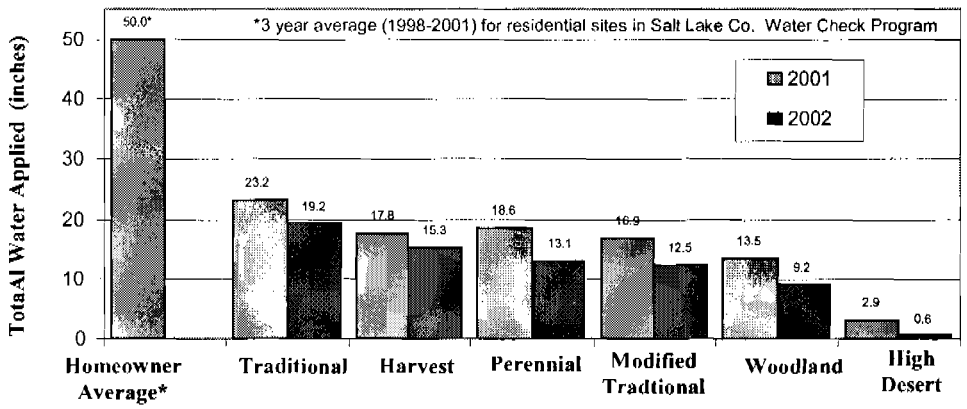
The Water Conservation Demonstration Garden consists of three main sections: The Neighborhood Garden; The Garden Park; and The Commercial Landscape. A brief description of each garden area is provided below:

<u>The Neighborhood Garden:</u> Construction of this area of the Garden was completed during the fall of year 2000. It features six themed yards or landscapes, along a mock residential street. These landscapes demonstrate water efficient practices that can be used as attractive alternatives to a typical predominantly bluegrass landscape. Each yard has its own water meter to monitor the actual amount of water being applied. The water usage of each yard is posted for comparison purposes with average homeowner water use. The six themed yards include:

- Traditional Landscape;
- Modified Traditional Landscape;
- Woodland Landscape;
- High Mountain Desert Landscape;
- Harvest Landscape; and
- Perennial Landscape.

A graph showing the amount of water applied to each landscape as compared to average homeowner use is provided in Figure 7-2.

Figure 7-2
JVWCD Demonstration Garden - Total Water Applied to Each Landscape in 2001 and 2002

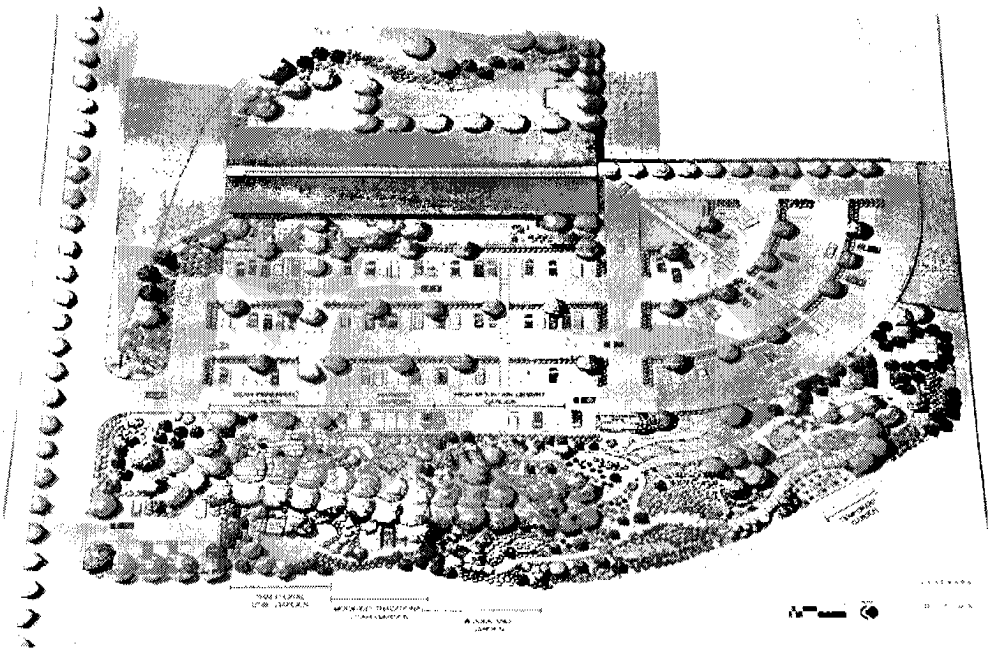


The Garden Park: Construction for this area of the Garden was completed in the fall of year 2001. The Garden Park is less formal, with wandering paths, a dry creek bed and bridges. Plants in the Garden Park range from Utah natives to vegetables, turf grasses and ornamental grasses. A range of alternative turf grasses are shown in plots, each with its own water meter. Water use data is shown for each turf plot for comparison purposes. This section of the Gardens also includes a weather station which measures evapotranspiration and precipitation, and controls the irrigation schedule for the Neighborhood Garden and Garden Park.

The Commercial Landscape: JVWCD re-landscaped the area immediately surrounding its administration buildings at its headquarters site in the summer of 2000. This was to provide an example of a waterwise commercial landscape. The turf area surrounding the building was reduced by 76% through the use of low water use plants, hardscapes and mulches. The design concepts utilized for the commercial landscape area are in accordance with the criteria identified in a model commercial landscape ordinance developed by JVWCD as further described herein.

A plan view drawing showing the Water Conservation Demonstration Garden is shown in Figure 7-3. The Garden is open and free to the public during spring, summer and fall months. The Garden is promoted through the "Slow the Flow, Save H_2O" public education and information campaign print materials and advertisements.

Figure 7-3



Thousands of people visit the Garden each year. Garden activities include Garden Fairs, dissemination of waterwise landscaping educational materials, volunteers, educational tours and free waterwise landscaping workshops.

Residential and Commercial Water Audits. Since adoption of the Water Conservation Master Plan in 1999, JVWCD and partnering agencies have pooled financial resources and contracted with Utah State University Extension to provide residential and commercial water audits (Water Checks) which are free to the public. Water audits target outdoor water usage and include an evaluation of the customer's soil type, plant root depth, sprinkler pressure, sprinkler distribution uniformity, and sprinkler precipitation rate. Following the audit, the customer is left with recommendations for sprinkler system repairs and adjustments to improve distribution uniformity and a customized irrigation schedule to improve watering efficiency. Water use records are obtained from each customer three years prior to and following the Water Check to measure the effectiveness of the water audit.

The Water Check program is now in its fifth year. More recently, there has been special emphasis placed on providing Water Checks for large water users including commercial, industrial and institutional water users.

The Water Audit Program has grown each year in terms of the number of Water Checks completed. Table 7-4 summarizes the total number of Water Checks performed within Salt Lake County during 1999 through 2002.

TABLE 7-4 Water Checks[1]					
	1999	**2000**	**2001**	**2002**	**Total**
Residential	446	638	882	1,066	**3,032**
Commercial	n/a	n/a	20	50	**70**
[1] Totals include all Water Checks for Salt Lake County					

Based on an evaluation of water use records of a randomly selected group of participants who received Water Checks in 1999, JVWCD and Utah State Extension Services have concluded that an average 15% reduction in water use has been achieved by participants receiving Water Checks. The Water Check data also shows that 66% of a resident's total water use is used outdoors and 34% is used indoors.

Model Commercial and Residential Landscape Ordinances. In 2000 JVWCD formed a working group which included representatives from the landscape and irrigation industry, Utah State University, and the Division of Water Resources to develop model commercial and residential landscape ordinances. With input from the working group, the model ordinances were developed over an 18-month period. The purpose of these ordinances is to provide models which JVWCD's member agencies, cities, counties and others can adopt to promote water-efficient landscaping of all new and rehabilitated commercial landscapes, and new residential landscapes.

The model commercial water-efficient landscape ordinance can be used for all new commercial and industrial developments. The main features of the ordinance include: the submission of a landscape plan documentation package by the developer, which is prepared by a landscape design professional, including a planting plan, irrigation plan, grading plan, soils report, a landscape water allowance worksheet and irrigation schedule; the landscape plan documentation package being approved prior to issuance and a building permit; the landscape irrigation systems being installed by a contractor certified by the Irrigation Association; a required water audit conducted by an independent Irrigation Association certified landscape irrigation auditor; and a requirement for the irrigation system to meet certain minimum efficiencies as certified by the irrigation auditor.

The model residential water-efficient landscape ordinance was designed for all new residences and is intended to heighten public awareness of water-efficient landscaping through the distribution of a landscape education packet for new homeowners. The residential packet includes information regarding waterwise landscaping, JVWCD Demonstration Garden activities and the Water Audit program.

JVWCD has been involved with its member agencies to form committees and working groups to assist with adoption of these landscape ordinances. To date, five of JVWCD's member agencies have adopted forms of the commercial landscape ordinance based on JVWCD's model. In terms

of water deliveries, the combined total of member agencies adopting the ordinance represents 54% of JVWCD's current yearly water delivery contract commitments.

Ultra Low Flush Toilet Pilot Replacement Program. In 2002 JVWCD implemented a pilot toilet replacement program within its retail service area. The program involved replacing 275 high flush toilets with flushing rates between 2.1 and 6.7 gallons per flush with new ultra low flush toilets (ULFTs) rated at 1.6 gallons per flush. The purpose of this program was to measure the water savings and calculate the cost effectiveness of replacing older high flush toilets with new ULFTs.

Three models of ULFTs were used for this program as follows: a Caroma Tasman 270, dual flush toilet with 0.8/1.6 gallons per flush (gpf); a Niagara Flapperless, with a tipping bucket flushing mechanism; and a Gerber Aqua Saver traditional style ULFT. Fifteen percent of the toilets installed were equipped with water measuring and flush counting equipment to determine water savings.

The water savings achieved from this program were found to be twofold. First, there were water savings associated with the reduced flush volume. Second, water savings were achieved through a reduction of toilets leaks associated with the older high flush toilets. Based on the preliminary evaluation of the data, Table 7-5 shows the water savings results:

TABLE 7-5

	Average Water Saved Per Day Per Toilet (gallons)	Average Water Saved Per Year Per Toilet (gallons)
Flush Volume	22.7	8,286
Savings due to leaks	19.2[1]	7,225
Total:	**42**	**15,511**

[1] The leak volume is calculated based on winter time water use records by the participants in the program. It should be noted that approximately 74% of the participants with water measuring and flush counter equipment had their new ULFT installed during winter months; therefore the full extent of toilet leaks cannot be calculated until water use records are obtained after the ULFT is in place for a full winter period. This data will be obtained in March 2004. The savings due to leaks will then be revised accordingly.

The total cost of the pilot toilet replacement program is summarized in Table 7-6 below.

TABLE 7-6	
Description	**Cost**
Toilet Installation	$25,127
Purchase of 275 ULFTs	25,046
Toilet Flush Measuring Equipment	3,130
Mailing Expenses	1,207
Legal Advertising	2,728
Less Participant Cost	(5,500)
JVWCD's Staff Time	3,262
Total Cost:	**$55,000**
	($200 per toilet)

Waterwise Classes and Workshops. In 2001, JVWCD hired a Conservation Horticulturalist as an addition to its Conservation Department staff. Among the duties included in this position are arranging for and teaching several waterwise landscaping classes throughout the spring and summer of each year. These classes are free to the public and include instruction on Utah native plants, designing efficient irrigation systems and waterwise landscapes, blue grass lawn care and alternatives and other topics emphasizing water conservation. Year 2003 marks the third year of these classes which are advertised through the "Slow the Flow, Save H_2O" campaign.

In addition, JVWCD staff and Utah State University Extension Services developed a new workshop series for large water users in 2001. This program was developed to educate large water users about landscape water conservation through proper landscape management, and targets decision makers and the maintenance staff of large water users throughout Davis, Weber, Salt Lake and Utah Counties. The workshop series began in 2002 and consists of a one-day instructional workshop including a morning classroom session followed by an afternoon field session. The curriculum includes irrigation system maintenance, irrigation scheduling, turf grass management, ornamental plant maintenance, irrigation auditing and field exercises. Attendees are given a work book, 24 catch cups and a soil probe.

The Large Water User Workshops are heavily subsidized by JVWCD, Weber Basin Water Conservancy District, State Division of Water Resources, Metropolitan Water District of Salt Lake & Sandy and Central Utah Water Conservancy District. The cost to each attendee is $10 which includes an approximate $90 subsidy. This program was largely successful in 2002 with 244 attendees spread over eleven workshops. Twelve workshops are scheduled for 2003, to be hosted by the five funding agencies.

Conservation Programs Cost And Cost Effectiveness. Table 7-7 shows the level of conservation funding in terms of cost per capita over the last three fiscal years.

TABLE 7-7			
Year	**Total Conservation Programs Cost**	**JVWCD Service Area Population**	**Cost Per Capita**
2000	$765,082	464,773	$1.65
2001	$938,548	471,967	$1.99
2002	$481,615	479,961	$1.00
2003*	$506,125		
* Total cost for 2003 is estimated.			

Conservation Cost Effectiveness. Table 7-8 below shows the amount expended for each of JVWCD's water conservation programs over the last three years.

TABLE 7-8				
Conservation Programs	**Program Cost**			
	2000	**2001**	**2002**	**2003***
Water Check / Hotline	$49,954	$93,225	$54,801	$54,615
Demonstration Garden	$465,661	$549,421	$91,061	$60,000
ULFT Program	$0	$0	$51,134	$55,000
Large Water User Workshops	$0	$0	$5,644	$5,645
State Media Campaign	$0	$34,333	$50,000	$50,000
JVWCD Media Campaign	$223,848	$250,693	$176,377	$213,623
Conservation Plan/Consulting	$19,003	$8,376	$48,892	$61,434
Education/Training/Member Dues	$6,616	$2,500	$3,706	$5,808
Total:	**$765,082**	**$938,548**	**$481,615**	**$506,125**
* Total cost for 2003 is estimated.				

The cost effectiveness of water conservation programs which primarily focus on public education and information is very difficult to calculate. However, it can be concluded that there has been tremendous water conservation savings over the past three years which is substantially due to the information being conveyed as part of the "Slow the Flow, Save H_2O" campaign. This is evidenced by the per capita water use reduction shown in Table 7-11. Table 7-9 below shows the calculated cost effectiveness, in terms of cost per acre-foot saved, for the Pilot Toilet Replacement Program and the Water Audit Program, since actual water savings have been

measured. The cost of these two programs can be compared with the estimated cost of future water development projects currently being considered and planned by JVWCD.

TABLE 7-9

Program/Project	Annual Cost ($/acre foot)
Pilot Toilet Replacement Program[1]	$313
Water Audit Program[2]	$252
Jordan River Shallow Groundwater RO Treatment	$180 - $400 (3)
Wastewater Recycling	$350 - $470
Bear River Development	$400 - $500 (3)
Utah Lake Agricultural Conversion – RO Treatment	$400 - $600 (3)

Notes:
1. Assumes 20 year life of toilet, savings of 42 gals/day/toilet, 4% interest
2. Assumes 15% reduction in outdoor water use for 5 years after Water Check, 4% interest
3. See Table 7-13.

CUPCA Section 207 Funding. In 1999, JVWCD submitted an application to Central Utah Water Conservancy District (CUWCD) for CUPCA Section 207 funding under its Conservation Credit Program. The application was approved for a 65% cost share of JVWCD's Water Conservation Demonstration Garden and other demand-side conservation programs. Table 7-10 shows the funding amounts which have been approved under CUPCA Section 207.

TABLE 7-10

Fiscal Year	*Funding Amount*
2000	$400,000
2001	$200,000
2002	$300,000
2003	$200,000
Total:	**$1,100,000**

In accordance with CUPCA Section 207 (b)(4) requirements, JVWCD will turn over 500 acre-feet of conserved water per year, for a five year period to CUWCD to enhance Provo River instream flows for environmental purposes.

Conservation Results. In order to achieve the water conservation goal of 25% water use reduction by 2025, a reduction in per capita use of 1% per year must be achieved. Table 7-11 shows that the actual per capita water use reduction has exceeded JVWCD's goal of 1% per year.

TABLE 7-11
JVWCD Service Area Population and Water Usage
(Updated May 23, 2003)

Year	[a]Population	Measured System Demand (AF)	Actual Usage Rate (gpcd)	[b]Water Usage Rate Goal (gpcd)
2000	464,773[c]	129,868	250	250
2001	471,967 [d]	128,617	243	248
2002	479,161	119,963	224	245
2005	517,584	[e]	N/A	238
2010	611,162	[e]	N/A	225
2020	752,604	[e]	N/A	200
2025	804,498	[e]	N/A	188
2030	856,392	[e]	N/A	188
2040	975,062	[e]	N/A	188
2050	1,119,779	[e]	N/A	188

(a) Population based on data furnished by the Governor's Office of Planning and Budget and Wasatch Front Regional Council.
(b) JVWCD's conservation goal is to reduce per capita water use 25% by year 2025, or 1% per year.
(c) Sandy City population (88,418) was part of JVWCD service area in 2000, but to provide a common reference for future water usage rates, Sandy City population and water uses is omitted from this data.
(d) Population estimated by interpolation.
(e) See Table 5-1 for future demand estimates with conservation.

Potential Future Programs

JVWCD is meeting the objectives set forth in the Water Conservation Master Plan adopted in 1999. JVWCD is recognized as a leader in conservation and has been influential statewide in its implementation of a comprehensive and complete water conservation plan.

In 2002, JVWCD adopted an aggressive water conservation goal of 25% water use reduction by the year 2025. Table 7-11 shows that significant water use reduction has occurred since year 2000. It is unknown whether this reduction in water use will be sustained due to a long term water conservation ethic or if there will be a rebound in water usage once the current drought cycle is over.

In spite of this, JVWCD is committed to continue its leadership role in the area of water conservation and implement those programs which are necessary to meet its conservation goal.

JVWCD recognizes that in order to achieve its conservation goal, its existing conservation programs will need to continue to be assessed, improved and refined. JVWCD will look to develop additional programs which will be effective in encouraging the structural changes needed within its service area to provide for long term water conservation.

Public Information/Education Program. Public education/information will continue to be the essence of JVWCD's water conservation programs. As an added feature in 2003, JVWCD will implement a waterwise reality home program which will serve as an education tool for the public to learn ways to save water on their landscapes. This program will be named "Water Quest, Saving Water by the Yard" and will include the selection of a family/homeowner from JVWCD's retail service area and replacing the homeowner's existing traditional blue grass landscape with a water efficient landscape.

The replacement work will include the removal of the homeowner's existing turf, plants and irrigation system and the installation of drought tolerant plants and turf, hardscaping features, mulches and an efficient irrigation system. The family will participate in the re-landscaping work and the media will track the progress of the landscape conversion process throughout the summer of 2003. In addition, the family's water use will be monitored and compared to past years water use to show the public the water savings that can be achieved through the structural changes made to the landscape.

Water Audit Program. Additional emphasis will be placed on performing water audits for large water users. This is because of the tremendous waste occurring due to inefficient irrigation schedules and systems belonging to commercial, institutional and industrial water users.

In addition, Water Savings Kits will be offered free of charge to homeowners who request Water Checks in 2003. The Water Savings Kits include a low flow shower head, two low flow faucet aerators, a displacement bag for the homeowner's toilet tank and toilet leak detection dye tablets.

Expanded Toilet Replacement Program. In the coming years, JVWCD has plans to enlarge its toilet replacement program by building on what was learned from the pilot toilet replacement program and other toilet replacement programs across the west. In fiscal year 2003/2004 (Year 1), JVWCD plans to replace at least 1,000 high flush toilets with a low flush flapperless toilet, which was determined to be the most effective in the pilot program. It is anticipated that JVWCD will offer these toilets at no charge to qualifying homeowners in its retail area and assist its member agencies in providing these toilets to homeowners within their respective service areas.

The proposed plan for Year 1 is as follows:

1. The program will be advertised through the use of billing stuffers.
2. Interested participants will mail or e-mail pertinent information back to the District and the District will confirm the information and determine if the participant qualifies.

3. If the participant qualifies, a voucher will be mailed to the participant which can be redeemable at JVWCD's offices for the flapperless ULFT.
4. The qualifying participant will be responsible to install the new toilet and dispose of the old toilet.
5. JVWCD will prepare and update a toilet replacement data base which will be used to confirm the participant's information and follow up on successful installation.

JVWCD also proposes to assist its member agencies in implementation of a similar program in Year 1. In future years, JVWCD's Board of Trustees is interested in further enlargement of a toilet replacement program by expanding the program county-wide or along the Wasatch Front if other water districts are willing to participate and if partial funding can be obtained. A successful toilet replacement program is a good example of a structural means of achieving water conservation.

Water Conservation Pricing. In 2002, JVWCD retained a consultant to assist it with a comprehensive financial review and water rate study. With assistance from its consultant, JVWCD considered several alternative water rate structures for both retail and wholesale service areas which would encourage the efficient use of water.

On June 11, 2003, JVWCD's Board of Trustees adopted seasonal water conservation rate structures for both retail and wholesale water deliveries, to become effective on July 1, 2003. The new seasonal rates are divided into winter months (November 1 through April 30) and summer months (May 1 through October 31), and are designed to be revenue neutral with a 25% differential between the winter and summer rate. This seasonal rate structure was adopted to encourage long-term conservation and the efficient use of JVWCD's water supply in order to sustain the tremendous growth expected.

Water Conservation Demonstration Gardens Master Plan. JVWCD's existing Water Conservation Demonstration Gardens have become a tremendous community asset and educational tool to demonstrate water conservation principles to the public. JVWCD owns additional property at its headquarters site which would provide for expansion of its existing Demonstration Gardens.

In May, 2003, JVWCD's Board of Trustees approved the selection of a consultant to assist JVWCD in the preparation of a Water Conservation Demonstration Gardens Expansion Master Plan. As part of the Master Plan, consideration will be given to additional educational features and displays which could be implemented in expanded garden areas which would further assist the District in showing the public how it can reduce per capita water use. A total of 17 acres of undeveloped property will be considered as part of the Master Plan. The work will include development of conceptual plan view drawings for the site, including plans for pathway expansion, additional parking, plant groupings, potential building space allotments and an additional innovative and interpretive design features for public education purposes. The work will also include construction phasing, construction schedules and cost estimates.

Additional Water Conservation Programs Master Planning Work. JVWCD will update its Master Plan work for future conservation programs and activities as needed. JVWCD will continue to monitor water use (on a per capita basis) and implement programs which are necessary to meet its water conservation goal.

JVWCD will continue to be involved with its member agencies and enlist their participation in meeting its conservation goal. Furthermore, JVWCD will look for opportunities to encourage its member agencies to implement water conservation measures within their own retail service areas. The following activities will be considered by JVWCD for its member agencies:

1. Provide funding assistance or a mechanism to provide funding assistance for implementation of water conservation programs among member agencies.

2. Require that member agencies prepare, submit and continue to update water conservation plans to meet the per capita water use reduction goal of the District.

3. Establish working groups with each member agency to assist in the implementation of effective and meaningful water conservation activities and programs.

TOTAL M&I DEMANDS WITH CONSERVATION

Table 7-12 shows the total estimated demands within the JVWCD service area. Demands are shown with and without conservation to illustrate the significant amounts of water which JVWCD expects to save through conservation. In 2002, JVWCD member agencies supplied 49,817 AF from their own sources and in the future are expected to ultimately be capable of supplying approximately 55,000 AF of the total demand within the JVWCD service area from their own sources.

TABLE 7-12
JVWCD Service Area Total M&I Demand Projections

Year	JVWCD Service Area Population	No conservation from 2000 usage rates		25% conservation by 2025 usage rates		Amount conserved (AF)
		Usage Rates (gpcd)	Total M&I Deliveries (AF)	Usage Rates (gpcd)	Total M&I Deliveries (AF)	
2000 [a)]	464,763	250	129,868	250	129,868	0
2005	517,584	250	144,942	235	136,246	8,697
2010	611,162	250	171,147	225	154,033	17,115
2020	752,604	250	210,756	200	168,605	42,151
2025 [b)]	804,498	250	225,288	188	169,417	55,872
2030	856,392	250	239,821	188	180,345	59,475
2040	975,062	250	273,052	188	205,335	67,717
2050	1,119,779	250	313,578	188	235,811	77,767

Notes:
a) Although JVWCD served water to Sandy City in 2000, a series of contracts executed in 1990 provided for Sandy City to de-annex from JVWCD with virtually all water deliveries to cease on December 31, 2001. Therefore, the population and water use data for Sandy City is omitted to provide a common comparison point for future population and water usage rates.
b) Estimated by interpolation between 2020 and 2030 estimates.

CAPABILITY OF EXISTING SUPPLIES TO MEET DEMANDS

Existing Supplies of JVWCD and Member Agencies

The JVWCD and its member agencies have a current water supply of approximately 133,436 acre-feet per year. This amount includes 13,636 acre feet of temporary, surplus water supply from the Metropolitan Water District of Salt Lake & Sandy (MWDSLS) which cannot be considered as a permanent supply. This surplus water supply was available to JVWCD by contract through December 31, 2001.

It is estimated that the JVWCD service area will have approximately 148,530 acre-feet per year as a water supply available by the year 2050. This will result from the termination of the temporary surplus water supply from MWDSLS, development of additional groundwater by JVWCD, and a second Central Utah Project increment of water supply being made available to reach a total petition amount of 50,000 acre-feet per year. The year 2050 water supply will come essentially from five sources:

- Groundwater developed by member agencies;
- Groundwater developed by JVWCD;

- Surface runoff from various Wasatch Front creeks in Salt Lake County;
- Water from the Weber and Provo Rivers available through an irrigation exchange known as the Welby Jacob Exchange; and
- Federally developed water from the M&I system of the Bonneville unit (Jordanelle Reservoir) of the Central Utah project.

A summary of water supplies from existing sources is presented in Table 7-13.

TABLE 7-13
Summary of Existing Water Supplies Available to the JVWCD
Drought Year Yield (acre-feet)

	Year 2000 with Temporary Surplus Water	Year 2050 w/o Temporary Surplus Water
Temporary Surplus Water [a)]		
From MWDSLS	13,636	0
Water Supply of Member Agencies		
Presently Developed (mostly groundwater)	55,000	55,000
Additional rights (groundwater)		0
Groundwater Wells	20,000	25,000
Springs	0	360
Surface Water		
High Quality (mountain front streams)	2,670	2,670
High Quality (Weber/Provo Rivers, Welby Jacob Exchange)	15,500	15,500
Central Utah Project		
1st increment	26,630	26,630
2nd increment		23,370
Total	**133,436**	**148,530**

a) The temporary surplus water terminated on December 31, 2001.

Projected M&I Shortages of JVWCD Under Existing Supplies

The future M&I use in the JVWCD service area was estimated using the population projections in Table 7-2 and the per capita use rates in Table 7-11. Table 7-14 presents the resulting M&I water demand in comparison with the existing supply. The estimates indicate that between 2000 and 2010 the JVWCD water supply will change from a surplus condition to a deficit condition as water demands increase and as temporary surplus water supply availability expires. The expiration of the temporary surplus water supply will be offset and superseded by increased well production and additional CUP water from the Bonneville Unit M&I System. However, in spite of these compensating supplies, the projected demand in excess of existing water supplies could

reach 90,000 acre-feet by the year 2050. Figure 7-4 displays the existing water supplies available to JVWCD and the projected water demands through 2050.

Table 7-14
Projected M&I Shortages Under Existing Water Supply Available to the JVWCD
(acre-feet)

Case	2000	2010	2020	2030	2040	2050
Total M&I Demand	129,868	154,033	168,605	180,345	205,335	235,811
Existing Supply [a)]	133,436	148,530	148,530	148,530	148,530	148,530
Surplus	**3,568**					
Deficit		**5,503**	**20,075**	**31,815**	**56,805**	**87,281**

a) In year 2010 the supply will be reduced by the loss of 13,636 acre-feet of temporary surplus water that was available in Year 2000 from MWDSLS. This reduction will be partially offset by increases in groundwater development and pumping by JVWCD, and by availability of additional CUP Bonneville Unit M&I System water under a JVWCD petition totaling 50,000 acre-feet.

Opportunities to fill this deficit include, in addition to the ULS water supply, the treatment of contaminated groundwater in the southwestern portion of Salt Lake County, membrane treatment of saline groundwater along the Jordan River, water recycling from wastewater treatment plants, and reverse osmosis treatment of Utah Lake water.

OTHER POTENTIAL LOCAL WATER SUPPLIES TO MEET M&I NEEDS

An array of potential water sources has been identified for development to meet the shortfalls indicated in Table 7-14 and in Figure 7-4. These potential sources are as follows:

- Southwest Salt Lake County contaminated groundwater treatment project
- Membrane treatment of Jordan Valley groundwater
- Agricultural conversion of Utah Lake water through reverse osmosis treatment
- Wastewater recycling
- Importation of Bear River water
- Delivery of water from the Utah Lake Drainage Basin Water Delivery System (ULS)

These water sources are described in the following paragraphs. Except for the delivery of Bonneville Unit water through the ULS, the potential sources contain water of low quality that will require expensive treatment before use as a culinary water supply.

The primary entity pursing these water supplies is JVWCD, which as presented in Table 7-14 will have an estimated shortage of 87,281 acre-feet by the year 2050.

Southwest Groundwater Treatment Project (Low Quality Source)

Historic mining practices in southwestern Salt Lake County have created a deep groundwater contaminant plume covering approximately 50 square miles. Contamination includes acidic waters, elevated metals concentrations, and elevated sulfate concentrations. The proposed project combines a CERCLA clean-up response action with a CERCLA natural resource damage settlement to accomplish the following purposes:

- Remediate the aquifer;
- Contain and contract the contaminant plume; and
- Produce a public water supply of approximately 7,000 acre-feet for drinking water

The project will produce potable water by pumping contaminated water from well fields and treating it with a reverse osmosis processes. The potable water will be delivered by the JVWCD through its existing water distribution system to the four communities affected by the contaminant plume, namely West Jordan City, South Jordan City, Riverton City, and Herriman City.

The project depends upon agreements being reached with Kennecott Utah Copper Corporation and with the Utah State Trustee holding the Natural Resource Damage Claim trust fund. The project also relies upon a concentrate discharge permit for the reverse osmosis treatment process. These agreements and discharge permits are currently being negotiated by JVWCD. Although it is anticipated that they will be executed during 2003, substantial difficulties still exist in reaching final agreements and a final permit.

JVWCD Membrane Treatment of Groundwater Using Its Existing Utah Lake/Jordan River Water Rights (Low Quality Source)

The Jordan Valley Water Conservancy District has a goal for purchasing between 50,000 and 70,000 acre-feet of water rights from Utah Lake and the Jordan River. At the present time, JVWCD has purchased 16,735 acre-feet of rights. In addition, JVWCD has negotiated the purchase of 6,000 – 7,000 acre-feet of Jordan River rights, subject to approval of change applications by the State Engineer. The change application has been submitted, and it is anticipated that this acquisition may be completed by JVWCD during 2004. However, substantial difficulties in overcoming protests of other potentially affected parties may exist.

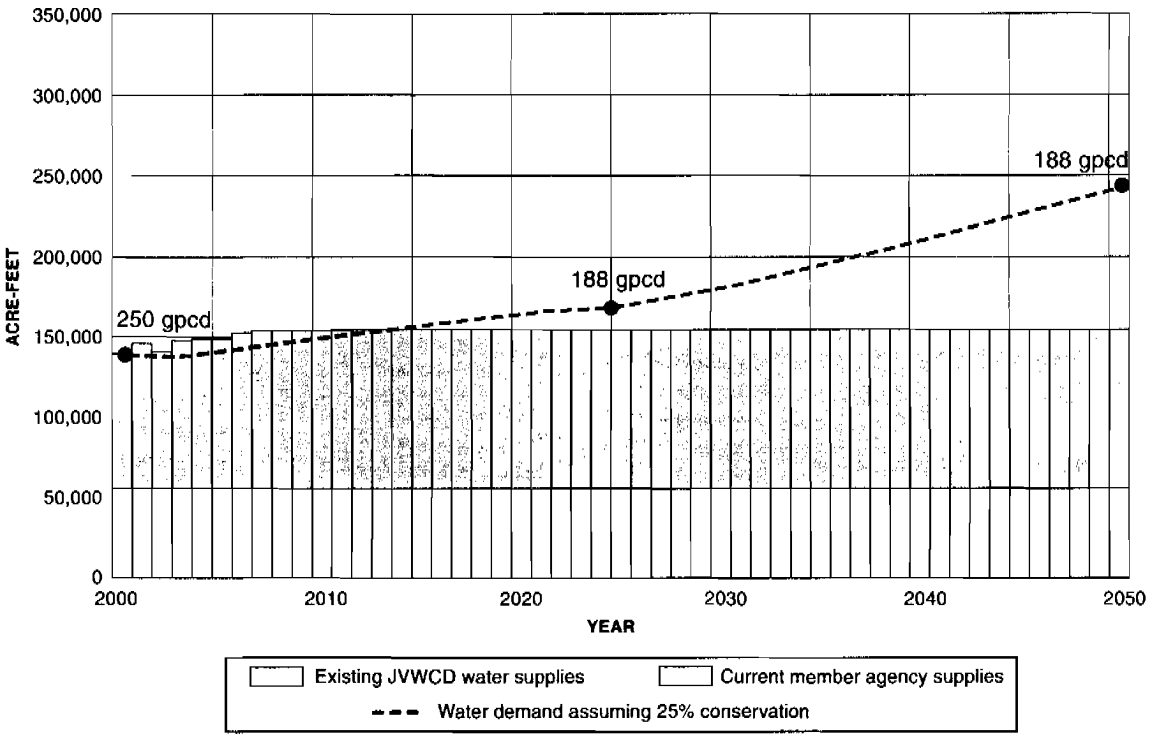


Figure 7-4
Jordan Valley Water Conservancy District
Water Supply and Demand Scenario for Drought Years

The JVWCD has completed studies to determine the most economical means of utilizing the water available under these existing rights. The most economical strategy is to use the shallow aquifer along the Jordan River as "pretreatment" of the Utah Lake/Jordan River waters to remove suspended matter and particles by means of riverbank filtration. Through a series of shallow riverbank filtration wells the water would then be extracted and treated for culinary use through a demineralization membrane treatment process. This process has been identified as reverse osmosis.

Of the 16,735 acre-feet of current rights, the JVWCD anticipates 2,000-3,000 acre feet will be required to replace Utah County return flows associated with its Welby Jacob Exchange. In addition to this, because of losses associated with the membrane treatment process (e.g. lost through brine disposal), JVWCD anticipates its total usable water supply resulting from the existing Utah Lake rights may be as low as 9,000 acre-feet annually.

JVWCD is pursuing plans to treat between 1,235 acre-feet and 2,300 acre-feet per year as an additional component of the Southwest Groundwater Treatment Project. This will involve extraction of shallow groundwater near the Jordan River by means of 4 – 6 riverbank filtration wells, and demineralization of that water through reverse osmosis treatment. As with the

Southwest Groundwater Treatment Project, challenges with the discharge of concentrate from this process will be encountered.

Water Supply and Reverse Osmosis Treatment of Water from Future Conversion of Irrigated Lands to Urban Use (Low Quality Source)

Development of this water source involves the conversion of Utah Lake/Jordan River water currently used for irrigation as community development occurs on irrigated acreage.

Rate of Urbanization of Agricultural Lands in Salt Lake County. The Draft Plan Formulation Report, Utah Lake Drainage Basin Water Delivery System, Central Utah Water Conservancy District, February 2002 excluded the conversion of Utah Lake water as a potential water supply for Salt Lake County in considering the need for ULS water. The rationale was that water from the lake is unsuitable for municipal use due to its dissolved solids content, and has taste and odor problems even with advanced water treatment procedures. Outdoor watering with Utah Lake water also is not desirable because the lake has a high calcium carbonate content that leaves a white film on shrubs and lawns. However, it was anticipated the JVWCD may eventually turn to this supply if other fresh water sources such as ULS water or other sources could not be secured or developed in a timely manner.

The present amount of irrigated land in Salt Lake County is approximately 14,021 acres, as listed on Table 7-15. Essentially all of the existing irrigated acreage in Salt Lake County lies within the boundaries of the Jordan Valley Water Conservancy District. Thus, it was assumed that the water made available by the retirement of the existing irrigated land would become largely available to the JVWCD. To estimate the rate at which irrigation water may become available for conversion to M&I use, an analysis was made of the rate of population growth and community development, and their influence on irrigated acreage reduction. Based on the proportions of irrigated land and non-irrigated land available for development, it was assumed that over the next five decades approximately 30 percent of the new growth would occur on presently irrigated land. The result was a gradual increase in availability of the amount of water presented on Table 7-15. The calculations are indicated on Table 7-16.

TABLE 7-15
Existing Irrigated Acreage in Salt Lake County
Associated with Water Rights From Utah Lake and the Jordan River
(Source: Utah Division of Water Rights, November 2002)

Canal Company	Primary or Secondary Right	Acres Irrigated	Acre-feet of Water
Utah and Salt Lake	Primary	5,517	27,676
South Jordan	Primary	2,870	14,306
East Jordan	Primary	2,564	13,962
North Jordan	Primary	1,070	5,350
Draper Irrigation & Sandy Canal Co.	Secondary	2,000	9,950
Total		**14,021**	**71,244**

TABLE 7-16
Projected Rate of Irrigation Water Conversion through Urbanization of Irrigated Lands in Salt Lake County

	2000	*2010*	*2020*	*2030*	*2040*	*2050*
Population						
JVWCD Population	464,763	611,162	752,604	856,392	975,062	1,119,779
Incremental Change		146,399	141,442	103,788	118,670	144,717
Population Density (assumed people/acre)		5	7	8	9	10
Total Acreage Urbanized						
Incremental acres		2,814	16,903	10,374	13,515	13,505
Cumulative acres		2,814	19,717	30,091	43,606	57,111
Assumed Distribution between Irrigated and Non-irrigated Acreage						
Non-irrigated (70%).		1,970	13,802	21,064	30,524	42,423
Irrigated (30%)		844	5,915	9,027	13,082	14,021 [a]
Water Supply (AF)						
Average (AF) [b]		4,220	29,575	45,135	65,410	70,105
Firm yield (AF) [c]		3,376	23,660	36,108	52,328	56,084

Notes:
a. From Table 7-1 the remaining agricultural land is approximately 14,021 acres, which happens to be less than 30 percent for the last decade prior to 2050.
b. From Table 7-1, the diversion requirement for the irrigated land is 5.0 acre-feet per acre as designated by the State Engineer in approval of water rights during the late 1800's. The average water supply is obtained by multiplying the irrigated acreage converted to urban use by 5.0 acre-feet per acre. For example, 844 acres times 5.0 acre-feet per acre = 4,220 AF (in Year 2010).
c. Firm yield is estimated to be 80% of the average yield. The firm yield is based upon drought cycles during which Utah Lake levels drop too low to pump full allotments.

Table 7-16 shows that a total of 70,105 acre-feet, based upon average yields, will become available for acquisition by the year 2050. Of this amount, it is assumed that 75% can be acquired by JVWCD, or 52,580 acre-feet. The remaining 25%, from experience by JVWCD, will be transferred to Utah County for conversion to groundwater sources, or will be retained by family trusts, estates, and small farm areas. In the case of a reduced firm yield of 56,084 acre-feet by 2050, the 75% acquisition by JVWCD would be 42,063 acre-feet.

Projected Volume of Yield Using Reverse Osmosis Treatment. Water demand projections and shortages that will result after all existing supplies have been developed will require the treatment of Utah Lake waters. This water will become available as the irrigated lands are converted as discussed above, and as the JVWCD makes use of additional Utah Lake water under other rights presently held or acquired in the future.

Feasibility studies by JVWCD have concluded that water from Utah Lake is expensive to treat For M&I use. Because of the high cost, it is likely that reverse osmosis (RO) treatment plants would be constructed in stages. A significant amount of waste byproduct results from RO treatment and its disposal would be an additional and substantial cost item. JVWCD projects a recovery rate of 75% for producing culinary grade water from the raw feed water delivered to reverse osmosis plants. This is based upon pilot reverse osmosis testing that JVWCD has performed.

The potential amount of water that could become available for RO treatment is estimated to be approximately 66,396 acre-feet. Note that 4,816 acre-feet of this feed water would be deep, brackish groundwater, to which JVWCD has water rights, to supplement irrigation stock from Utah Lake and the Jordan River. Of this feed water amount, it is anticipated that only about 50,000 acre-feet would be realized as product water. These amounts are presented in Table 7-17.

TABLE 7-17
Projected Yield of Converted Agricultural Water Using Reverse Osmosis Treatment
(acre-feet)

Raw (Feed) Water Supply	Facility	Volume of Feed Water Treated	Culinary Grade Water Produced [1]	Byproduct Disposal [2]
Current JVWCD stock	Reverse Osmosis Plants	9,000	6,750	2,250
Future Conversion to JVWCD	Reverse Osmosis Plants	52,580	39,638	13,212
JVWCD Deep Brackish Groundwater	Reverse Osmosis Plants	4,816	3,612	1,204
	Totals	**66,396**	**50,000**	**16,666**

[1]A 75% recovery rate is assumed.
[2]25% of feed water will be discharged as a byproduct (concentrate) flow.

Wastewater Recycling (Low Quality Source)

This water source involves the recycling and reuse of return flows from M&I water use that is conveyed to municipal wastewater treatment plants in Salt Lake County. The treated wastewater would be piped from the treatment plants to secondary water systems in various parts of Salt Lake County. Calculations of volumes of CUP Bonneville Unit water return flows to the significant wastewater treatment plants in Salt Lake County have been made. The three major wastewater plants in Salt Lake County are:

- Central Valley Water Reclamation Facility (CVWRF)
- South Valley Water Reclamation Facility (SVWRF)
- Salt Lake City Reclamation Facility (SLCRF)

The two most likely candidates for water recycling in the JVWCD service area are member agencies and service areas in the CVWRF and in SVWRF. The estimated CUP Bonneville Unit return flows as sewage effluent to these facilities are estimated as shown in Table 7-18. Both current and future deliveries of Bonneville Unit M&I system from Jordanelle Reservoir are shown in Table 7-18.

TABLE 7-18
Central Utah Project Bonneville Unit
Estimated Return Flows as Sewage Effluent

CUP Water (AF/yr)			Sewage Effluent (AF/yr)		
CUP Component	**Treated Potable Water**	**Sewage Effluent**	**To CVWRF**	**To SVWRF**	**To SLCRF**
Bonneville Unit M&I System - JVWCD Petition	50,000	7,500[a]	4,000	3,500	0
Bonneville Unit M&I System - MWDSLS Petition	20,000	3,000[a]	1,000	500	1,500
ULS – JVWCD Allocation	21,429 (5/7 of 30,000)	7,500[b]	3,500	4,000	0
ULS – MWDSLS Allocation	8,571 (2/7 of 30,000)	3,000[b]	750	750	1,500
Totals	**100,000**	**21,000**	**9,250**	**8,750**	**3,000**

Notes:
[a]15% of treated potable water is assumed.
[b]35% of treated potable water is assumed.

The most practical use of recycled water from these wastewater treatment plants would be for outdoor watering, primarily on golf courses and other large, landscaped, urban areas. The following sections describe plans of JVWCD and its member agencies.

Central Valley Water Reclamation Facility Planning. The CVWRF is a regional wastewater treatment facility located at 800 West 3190 South. It services seven local entities, involving three cities and four special improvement districts. Some of the CVWRF member agencies are also JVWCD member agencies, as shown in Table 7-19.

TABLE 7-19
CVWRF and JVWCD Member Agencies

CVWRF Member Agency	JVWCD Member Agency
Cottonwood Improvement District	Partial, in JVWCD water retail delivery system
Granger-Hunter Improvement District (GHID)	Yes
Kearns Improvement District (KID)	Yes
Murray City	Partial, in JVWCD water retail system in newly annexed perimeter of Murray City
Salt Lake City Suburban Sanitary District #1	Partial, in JVWCD water retail service area
City of South Salt Lake	Yes
Taylorsville-Bennion Improvement Dist (TBID)	Yes

CVWRF recently completed a "Water Reuse Market Feasibility Study." This study considered a tertiary treatment level (filtration) and delivery of recycled sewage effluent to large landscaped parcels, such as golf courses and parks, within the CVWRF member agencies service areas. A transmission system was developed consisting of four main trunk lines. Phase 1 transmission lines include a West Line that would serve parcels in the West Valley City area and a South Line that would serve parcels along the Jordan River in Murray City. The Phase 2 transmission lines include a Southwest Line through the Taylorsville-Bennion Improvement District to the east boundary of the Kearns Improvement District, and a Southeast Line that would serve other east side parcels within Murray City, Cottonwood Improvement District and Salt Lake Suburban Sanitary District #1. The CVWRF on-site facilities would include a new recycled water facility that would provide effluent filtration treatment to a level that would meet the State of Utah Type I reuse classification.

CVWRF concluded in its study that an ultimate quantity of 2,779 acres could be irrigated with a recycling project suitable for large landscaped areas. An annual recycling of 8,799 acre-feet, at a seasonal peak day demand of 31.9 million gallons per day (mgd), would be feasible. The details of the CVWRF study are shown in Table 7-20.

TABLE 7-20
CVWRF Estimated Recycled Water Demand by Member Agency

Member Agency	Irrigated Area (Acres)	Seasonal Demand (AF)	Seasonal Peak Day Demand (mgd)
Cottonwood Improvement District	190	600	2.2
Granger-Hunter Improvement District (GHID)	944	2,990	10.8
Kearns Improvement District (KID)	316 553 Ultimate	1,000 1,750 Ultimate	3.6 6.3
Murray City	628	1,990	7.2
Salt Lake City Suburban Sanitary District #1	128	405	1.5
City of South Salt Lake	0	0	0
Taylorsville-Bennion Improvement District (TBID)	336	1,064	3.8
Total	2,542 2,779 Ultimate	8,049 8,799 Ultimate	29.1 31.9 Ultimate

Utah water law gives preference to retail water distribution agencies being able to own and recycle their sewage effluent. The statute allows for a retail water distribution agency which owns water rights to recycle a portion of that water, within its sewage effluent flow, to service the same lands within its service area and within its original water rights beneficial uses.

JVWCD has estimated the portion of the CVWRF recycling project that could provide recycled water to its member agencies and service area. This amount is estimated to be 6,026 acre-feet per year. It would involve the highest deliveries of recycled water to GHID, TBID, and KID. It would also involve deliveries to JVWCD retail areas within Cottonwood Improvement District, Murray City and Salt Lake City Suburban Sanitary District #1. JVWCD has initiated discussion with CVWRF to pursue a joint effort recycling project. This project could involve CUP Bonneville Unit return flows, as shown in Table 7-18.

South Valley Communities Recycling. The South Valley Water Reclamation Facility (SVWRF) serves eight cities in southern Salt Lake County, together with various unincorporated Salt Lake County areas. These communities have formed the Association of South Valley Communities ("South Valley Communities"). Most of the South Valley Communities are also member agencies of JVWCD. Table 7-21 lists these communities.

TABLE 7-21
South Valley Communities and JVWCD Member Agencies

South Valley Communities (Members of SVWRF)	JVWCD Member Agency
Bluffdale City	Yes
Draper City	Yes
Herriman City	Yes
Midvale City	Yes
Riverton City	Yes
Sandy City	Yes (limited to a contract of 315 AF per year)
South Jordan City	Yes
West Jordan City	Yes
Unincorporated Salt Lake County	Partial, in JVWCD retail service areas

The South Valley Communities have commissioned a "Preliminary Analysis of Water Reuse" during 2003. This analysis considered the potential for recycling sewage effluent from the South Valley Communities at SVWRF for irrigation of large urban landscaped parcels, such as golf courses and parks. An additional treatment facility at the SVWRF site would deliver treated wastewater appropriate for Utah type I reuse.

The preliminary analysis study identified the current sewage effluent flow rate of the South Valley Communities as 27 mgd. This is an annual average, which has very little seasonal variation. A reliable flow of 25 mgd was identified. The contribution of the cities is shown in Table 7-22.

TABLE 7-22 South Valley Communities Sewage Flows to SVWRF	
City	**Flow (mgd)**
Bluffdale City	0.6
Draper City	3.0
Herriman City	0.2
Midvale City	2.6
Riverton City	2.6
Sandy City	5.7
South Jordan City	3.1
West Jordan City	7.2
Total	25.0

In the preliminary analysis for a project, two project capacities were assumed. The first would have a peak delivery capacity of 10 mgd considered a 1st phase of the project. The second capacity would be 25 mgd. The assumed daily flow rate of recycled water potentially available to each city in SVWRF is shown in Table 7-23.

TABLE 7-23 Assumed Daily Sewage Effluent Recycled Flow Requirement for Each SVWRF City		
City	**Project Capacity**	
	10 mgd	**25 mgd**
	Flow Requirements (mgd)	
Bluffdale City	0.0	3.0
Draper City	0.0	2.0
Herriman City	0.0	0.2
Midvale City	0.0	2.0
Riverton City	3.0	3.8
Sandy City	1.5	2.0
South Jordan City	3.0	4.0
West Jordan City	2.5	8.0
Total	10.0	25.0

Two alternative transmission pipeline corridors were studied in this conceptual level preliminary analysis. The Jordan River Corridor Alternative involves a major transmission pipeline extending southward along the Jordan River. The 1300 West Corridor Alternative involves a major transmission pipeline extending southward along 1300 West Street. Each of these two corridor alternatives involved an analysis of a constant flow rate project and a seasonal variable

rate project. Annual delivery amounts and unit costs for the various project alternatives were calculated. Table 7-24 shows these various alternatives, together with construction costs, annual O&M costs, annual recycled water deliveries, and unit costs.

TABLE 7-24
South Valley Communities Recycled Water Project Deliveries and Costs

Project Capacity (Source /Delivery Scenario)	Treatment & Transmission Cost		Annual Recycled Deliveries (AF)	Unit Cost ($/AF)
	Construction	Annual O&M		
10 MGD (SVWRF/Constant Rate)	$17,570,000	$360,000	5,600	310
10 MGD (SVWRF/Variable Rate)	$17,570,000	$210,000	3,300	470
25 MGD (SVWRF/Constant Rate)	$37,440,000	$1,000,000	14,000	290
25 MGD (SVWRF/Variable Rate)	$37,440,000	$590,000	8,300	440

The ultimate 25 MGD project alternatives represent the annual recycled water volumes most likely in this project. They range from 8,300 acre-feet to 14,000 acre-feet per year.

JVWCD is participating in the technical and managerial committees which are considering wastewater recycling. The majority of sewage effluent of the South Valley communities involves effluent from JVWCD member agencies and retail service areas. JVWCD estimates that at least 8,300 acre-feet of recycled water will result from its member agencies and service areas.

Magna Wastewater Plant. JVWCD serves Magna Water Company, a water improvement district. In 2002 JVWCD delivered 818 acre-feet. It is projected that JVWCD will commonly deliver at least 1000 acre-feet per year to Magna within the next five years.

Magna Improvement District operates its own sewage treatment plant. JVWCD estimates that at least 350 acre-feet per year of water provided by JVWCD results as sewage effluent at Magna's plant. JVWCD has not held discussions with Magna regarding a potential water recycling project. However, JVWCD anticipates the potential of participating in a water recycling project with Magna in a similar manner as with the CVWRF and SVWRF member agencies.

Projected Sewage Effluent Recycling. JVWCD plans on participating in wastewater recycling projects within its service area, as shown in Table 7-25.

TABLE 7-25
Projected Wastewater Recycling in JVWCD Service Area

Wastewater Facility	Annual Wastewater Recycling (AF)
CVWRF	7,250
SVWRF	7,400
Magna	350
Total	**15,000 AF**

These recycled water volumes fall within the wastewater amounts resulting from CUP Bonneville Unit waters received and delivered by JVWCD. The total recycled water amount in the JVWCD service area is based upon the JVWCD's prorate share of Bonneville Unit water and flow capacity from Jordanelle Reservoir. This is based upon 5/7 of 21,000 acre-feet, which results in 15,000 acre-feet of recycled return flows from Bonneville Unit waters.

Importation of Bear River Water (High Quality Source)

In 1991 the Utah State Legislature passed the Bear River Development Act. The Act directed the Utah Division of Water Resources to develop 220,000 acre-feet of the waters of the Bear River and its tributaries. Of the 220,000 acre-feet, 50,000 acre-feet was allocated for delivery to the Jordan Valley Water Conservancy District. The development of Bear River water for use by JVWCD would involve large capital expenditures for diversion and conveyance facilities. Development of this source of water would be postponed by delivery of ULS water to JVWCD. Development of this source would be deferred until at least after the year of 2030.

Water from the Utah Lake Drainage Water Delivery System (High Quality Source)

The estimated volume of water that may be available to Salt Lake County from the ULS project is approximately 30,000 acre-feet. The current split of M&I System water between the MWDSLS and the JVWCD is 2/7 to MWDSLS and 5/7 to JVWCD. It is anticipated that the ULS water would be allocated in this same ratio. This would result in the following annual deliveries:

- JVWCD (5/7) – 21,429 acre-feet
- MWDSLS (2/7) – 8,571 acre-feet

However, JVWCD could use more than 5/7 of the ULS yield, or all of it, if it were available.

The most likely means for delivering this water would be through conveyance facilities associated with the existing water supplies from the Provo River System; especially from the mouth of Provo Canyon. Assuming ULS deliveries to the Provo Reservoir Canal near the mouth of Provo Canyon, the water could be conveyed to Salt Lake County through the following existing facilities:

- Jordan Aqueduct System (270 cfs capacity)
- Provo Reservoir Canal (with an existing permitted capacity of 550 cfs that is currently operational and limited to 340 cfs by constrictions)

Summary of Potential New Water Sources

A summary of the potential water supplies is presented in Table 7-26.

TABLE 7-26
Summary of Potential New Water Sources For JVWCD

Water Source	Volume (acre-feet)	Potential M&I Developable Volume (acre-feet)	Type of Use and Required Treatment	Likelihood of Success
Southwest Groundwater Treatment	7,000	7,000	M&I Use (RO Plant)	Moderate to High
Jordan River Shallow GW (Existing JVWCD Utah Lake Rights) RO treatment	16,000	9,000	M&I Use (RO Plant)	Moderate
Utah Lake Agricultural Conversion - RO treatment	66,396	50,000	M&I Use (RO Plant)	Moderate to low
ULS	30,000	21,429	M&I Use	High
Wastewater Recycling of Central Utah Project supply [a]				
➢ SVWRF	7,400	7,400	Outdoor Use (Tertiary Filtration)	Moderate to High
➢ CVWRF	7,250	7,250	Outdoor Use (Tertiary Filtration)	Moderate to High
➢ Magna	350	350	Outdoor Use (Tertiary Filtration)	Moderate to High
Subtotal for Recycled CUP Supply	15,000	15,000		
Bear River Import Water	50,000	50,000	M&I Use (Standard and RO Treatment)	Moderate

Notes:
a. Based on 15% of Jordanelle and 35% of ULS Bonneville Unit waters.

The sequence of development of water supplies is dependent on several factors including cost, limitations on use of the water, institutional and permitting issues, and environmental and political issues.

Cost Considerations. Detailed cost estimates for developing potential sources of water are beyond the scope of this water needs analysis. However, JVWCD and other agencies have performed preliminary planning studies sufficient to identify approximate unit costs of providing water from the various potential water supplies. Some refinements in the cost ranges may be made during the ULS planning process, particularly by CVWRF and the South Valley Communities who are continuing to study the potential for water recycling.

Table 7-27 presents the approximate costs for the various sources of water discussed above, and lists those sources in increasing order of cost. It should be noted that the tabulated costs should not be used to determine the feasibility of the sources; inasmuch as physical facilities are not well defined, and the economics of water treatment processes change with time.

TABLE 7-27
Probable Cost Range for Developing New Water Sources for JVWCD

Water Source	Annual Water Volume [1] (AF)	Estimated Annual Cost [2] ($/AF)	Potential Use and Anticipated Limitations on Use
Existing JVWCD water supplies	148,500	$150 to $300	M&I
Southwest Groundwater Treatment	7,000	$180 to $220[3]	M&I
Jordan River Shallow Groundwater (Existing JVWCD Utah Lake Rights) -RO treatment	9,000	$180 to $400 [4]	M&I (Agreement for operation for 40 yrs)
ULS	21,429	$300 to $400	M&I
Wastewater Recycling of Central Utah Project supply	15,000	$350 to $470	Parks, golf courses & large urban irrigated areas
Utah Lake Agricultural Conversion - RO treatment	50,000	$400 to $700	M&I
Bear River Import Water	50,000	$400 to $500	M&I

Notes:
[1]Annual costs are based on information from JVWCD except for the ULS.
[2]Includes operation, maintenance, and amortized capital costs.
[3]Subsidized from State Natural Resource Damage Claim Trust Fund
[4]The first 2300 acre-feet of this supply is subsidized by the State NRD Trust Fund

Sequence of Development. The new sources of M&I water listed on Table 7-28 have been listed in order of increasing cost. In general, the lowest cost sources would be developed first while the more costly sources would be staged as later additions or new ventures. Other factors to be considered in developing a sequence of deliveries include:

- Institutional and permit limitations
- Environmental challenges

- Degree to which capital expenditures can be phased in on modular basis, verses expending a large amount of capital at one time
- Timing of availability of water supply or project

Figure 7-5 shows the water supply plan of JVWCD for a dry year planning scenario. For JVWCD's planning purposes a "dry year" scenario is one in which the water sources will yield a certain supply with 90% probability; or in other words, a one dry year out of 10 years scenario. Figure 7-5 shows existing JVWCD water supplies, and projected timing of future water supplies to meet demands. The demand projection line is based upon the conservation goal of JVWCD to reduce per capita use by 25% by the year 2025.

The availability of ULS water in Figure 7-5 is based on the water distribution of 30,000 acre-feet to Salt Lake County. It is envisioned that 5/7 of the 30,000 acre-feet, or 21,429 acre-feet, will be allocated to JVWCD; with the remaining 2/7 or 8,571 acre-feet allocated to MWDSLS.

Table 7-27 summarizes the sources of water available to JVWCD, and compares the total supply with the projected demand. This table relates to Figure 7-5, which graphically shows these results.

TABLE 7-28
Projected Development of Water Supplies for the Jordan Valley Water Cons. District (acre-feet)

	Demand and Supply by Time Period					
	2000	**2010**	**2020**	**2030**	**2040**	**2050**
M&I Demand	129,868	154,033	168,605	180,345	205,335	235,811
Water Supplies						
Existing Supplies						
Member Agency Wells and Supplies	55,000	55,000	55,000	55,000	55,000	55,000
MWDSLS (surplus)	13,636	0	0	0	0	0
Mountain Front Streams	2,670	2,670	2,670	2,670	2,670	2,670
Welby-Jacob Exchange	15,500	15,500	15,500	15,500	15,500	15,500
Groundwater Wells and Springs	20,360	25,360	25,360	25,360	25,360	25,360
CUP (Jordanelle)	26,000	50,000	50,000	50,000	50,000	50,000
Subtotal	133,436	148,530	148,530	148,530	148,530	148,530
Future Supplies						
Southwest Groundwater Treatment	0	7,000	7,000	7,000	7,000	7,000
Jordan River Shallow Groundwater RO Treatment	0	0	0	0	9,000	9,000
ULS	0	0	21,429	21,429	21,429	21,429
Wastewater Recycling	0	15,000	15,000	15,000	15,000	15,000
Bear River	0	0	0	0	50,000	50,000
Utah Lake – Agriculture Conversion	0	0	0	0	0	15,000
Subtotal	0	12,000	35,429	35,429	102,429	117,429
Total M&I Supply	133,436	160,530	183,959	183,959	250,959	265,959
Net Surplus (or Shortage)	+3,568	+6,497	+15,354	+3,614	+45,624	+30,148

Note:
Water for these RO Plants would come from Utah Lake water rights, including those that could become available as the remaining irrigated lands in Salt Lake County are urbanized. The amount of water from these rights is approximately 75,000 acre-feet, of which the yield through a RO Plant would be about 50,000 acre-feet of culinary water and about 25,000 acre-feet of brine water.

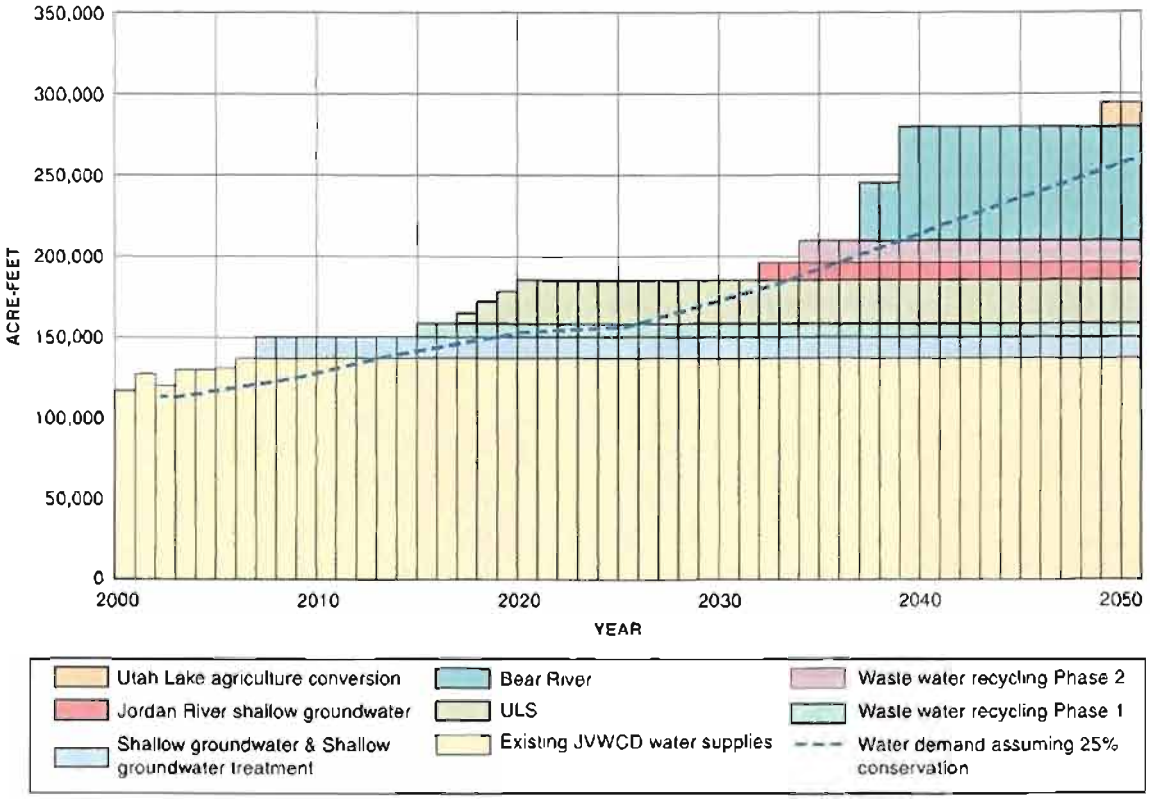


Figure 7-5
Jordan Valley Water Conservancy District Water Supply Plan
(Drought Year Scenario)

TIMING TO USE ULS WATER

As shown in Table 7-27 and Figure 7-5, JVWCD anticipates the need for ULS water between 2015 and 2020. JVWCD understands that this matches the availability of ULS water.

UNCERTAINTIES IN FUTURE WATER SUPPLIES DEVELOPMENT

The future water supply shown in Table 7-28 still have many challenges and uncertainties involved in their development. For example, sufficient technical institutional, and water right issues exist for each of those future water supplies to provide uncertainties as to whether they can be developed. Some of those issues are summarized in the following paragraphs.

Southwest Groundwater Treatment Project

As of the date of this report, this project still has not been approved by the State Natural Resource Damages Trustee. Substantial public opposition to the discharge of reverse osmosis concentrate to either the Jordan River or the Great Salt Lake has occurred. The Division of

Water Quality has not yet issued a UPDES permit for discharge of reverse osmosis concentrate to the Jordan River.

Jordan River Shallow Groundwater RO Treatment

The same challenges that have arisen in the Southwest Groundwater Treatment Project will be involved in development of this future water supply. The discharge of concentrate streams from reverse osmosis (RO) treatment will be a challenge as they involve either the Jordan River of the Great Salt Lake. Selenium concentrations have been shown to approach river water quality standards. The impacts of selenium in the Great Salt Lake south shore wetlands are not yet fully studied.

Wastewater Recycling

Water right notices and approvals will be required for recycling wastewater. The issues of ownership of the water and cost-sharing of the project cost are still unknown.

Bear River

Right-of-way acquisition for a conveyance system from western Weber County to northern Salt Lake County has been difficult. Rapid land development has precluded many portions of the corridor. Only 50% of the right-of-way has been acquired to date. Raw water storage issues on the Bear River system have been controversial, and are not yet answered. Water rights for the project have not yet been approved. State appropriations will rely upon the willingness of future legislatures.

Utah Lake Agriculture Conversion

Challenges similar to those involved in Jordan River shallow groundwater RO treatment will be involved in this project.

ATTACHMENT 7-A

Community: Bluffdale City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
4,700	46,279	8.10%	16.4	10,500

Population Density (people/acre)	
Year 2000	Year 2030
0.4	4.4

Public Water Supplier: Bluffdale City Water

Bluffdale City Water	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	1172	n/a
2002	1086	n/a

Primary Uses [c)]: Residential 82%, Commercial, Industrial, Institutional 18%

Bluffdale City is located in the southwest region of Salt Lake County. It is a residential community with most lot sizes large enough to accommodate horses and similar animals (1-acre typical). There is substantial vacant, undeveloped land within the City which is expected to substantially fill in during the next 30 years. A few small secondary irrigation water delivery systems are operated by homeowners associations, but no regional/city-wide secondary water system exists.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.

Community: Draper City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
25,220	51,309	13.3%	30.3	19,400

Population Density (people/acre)	
Year 2000	Year 2030
1.3	2.6

Public Water Suppliers: Draper City Water, Draper Irrigation Co. (Water Pro)

Draper City Water	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	2,104	---
2002	2,096	---

Primary Uses [c)]: Residential [d)]%, Commercial, Industrial, Institutional [d)]%

Draper Irrigation Co. (Water Pro)	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	1,964	8,862
2002	2,185	6,691

Primary Uses [c)]: Residential 94%, Commercial, Industrial, Institutional 6%

Draper City is located in the southeast region of Salt Lake County. A portion of Draper City extends into Utah County. It is a residential community that has had a high rate of growth driven primarily by large planned residential developments. Two public water suppliers provide water service within Draper City. Draper Irrigation Co. (Waterpro) operates an extensive secondary irrigation system, which services residential and agricultural uses.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.
d) Data not available.

Community: Herriman City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
1,523	37,415	n/a	9.1	5,800

Population Density (people/acre)	
Year 2000	Year 2030
0.3	6.5

Public Water Suppliers: Herriman City Water, Herriman Pipeline & Development Company

Herriman City Water	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	[d)]	---
2002	1,000	---

Primary Uses [c)]: Residential [d)]%, Commercial, Industrial, Institutional [d)]%

Herriman Pipeline & Development Company	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	---	[d)]
2002	---	460

Primary Uses [c)]: Residential 100%, Commercial, Industrial, Institutional 0%

Herriman City is located in the southwest region of Salt Lake County. Herriman City incorporated in 1999 and is a residential community that is growing rapidly. Large tracts of vacant lands lie to the west of Herriman City boundaries which have a strong potential to be annexed into Herriman City within the next 30 years. Growth is primarily driven by large planned subdivision developments with varied densities (3 – 5 units per acre). In February 2003, Herriman City established its own water service department and began providing retail water service that had previously been provided by JVWCD retail.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.
d) Data not available.

Community: Holladay City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
14,561	35,696	0.3%	5.3	3,400

Population Density (people/acre)	
Year 2000	Year 2030
4.3	10.5

Public Water Suppliers: Holladay Culinary Water., JVWCD retail, SLCPUD

Holladay Culinary Water	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	---	4,608
2002	---	4,341

Primary Uses [c)]: Residential 86%, Commercial, Industrial, Institutional 14%

JVWCD Retail	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	[d)]	n/a
2002	[d)]	n/a

Primary Uses [c)]: Residential [d)]%, Commercial, Industrial, Institutional [d)]%

SLCPUD	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	---	[d)]
2002	---	[d)]

Primary Uses [c)]: Residential [d)]%, Commercial, Industrial, Institutional [d)]%

Holladay City is located in the central eastern region of Salt Lake County. JVWCD supplies water services to approximately 1,000 residents. Holladay City has been substantially developed and there is limited vacant land for new growth.

Notes:

a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.
d) Data is not available specific to use within Holladay City.

Community: Midvale City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
27,029	32,270	n/a	5.8	3,700

Population Density (people/acre)	
Year 2000	Year 2030
7.3	8.7

Public Water Suppliers: Midvale City Water, Sandy City Public Utilities, JVWCD Retail

Midvale City Water	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	150	3,285
2002	161	3,061

Primary Uses [c)]: Residential 61%, Commercial, Industrial, Institutional 39%

Sandy City Public Utilities	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	[d)]	[d)]
2002	[d)]	[d)]

Primary Uses [c)]: Residential [d)]%, Commercial, Industrial, Institutional [d)]%

JVWCD Retail	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	[d)]	[d)]
2002	[d)]	[d)]

Primary Uses [c)]: Residential [d)]%, Commercial, Industrial, Institutional [d)]%

Midvale City is located in the south central region of Salt Lake County. Approximately 45% of the total population is served by Midvale City Water, 15% by JVWCD retail, and the balance by Sandy City Public Utilities Department. Midvale City has been substantially developed and there is limited vacant land for new growth.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.
d) Data is not available specific to use within Midvale City.

Community: Riverton City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
25,011	65,195	8.3%	12.6	8,100

Population Density (people/acre)	
Year 2000	Year 2030
3.1	8.0

Public Water Supplier: Riverton City Water

Riverton City Water	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	1,278	6,028
2002	623	7,570

Primary Uses [c)]: Residential 81%, Commercial, Industrial, Institutional 19%

Riverton City is located in the southwest region of Salt Lake County. It is a rapidly growing residential community with substantial undeveloped lands providing the potential for continued growth. Riverton City Water operates a secondary irrigation system which currently serves, or in the next 2-3 years will serve, virtually all lands within the City.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.

Community: Sandy City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
88,418	122,357	1.7%	22.3	14,300

Population Density (people/acre)	
Year 2000	Year 2030
6.2	8.6

Public Water Supplier: Sandy City Water

Sandy City Water.	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	7,853	23,663
2002	355	27,769

Primary Uses [c)]: Residential 94%, Commercial, Industrial, Institutional 6%

Sandy City is located in the southeast region of Salt Lake County. Prior to 2002, Sandy City was a major wholesale customer of JVWCD. Beginning in 2002, Sandy City joined the Metropolitan Water District of Salt Lake and Sandy and now receives only a limited supply from JVWCD. The 2002 supply from JVWCD to Sandy City supports a population of approximately 1,000 people and will not increase in the future. The 2002 amount shown for self supply includes deliveries from MWDSLS.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.

Community: South Jordan City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
29,437	93,474	9.2%	20.9	13,400

Population Density (people/acre)	
Year 2000	Year 2030
2.2	6.9

Public Water Supplier: South Jordan City Water

South Jordan City Water	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	8,993	---
2002	8,675	---

Primary Uses [c)]: Residential 86%, Commercial, Industrial, Institutional 14%

South Jordan City is located in the southwest region of Salt Lake County. It is a residential community that has been growing rapidly and there exists substantial vacant lands providing the potential for continued growth.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.

Community: South Salt Lake City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
22,038	26,829	n/a	6.9	4,400

Population Density (people/acre)	
Year 2000	Year 2030
5.0	6.1

Public Water Suppliers: South Salt Lake City Water, JVWCD Retail

South Salt Lake City Water.	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	1,148	2,958
2002	853	2,885

Primary Uses [c)]: Residential 32%, Commercial, Industrial, Institutional 68%

JVWCD Retail	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	[d)]	---
2002	[d)]	---

Primary Uses [c)]: Residential [d)]%, Commercial, Industrial, Institutional [d)]%

South Salt Lake City is located in the central region of Salt Lake County. There is substantial commercial and industrial development in the City. There is limited opportunity for growth within the City and the population is projected to grow very modestly.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.
d) Data is not available specific to use within South Salt Lake City.

Community: Taylorsville

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
57,439	74,996	n/a	10.7	6,900

Population Density (people/acre)	
Year 2000	Year 2030
8.3	10.9

Public Water Supplier: Taylorsville-Bennion Improvement District

Taylorsville-Bennion Improvement District	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	5,586	10,859
2002	4,627	9,706

Primary Uses [c)]: Residential 80%, Commercial, Industrial, Institutional 20%

Taylorsville City is located in the west central region of Salt Lake County. Since its incorporation in 1996, the City has grown steadily and is projected to continue growing at a moderate rate. The service area boundaries of TBID substantially coincide with the City's boundaries, but there are some limited areas in the City served by Granger Hunter Improvement District.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.

Community: West Jordan City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
68,336	152,393	4.8%	30.9	19,800

Population Density (people/acre)	
Year 2000	Year 2030
3.5	7.7

Public Water Supplier: West Jordan City Water

West Jordan City Water	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	13,715	3,652
2002	12,782	3,922

Primary Uses [c)]: Residential 70%, Commercial, Industrial, Institutional 30%

West Jordan City is located in the southwest central region of Salt Lake County. The community has been growing rapidly and is projected to continue to do so. Substantial amounts of vacant lands lie within the City and immediately adjacent to and west of the City boundaries.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.

Community: West Valley City

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
108,896	140,904	2.3%	35.4	22,700

Population Density (people/acre)	
Year 2000	Year 2030
4.8	6.2

Public Water Supplier: Granger Hunter Improvement District

Granger Hunter Improvement District	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	19,188	7,159
2002	16,898	7,875

Primary Uses [c)]: Residential 78%, Commercial, Industrial, Institutional 22%

West Valley City is located in the west central region of Salt Lake County. It has grown steadily over the last 10 years and is projected to continue to do so. The service area boundaries of GHID substantially coincide with the City's boundaries, but the GHID service area does extend into limited areas of adjacent communities.

Notes:
a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.

Community: Unincorporated Salt Lake County

Population			Land Area	
2000 [a)]	2030 [b)]	1990 - 2000 AARC [a)]	(Sq. miles)	(Acres)
193,254	327,550	-3.4%	n/a	n/a

Public Water Suppliers: JVWCD Retail, Kearns Imp. Dist., Magna Water Co., White City WID

JVWCD Retail	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	d)	-
2002	d)	-

Primary Uses [c)]: Residential [d)]%, Commercial, Industrial, Institutional [d)]%

Kearns Improvement District	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	8,286	727
2002	7,412	799

Primary Uses [c)]: Residential 75%, Commercial, Industrial, Institutional 25%

Magna Water Company	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	590	727
2002	818	3,831

Primary Uses [c)]: Residential 95%, Commercial, Industrial, Institutional 5%

White City Water Improvement District	Source of Supply (acre-feet)	
	JVWCD	Self Supply
2000	121	3,920
2002	100	3,050

Primary Uses [c)]: Residential 93%, Commercial, Industrial, Institutional 7%

The portions of unincorporated Salt Lake County within the JVWCD service area include several communities identified as Census Designated Places (CDP) in the 2000 Census. Those communities are Magna CDP (served by Magna Water Co.), Kearns CDP and Oquirrh CDP (served by KID), White City CDP (served by WCWID), and portions of Cottonwood West CDP and Little Cottonwood Creek Valley CDP (served by JVWCD retail).

Notes:

a) Census 2000 data. AARC – Average Annual Rate of Change
b) Future population projections updated in 2003 by the Wasatch Front Regional Council in coordination with the Governor's Office of Planning and Budget.
c) Per the most recent data submitted by Public Water Suppliers to the Utah Division of Water Rights.
d) Data is not available specific to use within unincorporated Salt Lake City.

Central Utah Project Completion Program

Chapter 8

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Chapter 8

DESCRIPTION OF ENTITY

INTRODUCTION

The Metropolitan Water District of Salt Lake & Sandy (MWDSLS / or District) was created on August 30, 1935 pursuant to the provisions of the Metropolitan Water District Act of Utah. Salt Lake City was the only member city of the District from 1935 to 1990. The District annexed Sandy City in 1990 and since that time those two cities have been member cities of the District. MWDSLS functions primarily as a wholesale provider of water to its member cities. Customers of MWDSLS collectively provide retail service to over 800,000 persons in Salt Lake County. Salt Lake City and Sandy City, as member cities of the District, have a statutory preferential right to purchase all of the District's water supplies for use within each city. The other major customer of MWDSLS, on a surplus basis, is the Jordan Valley Water Conservancy District (JVWCD), which supplies water to its customer agencies and individuals in southern Salt Lake County outside of MWDSLS boundaries. Figure 8-1 shows the service area of each member city of MWDSLS which is the service area of MWDSLS.

Salt Lake City, as the capital of Utah and the major business center for the Wasatch Front, has experienced steady growth in connections to its water system. It has major areas of developable ground on the west side of the City in what is called the Northwest Quadrant. Sandy City has experienced rapid growth in its service area over the last 20 years and has been struggling to meet the water needs that rapid growth has created. MWDSLS has been actively pursing additional water supplies for its member cities to meet the existing and future needs.

POPULATION PROJECTIONS

Projections

The Governor's Office of Planning and Budget (GOPB) released future population projection data in 2002 which utilized the results of the 2000 Census. The GOPB data provides county-wide population estimates for 2010, 2020, and 2030, and more detailed sub-county population estimates are made by regional planning organizations.

Population for Salt Lake County

In 2003, the Wasatch Front Regional Council, in coordination with the GOPB, released sub-county population estimates for each incorporated area and the balance of the unincorporated Salt Lake County. Table 8-1 shows the population projections for each incorporated community in Salt Lake County and the entire unincorporated area.

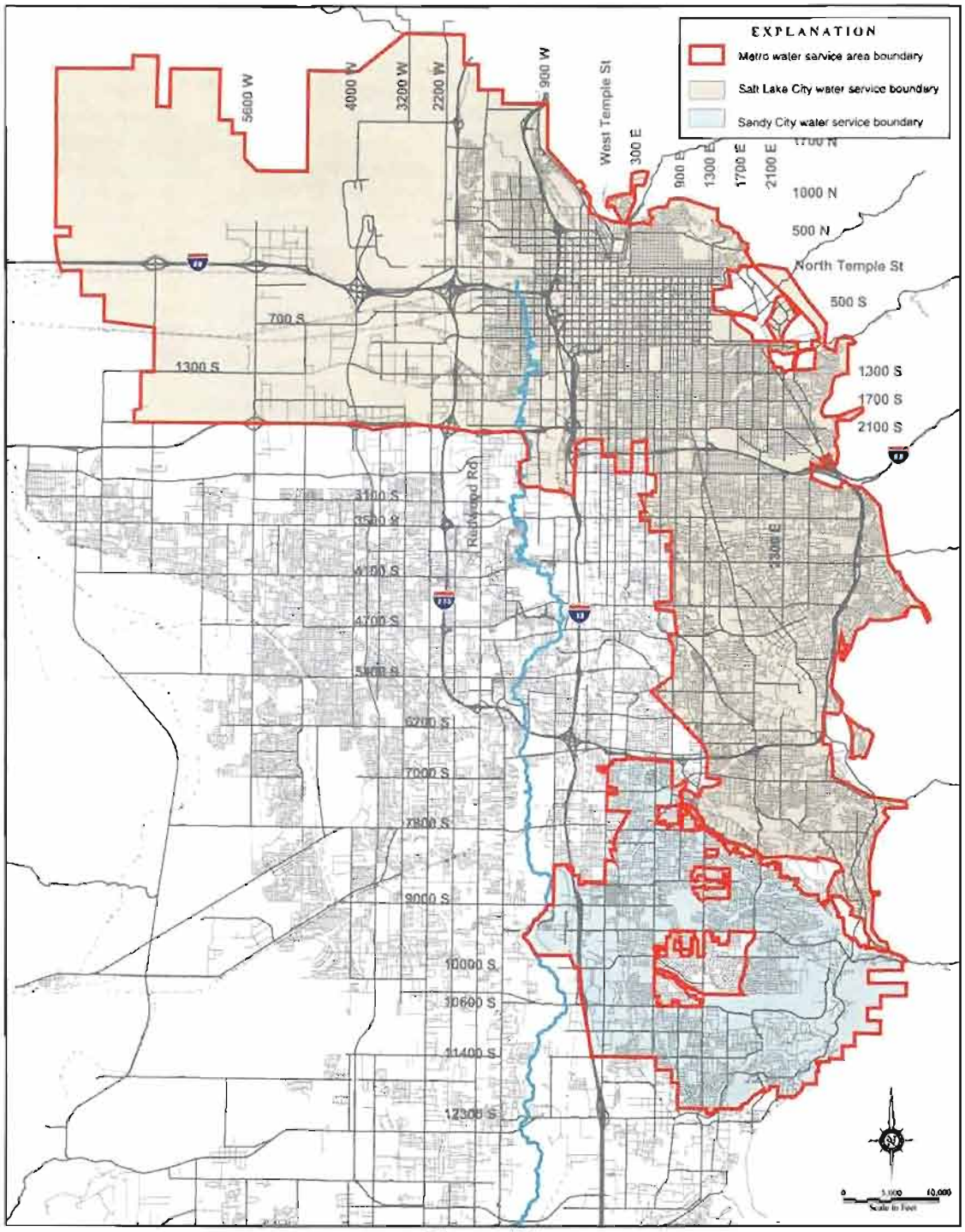


Figure 8-1
Service Area of Each Member City of MWDSLS

TABLE 8-1
Salt Lake County Population

Community Name	Year							
	2000	2002	2005	2010	2020	2030	2040	2050
Alta Town	370	368	397	461	560	631		
Bluffdale City	4,700	5,230	6,723	10,591	28,282	46,279		
Draper City	24,220	28,555	32,185	40,719	47,208	51,309		
Herriman City	1,523	3,223	9,097	15,000	28,307	37,415		
Holladay City	19,246	19,328	19,403	19,736	22,526	24,696		
Midvale City	27,029	27,698	28,558	29,581	31,310	32,270		
Murray City	34,024	34,718	35,908	38,146	39,778	39,465		
Riverton City	25,011	28,935	37,046	56,167	63,298	65,195		
Salt Lake City	181,743	184,092	185,336	187,259	193,140	197,079		
Sandy City	88,418	93,399	99,967	108,000	119,292	122,357		
So. Jordan City	29,437	32,218	37,689	48,118	68,610	92,474		
So. Salt Lake City	22,038	22,190	22,252	23,240	25,903	26,829		
Taylorsville City	58,764	59,656	60,001	63,876	72,134	74,996		
West Jordan City	78,714	83,577	96,310	126,021	144,941	153,393		
West Valley City	108,896	112,168	116,496	124,621	135,354	140,905		
Remainder of Salt Lake County	193,254	188,576	180,022	186,022	263,153	327,550		
Total	**898,387**	**923,931**	**967,390**	**1,077,556**	**1,283,784**	**1,431,843**	**1,625,103**	**1,866,299**

Source of data:
2000 – Census 2000 as revised by the Utah Population Estimating Committee.
2010, 2020, 2030 – (for Countywide total only), GOPB.
2002, 2005, and all sub-county community projections – Wasatch Front Regional Council in coordination with GOPB (released in 2003).
2040, 2050 – GOPB (released in 2000).

Population for MWDSLS Service Area

Table 8-2 shows the population projections for the service area of MWDSLS which includes Salt Lake City, Sandy City, portions of Midvale City, Holladay City, and major areas of unincorporated Salt Lake County.

TABLE 8-2
Population in MWDSLS Service Area

Community Name	Year							
	2000	2002	2005	2010	2020	2030	2040	2050
Holladay City [a]	18,196	18,278	18,330	18,636	21,376	23,496		
Midvale City [a]	10,529	11,198	11,858	12,581	13,310	13,270		
Sandy City [b]	87,418	92,399	98,967	107,000	118,292	121,357		
Salt Lake City	181,743	184,092	185,336	187,259	193,130	197,079		
Remainder of Salt Lake County [c]	110,873	103,717	99,012	102,311	144,734	180,153		
Total population in MWDSLS service area	**408,759**	**409,684**	**413,503**	**427,787**	**490,842**	**535,355**	**609,945[d]**	**706,424[d]**

Notes:

a) Population shown is only for that portion of the community within the MWDSLS service area.

b) Sandy City's population with reduction of 1,000 for JVWCD minor service areas within the City.

c) Salt Lake City serves major unincorporated areas on the east side of Salt Lake County, including water areas: Holladay, Murray, and Midvale City. Sandy City also provides retail service to county areas.

d) Calculated estimate assuming MWDSLS population remains at 37 percent of total population in Salt Lake County after 2030.

EXISTING WATER USAGE RATE

Table 8-3 presents historic and projected municipal and industrial (M&I) water demand, in gallons per capita per day, for each of the service areas of MWDSLS. The projections assume that the State's water conservation goals would be met, which call for reductions in per capita use by 12 ½ percent by 2020 and 25 percent by the year 2050. The 2002 numbers reflect the conservation efforts of the member cities over the last few years of drought. Salt Lake City's numbers reflect a seven percent reduction in per capita usage in past two years even with 2002 being an extremely dry summer. Sandy City essentially met the 25 percent goal for conservation between 2000 and 2002 due to increased conservation awareness and a new water rate structure that promotes water conservation within the City's service area. MWDSLS will work with Sandy City and Salt Lake City in achieving the State's water conservation goals into the future.

TABLE 8-3
Unit Water Demand with Conservation Element Included
(12 ½ Percent by Year 2020 and 25 Percent by Year 2050)
(Units: Gallons per Capita per Day)

Area	Year						
	2000 (actual)	2002 (actual)	2010	2020	2030	2040	2050
MWDSLS							
Sandy	250	189	235	220	209	199	188
Salt Lake	251	234	235	220	209	199	188

Salt Lake City's per capita usage rates are higher even with an aggressive conservation program because of the unique nature of their water system. Their per capita usage is affected by the following.

1. They are a regional economic hub with a transient daytime population approaching their resident population.

2. They have major industrial customers such as their largest customer, a refinery.

Salt Lake City's per capita usage for their residential customers is in the range of the State's proposed conservation guideline.

WATER CONSERVATION

MWDSLS has made a long-term commitment to water conservation. MWDSLS recognizes that the projected growth in its service area cannot be sustained by existing or future water sources without a reduction in per capita water use. Water conservation will not only extend limited water supplies, but have the added benefit of deferring costly infrastructure and future water development projects.

The State of Utah is now in the fifth year of a prolonged drought cycle. The drought has exposed many limitations of existing water supplies. As rapid growth along the Wasatch Front and in the State of Utah continues, the next drought cycle will have far reaching and much greater impacts on the citizens of the state.

Water Conservation Master Plan

In 2000, MWDSLS adopted a water conservation plan in response to the "Water Conservation Plan Act" which was signed into state law in 1998. The District adopted an overall Master Plan in 2001 which provided for the development of additional water conveyance facilities and

treatment capacity to enable the District to supply water to its member cities to meet their anticipated needs through the year 2025. Water conservation is a key component of the Master Plan. MWDSLS's conservation plan summarizes the water conservation measures undertaken by the District, within the District, and efforts by the District to promote water conservation by its member cities.

The plan focused on supply-side conservation. MWDSLS is a water wholesaler and has no retail customers. Therefore, the plan focuses on supply-side conservation and working with and financially supporting its member cities, Salt Lake City and Sandy, to promote demand side conservation.

Water Conservation Goal

MWDSLS's Master Plan assumes that MWDSLS will meet the State of Utah's goal of reducing water consumption statewide by 25 percent by the year 2050.

Current Water Conservation Programs and Activities

Public Education and Information Campaign. MWDSLS has been assisting in funding, the "Slow the Flow, Save H_2O" campaign. The campaign has continued to be developed, receiving significant recognition and market penetration statewide.

The campaign includes the development and dissemination of water conservation educational information through printed materials, radio and television advertisements, and media and community events in order to create heightened public awareness of the benefits of reduced water use.

In August of 2001, the Governor of the State of Utah met with water and other governmental officials across the state to develop a statewide water conservation initiative. The purpose of this initiative was twofold as follows:

- To immediately increase public awareness and educate the citizens of the state on water saving measures to address the current drought;
- To generate a long-term water conservation ethic to address Utah's rapid population growth.

A water conservation team was formed to develop a statewide water conservation campaign. The funding members of the team include the State Division of Water Resources, JVWCD, Central Utah Water Conservancy District (CUWCD), MWDSLS, Weber Basin Water Conservancy District (WBWCD), Washington County Water Conservancy District (WCWCD), and more recently the Utah Water Users Association (UWUA) and the Rural Water Association of Utah (RWAU).

The team agreed that the statewide initiative should broaden the "Slow the Flow, Save H_2O" campaign and expand the campaign statewide. This has provided for greater market penetration and greater awareness of water conservation on a statewide basis and provided an umbrella campaign for local conservation activities throughout the state.

The main focus of this campaign is to create a long-term conservation ethic through television and radio advertisements and dissemination of educational materials on water conservation, in order to meet the long-term water conservation goal of 25 percent reduction in water use.

Residential and Commercial Water Audits. Since adoption of the 1999 Water Conservation Master Plan, partnering agencies have pooled financial resources and contracted with Utah State University Extension to provide residential and commercial water audits (Water Checks) which are free to the public. Water audits target outdoor water usage and include an evaluation of the customer's soil type, plant root depth, sprinkler pressure, sprinkler distribution uniformity, and sprinkler precipitation rate. Following the audit, the customer is left with recommendations for sprinkler system repairs and adjustments to improve distribution uniformity and a customized irrigation schedule to improve watering efficiency. Water use records are obtained from each customer three years prior to and following the Water Check to measure the effectiveness of the water audit.

The Water Checks Program is now in its fifth year. More recently, there has been special emphasis placed on providing Water Checks for large water users including commercial, industrial and institutional water users.

The Water Audit Program has grown each year in terms of the number of Water Checks completed. Table 8-4 summarizes the total number of Water Checks performed within Salt Lake County during 1999 through 2002.

TABLE 8-4
Water Checks[1]

	1999	2000	2001	2002	Total
Residential	446	638	882	1,066	**3,032**
Commercial	n/a	n/a	20	50	**70**

[1] Totals include all Water Checks for Salt Lake County

Based on an evaluation of water use records of a randomly selected group of participants who received Water Checks in 1999, Utah State Extension Services have concluded that an average 15 percent reduction in water use has been achieved by participants receiving Water Checks. The Water Check data also shows that 66 percent of a resident's total water use is used outdoors and 34 percent is used indoors.

Water Conservation Pricing. Both member cities of MWDSLS now have in place water rates that encourage water conservation through charging higher rates for higher water use on a seasonal basis. Each city's rates are briefly discussed below.

Sandy City. In 2001, Sandy City adopted a water rate structure to encourage conservation. The rate structure has a much higher rate (186 percent) during the summer months of May through September when the City is trying to encourage conservation of outside water use. Historically, the City's outside water use accounted for 65 percent of the water used by City customers. The rate structure has resulted in lower water use during the last two years as reflected by decreasing per capita consumption and total water deliveries.

Salt Lake City. Salt Lake City's Council adopted a seasonal water conservation rate structure for retail water deliveries for the 2003 water season. This seasonal rate structure was adopted to encourage long-term conservation and the efficient use of the City's water supply. In spring of 2003, Salt Lake City adopted an inclining-block rate structure with three blocks. The first block is set to provide adequate supplies of water for indoor use based on the consumption levels of the average utility customer. The second block is set at 10 percent less than the average outdoor summer consumption. Block 3 is all the water consumed exceeding Block 2.

Commercial customers are billed under a three block structure, with the first block based on each meter's average winter consumption; Block 2 is 100 to 300 percent of Block 1 (the same ratio as established for residential customers); and Block 3 is all the water consumed outside of Block 2.

For those accounts connected to meters used only during the irrigation season, targets were established based on permeable area and historic evapo transpiration (ET) data; water used within the target is billed at the Block 2 rate and water used exceeding the target is billed in Block 3.

The rate restructuring was accompanied by a redesign of the utility bill to provide adequate information to the consumer regarding current and historical use.

Salt Lake City Conservation Activities.

Web-page Development. In 2001, the Salt Lake City Public Utilities Department (Public Utilities) launched a water conservation web page, designed to provide information for saving water indoors and outdoors to Public Utilities customers, both commercial and residential.

High Performance Building Guidelines. The City developed High Performance Building Guidelines, a tool to guide the design and construction of water and energy efficient buildings constructed in partnership with Salt Lake City. The water section addresses landscape design and maintenance, indoor efficiencies, stormwater protection, and reclaimed water opportunities.

Landscape Ordinance and Guidelines. Public Utilities worked with the Planning Department to update the park strip ordinance, and is involved in evaluating existing landscape ordinances to ensure that those ordinances meet broader administrative goals of encouraging water conservation. Public Utilities is also updating the Water-wise Landscape Plant list, first published in 1995.

Water Efficiency Study. The City performed a study which provided a planning-level evaluation of water conservation and efficiency opportunities with existing irrigation of City-owned open-space, secondary water system and source development, and landscaping requirements for new development. This report provided information as a planning resource for development, funding, and implementation of capital improvement programs needed to achieve the City's increased water conservation and efficiency goals.

Demonstration Gardens. Public Utilities is constructing a number of demonstration gardens throughout its service area. Two gardens have been constructed, one at Washington Square and the second at Concord Lift Station. Three more gardens are in the planning or design stage. Public Utilities has also partnered with other city or regional projects as a subject-specialist to ensure that water conservation and sustainability continue to be addressed in all landscape designs. Some of those projects include Library Square, Pork Chop Park, the 10th East Senior Center, and the Intermodal Hub (a LEED-qualified project).

Water Audit Project. Public Utilities conducted full irrigation audits at 17 City-owned sites, including six golf courses in order to 1) determine specific irrigation efficiency; 2) generate repair action-items lists; 3) develop long-term capital improvements goals; and 4) provide adequate data to establish economic incentives for improvements.

Water Shortage Contingency Plan. The contingency plan was adopted by the City council in July 2003, and includes the following four (4) components:

- *Ordinance* authorizes the Mayor to declare one of five water shortage stages; compels Public Utilities to draft and maintain a Water Shortage Plan; establishes fines; authorizes Public Utilities to enforce mandatory actions; and establishes an appeals process.

- *Water Shortage Plan* identifies and defines five stages of water shortage; establishes triggering criteria for the implementation and termination of the stages; outlines public education and notification process; defines terms; and describes hearing and appeals process.

- *Response Summary* provides quick reference to the five water shortage stages, dividing water customers into three categories (residential, commercial/industrial, and municipal), articulates specific response actions, assigns voluntary/mandatory status to each response action, and identifies Best Management Practices (BMP) (this has been designed to be web and brochure ready).

- *Appendices* provides a collection of BMP for a broad spectrum of water customers and uses, including residential; commercial carwashes; hotels and restaurants; pools; and the nursery and landscape industry.

The contingency plan is being modeled by a number of other communities, including Draper and Murray, and Grand Junction and Denver, Colorado.

Media.

- Salt Lake City was the focus of several news stories relating to the drought and water conservation, and appeared in two Associated Press (AP) stories which appeared in Colorado newspapers.

- Participated in a number of radio programs on KSL, KUER, and KCPW, and were featured on an hour-long syndicated morning news program which airs all non-clear channel stations.

- Provide weekly information, including water-use charts, to several local news networks for use on weather segments.

Brochure List. The City developed brochures for customers that provided guidance to customers for the following subjects.

- Lawn Watering Guide
- Parkstrip Guide
- Water Shortage Contingency Plan – BMP
- Rate Restructuring
  - Residential
  - Commercial

Sandy City Conservation Activities. In 1996, Sandy City completed a Water Conservation Plan. The detailed plan was the first of its kind in Sandy City. As a result of that conservation study, Sandy City implemented a number of conservation measures to reduce water usage. Some of these are identified below:

Water Meters. All residential, industrial and institutional connections to the City's water system are metered. The City also meters water that is used in public areas such as parks and streetscapes.

Pipeline Corrosion Protection. Sandy City requires the installation of corrosion protection on all ductile iron pipes in acidic soil. This measure is designed to reduce leaks in pipelines.

Conjunctive Use of Surface and Groundwater. Sandy City, by having membership in the MWDSLS, more efficiently utilizes surface waters when available and only uses groundwater supplies during periods of peak demand.

Public Education. Sandy City constructed a xeriscape demonstration garden called Sego Lily Gardens at its Zone 5 water tank site to illustrate landscape practices that conserve water. The gardens are open to the public during the warm weather months. The gardens provide an opportunity for the City to inform the public of low-water use that are available and landscaping techniques that promote water conservation. In addition, the City and its residents are able to learn, by first hand experience, which plant varieties and irrigation methods are the most effective at providing an aesthetically pleasing yet water saving landscape for the sandy soils prevalent in the area.

Use of Secondary Water on Parks. Sandy City has retrofitted two parks within the City (Lone Peak and Crescent) for use of secondary irrigation water for landscape watering. Two additional parks (Eastridge and Storm Mountain) are currently being considered for secondary water. The City also continues to investigate other potential uses for secondary water.

Renewed Emphasis on Conservation. The past few years have born a renewed emphasis on conservation in Sandy City and its neighboring communities. This is the result of both the recent period of drought and Sandy City's need to conserve water to meet future demands. The result of this renewed conservation effort is the implementation of several additional conservation measures[1] listed below.

Seasonal Rate Structure. In December 2000, the City council adopted a new water rate structure intended to provide an incentive for water users to conserve. The key element of the rate structure is an increased peak season overage rate during the months of May through September. The goal is to reduce peak system demands and reduce the waste of water on outdoor landscaping uses.

Monthly Billing. As part of the implementation of the water rate structure, the City has opted to begin billing customers on a monthly basis. Historically, the City billed on a bi-monthly basis. Monthly billing allows consumers to receive more frequent feedback on their water use habits and adjust their use accordingly.

Water Conservation Coordinator. The City hired a water conservation coordinator with a background in horticultural training with a specific emphasis on institutional water conservation. The duties of the water conservation coordinator include acting as a park visitor guide at Sego Lily Gardens, developing conservation education material, and performing irrigation system audits and low-water use landscape consulting throughout the City. The water conservation

[1] From the Sandy City Memo " Summary of Conservation Measures" dated February 5, 2002

coordinator also gives presentations on conservation to community groups (schools, churches, businesses, residents, etc.).

Expanded Public Education Program. Sandy City has greatly expanded their public education program in recent years to include a number of new components:

- "Slow the Flow" Campaign – Sandy City has provided financial support to the "Slow the Flow – Save H2O" water education campaign. This campaign was developed in conjunction with JVWCD and municipalities along the Wasatch Front to provide water education information, irrigation system water checks, advertising campaign, and related conservation efforts.

- Water Conservation Education Program – Sandy City also supports a program to educate school-aged children about water and the importance of conservation. This program is specifically designed to motivate children to use water wisely and grow up with a conservation ethic. It is hoped that this effort will motivate the children to encourage their parents to use water more wisely as well.

- Improved Xeriscape Demonstration Gardens – In 2002 and 2003, the Sego Lily Gardens were divided into different landscaped areas, each with separate metering. This will allow water use to be measured for specific landscaping themes.

- Water Conservation Classes – Six water conservation classes were offered in 2002 at Sego Lily Gardens. Topics discussed at the classes included low-water use landscape design, irrigation systems, varieties of turf, low-water use plants, native plants, and performing a home water check. All classes are free to the public.

- Sandy City Newsletter – The City has utilized the City newsletter to educate and inform the public regarding conservation and other water issues.

- Water Conservation Web Site – On the Sandy City web site, there is a page devoted to water conservation (http://www.sandy-city.net/Public_Utilities_Dept/water-conservation-tips.htm). It provides water conservation tips (both indoors and outdoors), announcements, pictures, and links to other water conservation related sites.

- Free Water Saving Material – The City has distributed water saving material to schools, community groups, and at Sego Lily Gardens. The material includes an indoor and outdoor water conservation kit, soil probes, and other educational information. The water conservation material is also sent to individual water users upon request.

Line Replacement Program. A new component has been added to the Sandy City Water Fund Budget for pipeline replacement. Funds reserved for this purpose will be used to replace old and failing water lines in the Sandy City water system. In addition to maintaining the system in good

working order, it is hoped that this effort will reduce the number and severity of water leaks in the system. The budget item for pipeline replacement was initially $500,000 in FY 2000-2001 and will grow to $1.5 million by FY 2005-2006.

Irrigation Restrictions. Sandy City has coordinated with other water agencies to develop a six-phase water restriction protocol to be implemented in times of drought or other water emergency. In 2001, the City went to the phase of recommending no outdoor watering between 10:00 a.m. and 6:00 p.m. The City Council took this concept a step further in December of 2001 by adopting an ordinance specific to the Sandy City water system that permanently restricts sprinkler irrigation between 10:00 a.m. and 6:00 p.m. for all water users. Violations of this ordinance are generally met with friendly reminders from the City, but the ordinance does allow the City to assess fines to chronic violators.

Water Efficient Landscape Ordinance. In January of 2002, the City Council adopted the Water Efficient Landscape Ordinance. This new ordinance was designed to promote water conservation in the landscaping of new development. The ordinance requires new commercial and multifamily developments, as well as new City-owned properties, to submit landscape and irrigation plans during the development review process. The plans are required to be designed by certified professionals in both landscape and irrigation systems. The landscaped areas of the new developments are required to meet certain irrigation system efficiency standards once installation in completed. In addition, water conserving plants are now required for slopes greater that 30 percent.

Conversion of Public Landscapes. Many changes have been implemented in the landscaping of public areas. A parking strip at a public utilities booster station has been converted to a low-water use ground cover. The Parks and Recreation Department is experimenting with the conversion of streetscapes to bark and/or low-water use trees and plants. At Flat Iron Park, the Parks and Recreation Department has planted trees and shrubs on several existing inclines. Water use in these areas will be restricted once the plants are established. At the new 40-acre Hidden Valley Park, only two acres are planted with turf, with native plants being preserved in the remaining area.

Water Audits. Sandy City has begun the process of identifying which water users use excessive water on their landscape compared to plant needs. For those users with excessive water use, Sandy City will provide information and resources to help in their efforts to save water. Currently, the focus is on the top 100 non-residential water users and the top 25 residential water users. Sandy City residential water users may also request water audits through the "Slow the Flow" conservation campaign.

Water Conservation Hotline. Sandy City has a water conservation hotline. This hotline allows residents to report violations of irrigation restrictions and to ask questions regarding water conservation.

Charging True Water Costs to All Water Users. In the past, Sandy City has not charged City departments the true cost of their water. For example, the Parks and Recreation Department paid an annual charge based on a budget number rather that the amount of water actually used. Although the Parks and Recreation Department has traditionally done a commendable job of managing their water use, not charging the true cost of water gave the department little motivation to conserve. This policy has been changed and City departments are now charged for water based on actual water consumption. There is currently a cap on the amount charged to the Parks and Recreation Department to help the department make the transition to the new rate structure. Eventually, this cap should be removed and all departments should be charged the full cost of their water use.

Park Computerization. Over half of the City's large parks have been equipped with computerized irrigation systems. These systems allow the Parks and Recreation Department to closely monitor conditions at each park and maximize irrigation efficiency. The Parks and Recreation Department plans to computerize an additional three parks each year. It is expected that all parks will receive computerized irrigation systems by the year 2005.

Drought and Water Emergency Measures. In addition to its efforts to achieve long-term water use reductions through conservation, Sandy City also has a plan for reducing water consumption in times of drought or other water emergency. The current Sandy City drought and water emergency policy consists of two major components. First, Sandy City is a member agency of the Salt Lake Valley Conjunctive Management Team. This team consists of the water directors of Sandy City, Salt Lake City, MWDSLS, and JVWCD. During a water emergency, this team convenes to pool resources that can be used to resolve the emergency.

TOTAL M&I DEMANDS WITH CONSERVATION

Table 8-5 shows the total estimated demands within the MWDSLS service area and each individual member city service area. Demands are shown with and without conservation to illustrate the significant amounts of water which MWDSLS expects to save through conservation. Even with this conservation, Sandy City will need additional supplies to meet its future demands.

Table 8-5
Existing Water Supplies of the Metropolitan Water District of Salt Lake & Sandy
Dry Year Water Supply
(Units: acre-feet)

Water Source	Salt Lake City	Sandy City
Groundwater Wells	18,911	14,400
Surface Supplies		
Little Dell	3,100	
Big Cottonwood Creek	20,028	
City Creek	4,690	
Little Cottonwood Creek	13,212	7,880
Bell Canyon		880
Wholesale Water Purchase		
Provo River Project- Deer Creek Reservoir (Federal)	22,910	7,940
Central Utah Project-Jordanelle Reservoir (Federal)	22,800	
Jordan Valley WCD		315
Transmission Losses in PRC	-1,600	
Total	**104,051**	**31,415**

EXISTING SUPPLIES

Capability of Existing Supplies to Meet Demands

Salt Lake City and Sandy City, as member cities of MWDSLS, have a statutory preferential right to purchase all of MWDSLS water supplies for use within each city. The District supplies approximately 39 percent of the water used by Salt Lake City and approximately 67 percent of the water used by Sandy City during an average year. Local supplies provide the rest of the water.

Existing Supplies of MWDSLS

MWDSLS and its member cities have a current dry year water supply of approximately 137,066 acre-feet per year, of which 104,051 acre-feet belongs to Salt Lake City and 31,415 acre-feet to Sandy City. These supplies are derived essentially from three sources – federally developed supplies from the Provo River Project (Deer Creek Reservoir), the M&I System of the Bonneville Unit (Jordanelle Reservoir), surface runoff from various Wasatch front creeks in Salt Lake County, and local groundwater wells. A list of the existing supplies available to the MWDSLS member cities is presented in Table 8-5.

PROJECTED M&I SHORTAGES OF MWDSLS UNDER EXISTING SUPPLIES

The areas of the two cities within the MWDSLS service area are projected to fare differently under their existing M&I water supplies. The Salt Lake City service area, by virtue of its local and contracted water supplies, is projected to have a small excess of supply over demand to year 2050 when a slight deficit will exist. This is illustrated in Table 8-6 by a declining surplus to 2050. The Sandy City water service area, by contrast, has begun to experience a water supply deficit, which is projected to increase in future decades under existing supplies. This is illustrated in Table 8-6.

TABLE 8-6
Projected M&I Shortages Under Existing Supplies
Within the MWDSLS Service Areas
(Units: acre-feet)

Water Entity	2000	2010	2020	2030	2040	2050
Salt Lake City						
Total M&I Demand	96,000	96,000	96,448	97,304	97,887	107,154
Existing Supplies (Dry Year)	104,051	104,051	104,051	104,051	104,051	104,051
Surplus/Deficit	***8,051***	***8,051***	***7,603***	***6,747***	***6,164***	***-3,103***
Sandy City						
Total M&I Demand	34,979	33,928	32,503	32,885	38,556	41,600
Existing Supplies (Dry Year)	31,415	31,415	31,415	31,415	31,415	31,415
Surplus/Deficit	***-3,564***	***-2,513***	***-1,088***	***-1,470***	***-7,141***	***-10,185***

Table 8-6 poses the logical question of whether the Sandy City deficit could be offset by the Salt Lake City surplus over the next few decades, perhaps under the auspices of MWDSLS. The answer is that such a pooling of existing water supply is not practicable for several reasons, namely 1) each of the cities has water service responsibilities that extend beyond the jurisdictional area of MWDSLS, 2) the various water sources of each city are essentially held in trust for their local water using communities, 3) the estimated surplus or deficit of each city is a relatively small portion of its total water needs, and thus subject to unanticipated changes in population growth and permanence of water source capacity, and 4) the recent long-term dry cycles that have occurred in Utah require each member city to provide a reserve pool of their own supply to help meet their water needs during the multi-year drought cycles. The current Sandy City deficit is made up by lease of water from other agencies and Sandy City's utilization of groundwater supplies that will be limited in the future.

OTHER POTENTIAL WATER SUPPLIES TO MEET M&I NEEDS

Other potential water sources have been identified for development to meet the shortfall indicated in Table 8-6. These potential sources are as follows:

- Delivery of water from the Utah Lake Drainage Basin Water Delivery System
- Wastewater Recycling.

These water sources are described in the following paragraphs. Wastewater recycling will develop a water source of low quality water that will require expensive treatment before use as a culinary water supply, or possibly as a secondary water supply.

Water from the Utah Lake Drainage Basin Water Delivery System (High Quality Source)

The estimated volume of water that may be available to Salt Lake County from the Utah Lake System (ULS) project is approximately 30,000 acre-feet. The current split of M&I System (Jordanelle Reservoir) water between MWDSLS and the JVWCD is 2/7 to MWDSLS (20,000 acre-feet) and 5/7 (50,000 acre-feet) to JVWCD. It is anticipated that the ULS water would be split in this same ratio resulting in a split of 8,571 acre-feet for MWDSLS and 21,429 acre-feet for JVWCD. The final allocation of ULS water between JVWCD and MWDSLS has not been determined. It is assumed for this document to be as shown. The most likely means for delivering this water would be through conveyance facilities associated with the existing water supplies from the Provo River System. From the Provo River the water could be conveyed to Salt Lake County through one of the following existing facilities: Jordan Aqueduct (JA) (270 cfs capacity), the Provo Reservoir Canal (PRC) (550 cfs capacity), or the Salt Lake Aqueduct (SLA) (175 cfs capacity).

Wastewater Recycling (Low Quality Source)

This water source involves the recycling and reuse of return flows from M&I water use that is conveyed to municipal wastewater treatment plants in Salt Lake County. The treated wastewater would be piped from the treatment plants to secondary water systems in various parts of Salt Lake County. Calculations of volumes of Central Utah Project (CUP) Bonneville Unit water return flows to the significant wastewater treatment plants in Salt Lake County have been made. The three major wastewater plants in Salt Lake County are:

- Central Valley Water Reclamation Facility (CVWRF)
- South Valley Water Reclamation Facility (SVWRF)
- Salt Lake City Reclamation Facility (SLCRF)

The estimated CUP Bonneville unit return flows as sewage effluent to these facilities are estimated as shown in Table 8-7. Both current and future deliveries of Bonneville Unit M&I system from Jordanelle Reservoir are shown in Table 8-7.

TABLE 8-7
Central Utah Project Bonneville Unit
Estimated Return Flows as Sewage Effluent

	CUP Water (AF/yr)		Sewage Effluent (AF/yr)			
	CUP Component	**Treated Potable Water**	**Sewage Effluent**	**To CFWRF**	**To SVWRF**	**To SLCRF**
15 Percent	Bonneville Unit M&I System – JVWCD Petition	50,000	7,500	4,000	3,500	0
	Bonneville Unit M&I System - MWDSLS Petition	20,000	3,000	1,000	500	1,500
35 Percent	ULS – JVWCD Allocation	21,429 (5/7 of 30,000)	7,500	3,500	4,000	0
	ULS – MWDSLS Allocation	8,571 (2/7 of 30,000)	3,000	750	750	1,500
	Totals	**100,000**	**21,000**	**9,250**	**8,750**	**3,000**

The most practical use of recycled water from these wastewater treatment plants would be for outdoor watering, primarily on golf courses and other large, landscaped, urban areas. The following sections describe plans for use of the water from the various wastewater treatment plants.

Central Valley Water Reclamation Facility Planning. The CVWRF is a regional wastewater treatment facility located at 800 West 3190 South. It services seven local entities, involving three cities and four special improvement districts. Some of the CVWRF member agencies accept wastewater from areas served by MWDSLS member cities, as shown in Table 8-8.

TABLE 8-8
CVWRF Member Agencies

CVWRF Member Agency	MWDSLS Member City
Cottonwood Improvement District	Partial, in MWDSLS water delivery system
Granger-Hunter Improvement District (GHID)	No
Kearns Improvement District (KID)	No
Murray City	Partial, in MWDSLS water system in newly annexed perimeter of Murray City
Salt Lake City Suburban Sanitary District #1	Partial, in MWDSLS water service area
City of South Salt Lake	No
Taylorsville-Bennion Improvement District (TBID)	No

CVWRF recently completed a "Water Reuse Market Feasibility Study". This study considered a tertiary treatment level (filtration) and delivery of recycled sewage effluent to large landscaped parcels, such as golf courses and parks, within the CVWRF member agencies service areas. A transmission system was developed consisting of four main trunk lines. Phase 1 transmission lines include a West Line that would serve parcels in the West Valley City area and a South Line that would serve parcels along the Jordan River in Murray City. The Phase 2 transmission lines include a Southwest Line through the TBID to the east boundary of the KID, and a Southeast Line that would serve other east side parcels within Murray City, Cottonwood Improvement District and Salt Lake Suburban Sanitary District #1. The CVWRF on-site facilities would include a new recycled water facility that would provide effluent filtration treatment to a level that would meet the State of Utah Type I reuse classification.

CVWRF concluded in its study that an ultimate quantity of 2,779 acres could be irrigated with a recycling project suitable for large landscaped areas. An annual recycling of 8,799 acre-feet, at a seasonal peak day demand of 31.9 million gallons per day (mgd), would be feasible. The details of the CVWRF study are shown in Table 8-9.

TABLE 8-9
CVWRF Estimated Recycled Water Demand by Member Agency

Member Agency	Irrigated Area (Acres)	Seasonal Demand (AF)	Seasonal Peak Day Demand (mgd)
Cottonwood Improvement District	190	600	2.2
Granger-Hunter Improvement District	944	2,990	10.8
Kearns Improvement District	316 553 Ultimate	1,000 1,750 Ultimate	3.6 6.3
Murray City	628	1,990	7.2
Salt Lake City Suburban Sanitary District #1	128	405	1.5
City of South Salt Lake	0	0	0
Taylorsville-Bennion Improvement District	336	1,064	3.8
Total	2,542 2,779 Ultimate	8,049 8,799 Ultimate	29.1 31.9 Ultimate

Utah water law gives preference to retail water distribution agencies being able to own and recycle their sewage effluent. The statute allows for a retail water distribution agency which owns water rights to recycle a portion of that water, within its sewage effluent flow, to service the same lands within its service area and within its original water rights beneficial uses.

South Valley Communities Recycling. The SVWRF serves eight cities in southern Salt Lake County, together with various unincorporated Salt Lake County areas. These communities have formed the Association of South Valley Communities ("South Valley Communities"). Table 8-10 lists these communities.

TABLE 8-10
South Valley Communities

South Valley Communities (Members of SVWRF)	MWDSLS Service Area
Bluffdale City	No
Draper City	No
Herriman City	No
Midvale City	Partial
Riverton City	No
Sandy City	Yes
South Jordan City	No
West Jordan City	No
Unincorporated Salt Lake County	Partial

The South Valley Communities have commissioned a "Preliminary Analysis of Water Reuse" during 2003. This analysis considered the potential for recycling sewage effluent from the South Valley Communities at SVWRF for irrigation of large urban landscaped parcels, such as golf courses and parks. An additional treatment facility at the SVWRF site would deliver treated wastewater appropriate for Utah Type I reuse.

The preliminary analysis study identified the current sewage effluent flow rate of the South Valley Communities as 27 mgd. This is an annual average, which has very little seasonal variation. A reliable flow of 25 mgd was identified. The contribution of the cities is shown in Table 8-11.

TABLE 8-11
South Valley Communities Sewage Flows to SVWRF

City	Flow (mgd)
Bluffdale City	0.6
Draper City	3.0
Herriman City	0.2
Midvale City	2.6
Riverton City	2.6
Sandy City	5.7
South Jordan City	3.1
West Jordan City	7.2
Total	**25.0**

In the preliminary analysis for a project, two project capacities were assumed. The first would have a peak delivery capacity of 10 mgd considered a 1st phase of the project. The second capacity would be 25 mgd. The assumed daily flow rate of recycled water potentially available to each City in SVWRF is shown in Table 8-12.

TABLE 8-12
Assumed Daily Sewage Effluent Recycled Flow Requirement for Each SVWRF City

City	Project Capacity	
	10 mgd	25 mgd
	Flow Requirements (mgd)	
Bluffdale City	0.0	3.0
Draper City	0.0	2.0
Herriman City	0.0	0.2
Midvale City	0.0	2.0
Riverton City	3.0	3.8
Sandy City	1.5	2.0
South Jordan City	3.0	4.0
West Jordan City	2.5	8.0
Total	**10.0**	**25.0**

Two alternative transmission pipeline corridors were studied in this conceptual level preliminary analysis. The Jordan River Corridor Alternative involves a major transmission pipeline extending southward along the Jordan River. The 1300 West Corridor Alternative involves a major transmission pipeline extending southward along 1300 West Street. Each of these two corridor alternatives involved an analysis of a constant flow rate project and a seasonal variable rate project. Annual delivery amounts and unit costs for the various project alternatives were calculated. Table 8-13 shows these various alternatives, together with construction costs, annual operation and maintenance (O&M) costs, annual recycled water deliveries, and unit costs.

TABLE 8-13
South Valley Communities Recycled Water Project Deliveries and Costs

Project Capacity (Source /Delivery Scenario)	Treatment and Transmission Cost		Annual Recycled Deliveries (AF)	Unit Cost ($/AF)
	Construction	Annual O&M		
10 MGD (SVWRF/Constant Rate)	$17,570,000	$360,000	5,600	310
10 MGD (SVWRF/Variable Rate)	$17,570,000	$210,000	3,300	470
25 MGD (SVWRF/Constant Rate)	$37,440,000	$1,000,000	14,000	290
25 MGD (SVWRF/Variable Rate)	$37,440,000	$590,000	8,300	440

The ultimate 25 mgd project alternatives represent the annual recycled water volumes most likely in this project. They range from 8,300 acre-feet to 14,000.

Salt Lake City Reclamation Facility. Salt Lake City is presently performing a study to determine the potential for use of their plant effluent for a recycled water supply for various low quality water users.

Projected Sewage Effluent Recycling. MWDSLS has the potential for wastewater recycling projects within its service area, as shown in Table 8-14.

TABLE 8-14
Projected Wastewater Recycling in MWDSLS Service Area

Wastewater Facility	Annual Wastewater Recycling (AF)
CVWRF	1,750
SVWRF	1,250
SLCRF	3,000
Total	**6,000 AF**

These recycled water volumes fall within the wastewater amounts resulting from CUP Bonneville Unit waters received and delivered by MWDSLS.

SUMMARY OF POTENTIAL NEW WATER SOURCES

A summary of the potential water supplies is presented in Table 8-15.

TABLE 8-15
Summary of Potential New Water Sources For MWDSLS

Water Source	Volume (acre-feet)	Potential M&I Developable Volume (MWDSLS) (acre-feet)	Type of Use and Required Treatment	Likelihood of Success
ULS	30,000	8,571	M&I Use	High
Wastewater Recycling of Central Utah Project Supply[a]				
➢ SVWRF	8,750[b]	1,250	Outdoor Use (Tertiary Filtration)	Moderate to High
➢ CVWRF	9,250[b]	1,750	Outdoor Use (Tertiary Filtration)	Moderate to High
➢ SLCRF	3,000[b]	3,000	Outdoor Use (Tertiary Filtration)	Moderate to High
Subtotal for Recycled CUP Supply	21,000	6,000		
Total ULS & Recycled CUP	51,000	14,571		

Notes:
a. Based on 15 percent of Jordanelle and 35 percent of ULS.
b. Total estimated Bonneville Unit and ULS return flows at these facilities.

The sequence of development of water supplies is dependent on several factors including cost, limitations on use of the water, institutional and permitting issues, and environmental and political issues.

Cost Considerations

Detailed cost estimates for developing potential sources of water are beyond the scope of this water needs analysis. However, other agencies have performed preliminary planning studies sufficient to identify approximate unit costs of providing water from the various potential water supplies. Some refinements in the cost ranges may be made during the ULS planning process, particularly by CVWRF and the South Valley Communities who are continuing to study the potential for water recycling.

Table 8-16 presents the approximate costs for the various sources of water discussed above, and lists those sources in increasing order of cost. It should be noted that the tabulated costs should

not be used to determine the feasibility of the sources; inasmuch as physical facilities are not well defined, and the economics of water treatment processes change with time.

TABLE 8-16
Probable Cost Range for Developing New Water Sources for MWDSLS

Water Source	Annual Water Volume[a] (AF)	Estimated Annual Cost ($/AF)	Potential Use and Anticipated Limitations on Use
Existing MWDSLS Water Supplies	137,066	$150 to $220	M&I
ULS	8,571	$300 to $350	M&I
Wastewater Recycling of Central Utah Project and ULS Supply	6,000	$350 to $470	Parks, golf courses and large urban irrigated areas

Notes:
[a]Annual cost are based on information from MWDSLS except for the ULS.

SEQUENCE OF DEVELOPMENT

Salt Lake City

Table 8-17 summarizes the sources of water available to the Salt Lake City service area of MWDSLS and compares the total supply with the projected demand.

Table 8-17 shows that the Salt Lake City service area of the MWDSLS would have a sufficient water supply to meet its needs until 2050, based on its current sources of supply. The tabulated surplus of supply over demand would provide flexibility in water management to accommodate variations in the rate of community growth in its service area. It is noteworthy that the application of water conservation measures would have the effect of keeping estimated needs from rising above the 2000 amount until beyond 2030.

Sandy City

Table 8-18 summarizes the sources of water available to Sandy City service area of the MWDSLS and compares the total supply with the projected demand.

Table 8-18 shows that the water supplies available to the Sandy City service area of the MWDSLS, with the future ULS water supply and wastewater recycling, would meet its demand through the year 2050.

TABLE 8-17
Projected Development of Water Supplies for Salt Lake City Service Area of MWDSLS
Dry Year
(Units: acre-feet)

	Demand and Supply by Time Period					
	2000	**2010**	**2020**	**2030**	**2040**	**2050**
M&I Demand	96,000	96,000	96,448	97,304	97,887	107,154
Water Supplies						
Existing Supplies						
Groundwater Wells	18,911	18,911	18,911	18,911	18,911	18,911
Little Dell Reservoir	3,100	3,100	3,100	3,100	3,100	3,100
Big Cottonwood Creek	20,028	20,028	20,028	20,028	20,028	20,028
City Creek	4,690	4,690	4,690	4,690	4,690	4,690
Little Cottonwood Creek	13,212	13,212	13,212	13,212	13,212	13,212
Deer Creek Reservoir	22,910	22,910	22,910	22,910	22,910	22,910
CUP Jordanelle	22,800	22,800	22,800	22,800	22,800	22,800
(Minus losses from CUP delivery)	(1,600)	(1,600)	(1,600)	(1,600)	(1,600)	(1,600)
Total Existing Supply	104,051	104,051	104,051	104,051	104,051	104,051
Future Supplies						
Wastewater Recycling-CUP	-	-	-	4,070	4,070	4,070
Subtotal	-	-	-	4,070	4,070	4,070
Total Supplies	104,051	104,051	104,051	108,121	108,121	108,121
Net Surplus (or Shortage)	8,051	8,051	7,603	10,817	10,234	967

TABLE 8-18
Projected Development of Water Supplies for
Sandy City Service Area of MWDSLS
Dry Year
(Units: acre-feet)

	Demand and Supply by Time Period					
	2000	**2010**	**2020**	**2030**	**2040**	**2050**
M&I Demand	34,979	33,928	32,503	32,885	38,556	41,600
Water Supplies						
Existing Supplies						
Groundwater Wells	14,400	14,400	14,400	14,400	14,400	14,400
Little Cottonwood Creek	7,880	7,880	7,880	7,880	7,880	7,880
JVWCD Lease	315	315	315	315	315	315
Provo River Project- Deer Creek	7,940	7,940	7,940	7,940	7,940	7,940
Bell Canyon	880	880	880	880	880	880
Subtotal	31,415	31,415	31,415	31,415	31,415	31,415
Future Supplies						
Temporary Lease Water	-	5,000	-	-	-	-
ULS	-	-	8,571	8,571	8,571	8,571
Wastewater Recycling-CUP	-		-	1,930	1,930	1,930
Subtotal	-	5,000	8,571	10,501	10,501	10,501
Total Supplies	31,415	36,415	39,986	41,916	41,916	41,916
Net Surplus (or Shortage)	(3,564)	2,487	7,483	9,031	3,360	316

TIMING TO USE ULS WATER

Figures 8-2 and 8-3 show water demand and supply forecasts for MWDSLS member cities. MWDSLS anticipates the need for ULS water for its Sandy City service area between 2015 and 2020. MWDSLS understands that this matches the availability of ULS water. Salt Lake City does not anticipate a need for ULS water in the coming years.

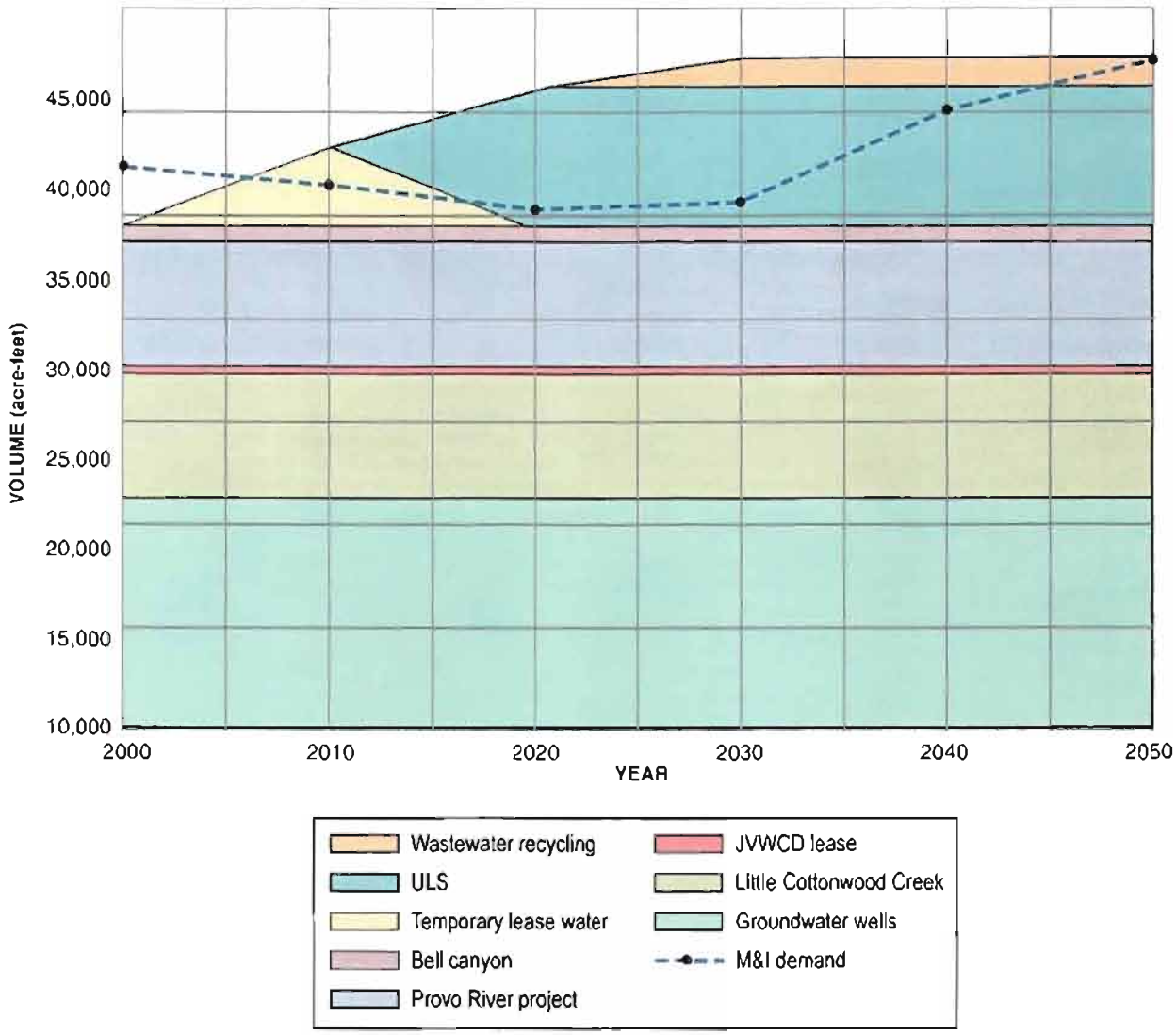


Figure 8-2
Water Demand and Supply Forecasts for MWDSLS Member Cities

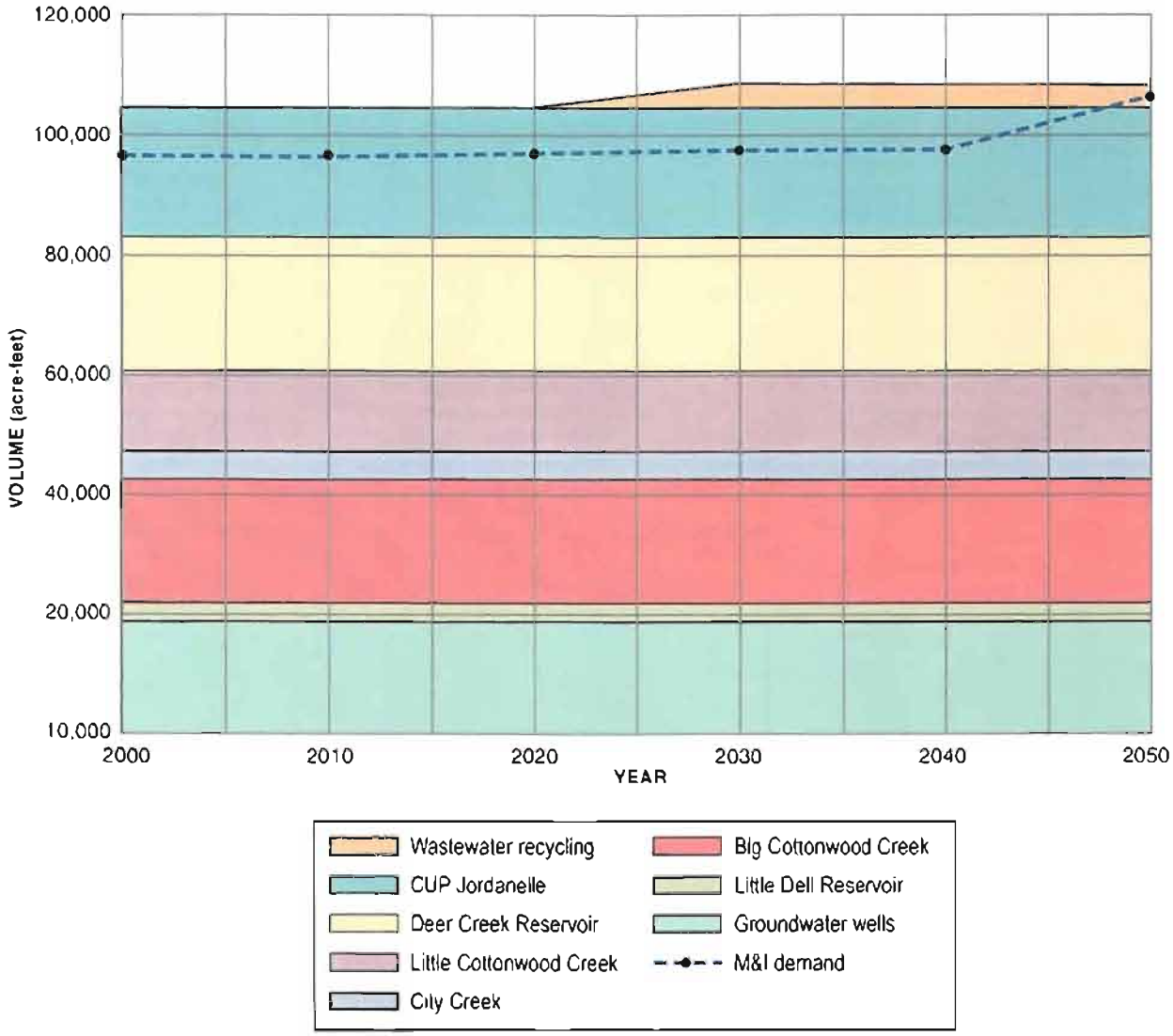


Figure 8-3
Water Demand and Supply Forecasts for MWDSLS Member Cities

Central Utah Project Completion Program

Chapter 9

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Chapter 9

The assessment of M&I needs in the Heber Valley of Wasatch County drew heavily from the analysis completed by J.M. Montgomery in 1993 as part of the Wasatch County Water Efficiency Project. Current information on water supply was obtained from the Jordanelle Special Services District. Information from the Montgomery study and this assessment confirms that Wasatch County has a significant amount of agricultural water that could be converted to meet future M&I needs. The analysis in this M&I Water Needs Appendix concludes there would be no need for additional M&I water beyond what local supplies and agricultural conversion could meet. Attachment C presents details on the analysis for the individual communities.

POPULATION PROJECTIONS

At present, the only change in population projections from the February 2002 Plan Formulation Report is the replacement of the year 2000 population with year 2000 census data. Using the census data, the GOPB has set new Wasatch County population totals for the period of years 2000 to 2030. However, because of the small change, city populations for the various communities have not been adjusted by the Mountain Land Association of Governments to reflect the updated projections. The data recently available for year 2000 census populations and the population projections contained in the Draft Plan Formulation Report are presented in Table 9-1.

TABLE 9-1
Population Projections
Wasatch County

Community	Projections as Presented in Draft Plan Formulation Report						
	2000 Census	2000	2010	2020	2030	2040	2050
Charleston	378	501	871	1,354	2,106	3,500	5,482
Heber	7,291	6,232	8,552	10,496	12,880	16,320	20,697
Midway	2,121	2,548	3,681	4,755	6,143	8,449	11,095
Jordanelle Special Services District	n/a	n/a	663	2,034	3,705	6,207	9,246
Balance of County	5,425	4,830	5,991	6,167	6,402	5,106	1,407

TOTAL M&I DEMAND WITH CONSERVATION

Projected Water Usage with Conservation in Gallons per Capita per Day

Table 9-2 presents the projected M&I water demands in gallons per capita per day (gpcd) for the three communities in Wasatch. The projections assume that the State's water conservation goals would be met, which call for reductions in per capita use of 12 ½ percent by year 2020 and 25 percent by the year 2050.

TABLE 9-2 Projected Water Usage in Gallons per Capita per Day with Conservation Element Included (12 ½ % by year 2020 and 25 % by year 2050) (Units in Gallons per Capita per Day)						
City	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
	Units in GPCD					
Charleston	300	281	262	250	237	225
Heber	350	328	306	292	277	262
Midway	565	530	494	471	447	424
Jordanelle Special Service Area	N/a	213	198	189	180	170

Projected M&I Water Demands in Acre-Feet

The projected M&I water demands of the three communities in Wasatch County were calculated by multiplying the population projections in Table 9-1 with the per-capita water use values presented in Table 9-2. The resulting projections of M&I demands in acre-feet are projected to year 2050 in Table 9-3.

TABLE 9-3 Total M&I Water Demands with Conservation Element Included (12 ½ % by year 2020 and 25 % by year 2050) (Units: acre-feet)						
City	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
	Units in Acre-Feet					
Charleston	127	274	398	590	931	1,381
Heber	2,858	3,143	3,600	4,207	5,065	6,085
Midway	1,343	2,184	2,634	3,240	4,234	5,267
Jordanelle Special Service Area	N/a	158	452	784	1,248	1,761
Total	**4,328**	**5,759**	**7,084**	**8,821**	**11,478**	**14,494**

CAPABILITY OF EXISTING SUPPLIES TO MEET M&I DEMANDS

M&I demands are currently being met by groundwater and springs in the vicinities of the communities. Increased future demand could be met by additional groundwater pumping, which typically would involve the purchase of groundwater pumping rights currently exercised for production of irrigation water. Such "conversion" of water would generally involve the urbanization of the agricultural lands and the water attached to that land.

Existing Water Supplies in Wasatch County

Existing water supplies include:

- Groundwater
- Springs
- Surface Streams

Groundwater. Table 9-4 presents the groundwater rights, present yield of wells and the projected use of groundwater by the year 2050. The information in the table demonstrates by the year 2050 the communities will begin to maximize their groundwater pumping rights. Additional rights could be purchased through the process of converting agricultural water to urban use.

TABLE 9-4
Yield and Utilization of
Groundwater Wells in Meeting M&I Demand
(Units: acre-feet)

Community	Water Right (acre-feet)	Present Yield of Wells (acre-feet)	Total Groundwater Projected to be Used in Meeting Needs at Year 2050 (acre-feet)	Present Utilization Of Groundwater Rights (%)
Charleston	229	228	228	100%
Heber	3,929	3,929	2,566	65%
Midway	455	455	455	100%
Jordanelle Special Services District	1,000	0	1,000	100%
TOTAL	**5,612**	**4,612**	**4,249**	**76%**

Springs. The utilization of water from springs is the first priority of communities in meeting their culinary water needs. This is because of the low level of water treatment required for culinary use. Unlike southern Utah County, the availability of water from springs in northern Utah County for use as an M&I water supply is very limited. The total amount of M&I water from springs in northern Utah County is about 1,926 acre-feet. As shown in Table 9-5, only four communities have a water supply from springs with 100% utilization by these communities.

TABLE 9-5 Spring Water Available to Wasatch County Communities (Units: acre-feet)				
Community	**Water Right (acre-feet)**	**Present Yield of Wells (acre-feet)**	**Total Groundwater Projected to be Used in Meeting Needs at Year 2050 (acre-feet)**	**Present Utilization Of Groundwater Rights (%)**
Charleston	180	180	180	100%
Heber	3,519	3,519	3,519	100%
Midway	1,564	1,564	1,564	100%
Jordanelle Special Services District	0	0	0	0
TOTAL	**5,263**	**5,263**	**5,263**	**100%**

OTHER POTENTIAL SOURCES OF WATER FOR M&I USE

The greatest potential for additional water supplies to meet M&I water needs is through one or both of the following processes:

- Conversion of agricultural water to urban use;
- Purchase of irrigation water rights from irrigated lands not urbanized; and
- Implementation of water recycling

Urbanization of Irrigated Lands

Table 9-6 shows the projected water that could be made available as the population moves onto irrigated land in Wasatch County.

TABLE 9-6 Water That Could Potentially Be Made Available to Wasatch County Communities From Urbanization of Irrigated Lands					
Community	**2010**	**2020**	**2030**	**2040**	**2050**
Charleston	247	488	864	1,561	2,552
Heber	631	1,603	2,795	4,515	6,703
Midway	780	1,317	2,011	3,164	4,487
Jordanelle Special Services District	158	452	784	1,248	1,761
TOTAL	**1816**	**3,860**	**6,454**	**10,488**	**15,503**

The water resources available to Heber Valley within Wasatch County include the Provo River system, tributary streams, return flows, and groundwater. Prior to the Wasatch County Efficiency Project, approximately 98,000 acre-feet per year of historical diversions occurred within Heber Valley each year. Historical diversions from the Provo River for agricultural use within the Valley averaged approximately 55,000 acre-feet per year over the period of 1950-

1991. Principal local tributaries of the Provo River in the Heber Valley are Snake, Spring, Lake, Center and Daniels creeks. Of the 98,000 acre-feet approximately 43,000 acre-feet is diverted from these 5 smaller creeks. Table 9-7 presents the potential of local surface supplies from agricultural conversion to meet M&I needs.

TABLE 9-7
Surface Supplies Potentially Available to Wasatch County Communities

Community	Surface Water Within Community's Incorporated Boundaries (acre-feet)	Average Annual Amount Through Agricultural Conversion at Year 2050 (acre-feet)	Amount That Would Potentially Be Available	Estimate of Firm Yield
Charleston	Estimate a range of 30,000 to 50,000 acre-feet within boundaries	2,552	15,503AF	(1)
Heber		6,703		
Midway		4,487		
Jordanelle Special Services District		1,761		

(1)Firm yield of the 15,503 AF would be comprised of an amount that could be used directly in secondary systems plus the amount available through a conjunctive use program. Firm yield would be about 50% of the 15,503 AF.

Purchase of Irrigation Water Rights

A second category of potential M&I water supplies is the purchase of irrigation water rights from willing sellers on lands not projected to be urbanized by the year 2050. As described in the preceding section, the historical diversions from surface streams has been approximately 98,000 acre-feet. Through acquisition of water rights by developers or the city's themselves, and by appropriate change applications with the State Engineer, these water supplies could be used for M&I purposes.

Water Recycling

In Heber Valley, the Heber Valley Special Services District presently uses treated wastewater flows for irrigation of alfalfa. The Jordanelle Special Services District is investigating a recycling plan that would deliver sewage effluent to other irrigated lands in Heber Valley in exchange for irrigation rights. Beyond these two water recycling projects, others may be limited in nature because the return flows from Wasatch County are captured in Deer Creek Reservoir, where they combine with other Bonneville Unit M&I water in route to use in northern Utah County and Salt Lake County.

Summary and Conclusions

The analysis shows that the M&I water supply for the GOPB projected population in Wasatch County can be met through full utilization of existing groundwater wells and springs coupled with future conversion of irrigated land to municipal use. Because the ULS project does not contemplate or plan to develop these water supplies no detailed hydrogeology studies were

conducted in this review of potential groundwater/agricultural water supply conversion. Additional studies of water quality, return flows, wetlands, and impacts to other water users would be required in order to fully utilize available groundwater and agricultural water supplies for M&I use within Wasatch County.

Central Utah Project Completion Program

Attachment A

October 2004

UTAH RECLAMATION
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2050 Utah County
Planning Population Projections

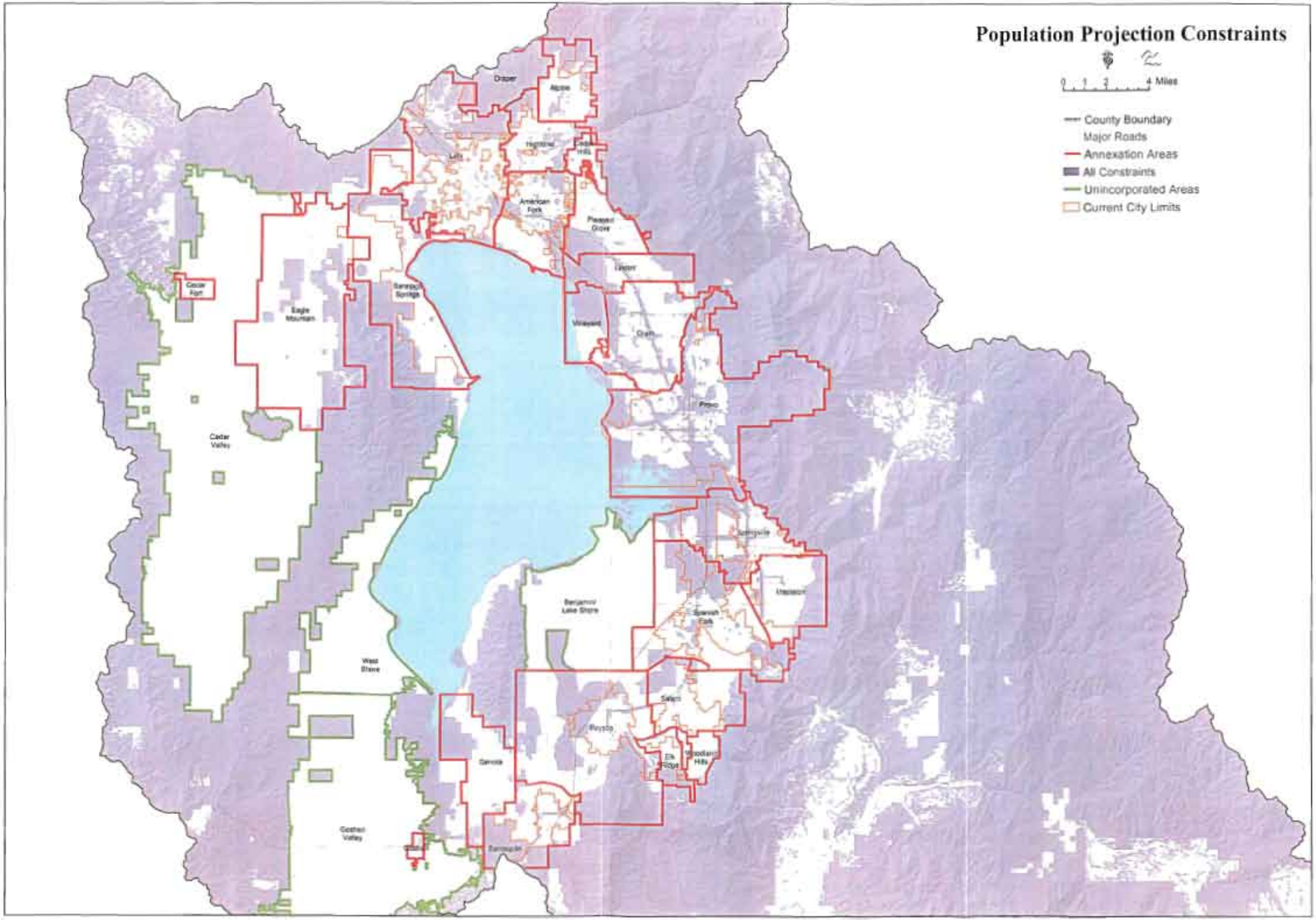
Mountainland

Municipality	Census 2000	Official Projections 2010	AARC	2020	AARC	2030	AARC	Planning Projections 2040	AARC	2050	50 Year AARC
Alpine	7,146	9,874	1.8%	11,762	2.3%	15,870	1.9%	[illegible]	[illegible]	[illegible]	2.0%
American Fork	21,941	27,787	1.6%	32,375	0.9%	35,583	2.0%	46,008	2.1%	56,433	1.9%
Cedar Fort	341	500	2.4%	632	1.8%	738	3.4%	922	1.9%	1,127	2.4%
Cedar Hills	3,056	5,807	3.6%	9,863	5.5%	10,120	2.0%	[illegible]	[illegible]	[illegible]	2.8%
Draper	0	na	5.1%	7,803	2.9%	10,445	3.0%	[illegible]	[illegible]	[illegible]	5.1%
Eagle Mountain	2,157	16,3%	3.6%	16,756	3.1%	22,770	5.3%	38,207	3.8%	53,644	6.6%
Elk Ridge	1,638	5.3%	3.8%	4,391	1.4%	5,524	1.8%	[illegible]	[illegible]	[illegible]	2.4%
Genola	365	3.0%	4.3%	2,592	7.1%	4,744	9.2%	11,467	4.7%	18,191	6.0%
Goshen	874	3.0%	3.0%	1,882	1.8%	1,970	2.3%	2,611	2.2%	3,251	2.7%
Highland	6,172	6.2%	3.0%	20,120	1.6%	23,564	1.8%	[illegible]	[illegible]	[illegible]	2.5%
Lehi	19,028	5.1%	3.8%	44,437	1.0%	65,375	3.5%	89,038	2.8%	99,038	3.1%
Linden	8,363	2.0%	1.1%	11,918	0.9%	13,025	4.9%	[illegible]	[illegible]	[illegible]	1.3%
Mapleton	5,809	4.9%	4.7%	14,928	3.5%	20,386	2.7%	27,607	2.1%	34,034	3.6%
Orem	84,324	1.3%	0.4%	100,020	0.3%	103,000	0.4%	[illegible]	[illegible]	[illegible]	0.5%
Payson	12,716	4.9%	3.0%	27,750	1.0%	30,583	6.2%	55,673	3.8%	86,763	3.9%
Pleasant Grove	23,488	1.8%	1.1%	30,415	0.9%	33,225	2.0%	[illegible]	[illegible]	[illegible]	1.1%
Provo	105,166	1.2%	1.0%	130,814	0.3%	134,667	0.8%	145,306	0.7%	157,125	0.8%
Salem	4,372	5.3%	5.1%	12,101	3.6%	17,816	3.6%	24,212	2.6%	31,409	4.0%
Santaquin	4,804	7.3%	5.8%	16,885	3.7%	24,253	6.0%	43,442	3.7%	62,621	5.3%
Saratoga Springs	1,003	24.5%	7.2%	15,035	2.7%	20,450	5.1%	38,606	3.4%	53,782	6.3%
Spanish Fork	20,246	3.2%	1.7%	32,745	0.9%	35,771	3.6%	50,900	2.8%	66,028	2.4%
Springville	20,424	3.5%	1.7%	34,132	0.9%	37,284	4.0%	[illegible]	[illegible]	[illegible]	2.2%
Utah County	11,184	7.6%	1.3%	25,253	0.1%	25,483	8.1%	57,467	6.8%	111,177	4.7%
Goshen Valley Area	415	–	4,109	–	4,878	–	4,767	–	17,581	–	48,114	–
Cedar Valley Area	510	–	5,078	–	5,258	–	5,864	–	21,809	–	35,649	
West Mountain Area	2,028	–	3,065	–	7,699	–	8,357	–	10,805	–	14,525	
West Shore Area	44	–	430	–	454	–	508	–	1,868	–	13,081	
Other Unincorporated Areas	8,169	–	8,474	–	8,665	–	8,933	–	8,526	–	1,811	–
Vineyard	180	20.5%	968	16.4%	4,256	3.5%	5,709	3.4%	[illegible]	[illegible]	[illegible]	8.3%
Woodland Hills	941	7.2%	1,881	5.6%	3,247	2.1%	4,214	1.8%	[illegible]	[illegible]	[illegible]	3.3%
North County	35,462	3.0%	163,842	2.8%	215,921	1.3%	248,891	3.5%	302,409	2.5%	436,620	3.0%
Central County	189,640	1.3%	215,614	0.8%	234,889	0.4%	240,365	0.7%	260,606	0.8%	272,125	0.7%
South County	79,413	4.6%	124,782	2.8%	165,269	1.8%	196,821	5.0%	318,177	4.0%	430,410	3.4%
GOPB County Control Total	368,536	3.2%	503,039	2.0%	615,480	1.1%	688,110	3.1%	882,488	2.5%	1,138,157	2.3%

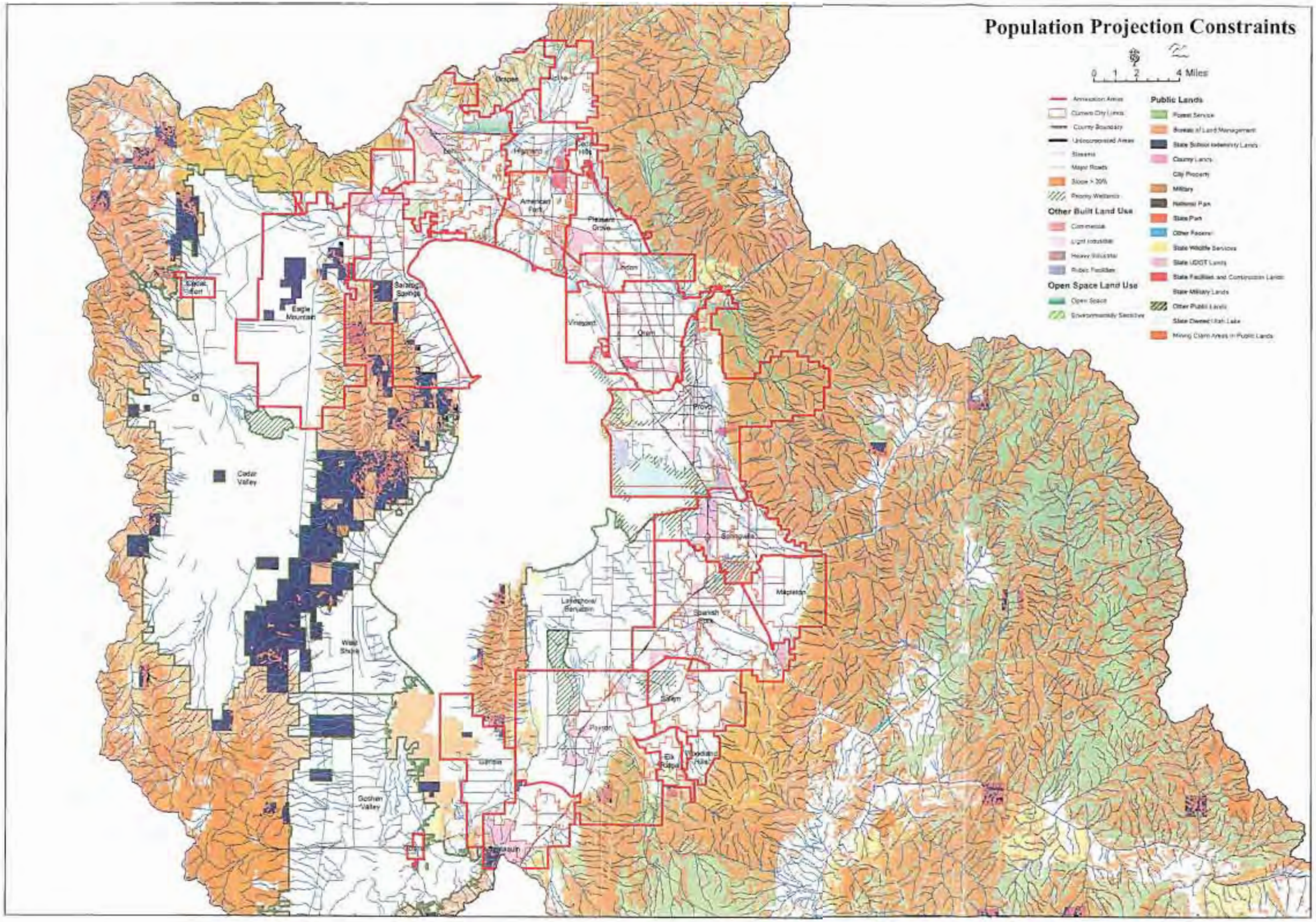
Notes:

1. GOPB County Control Totals for 2010 - 2030, produced by the Governor's Office of Planning and Budget and is official data.
2. GOPB County Control Total for 2040: A range between 710,000 and 1,023,391 was used. GOPB produced the range for planning only.
3. GOPB County Control Totals for 2050: a range between 820,000 and 1,276,351 was used. GOPB produced the range for planning only.
4. AARC = Annual Average Rate of Change
5. Unincorporated Utah County data for 2040 - 2050 is divided between North County (48%) and South County (58%).
6. Build-out Population: [illegible]
7. Final - 22 August 2002

Prepared by Shawn Ellis - 801/229-3841 - sellis@mountainland.org


Population Projection Constraints
0 1 3 4 Miles
County Boundary
Major Roads
Annexation Areas
All Constraints
Unincorporated Areas
Current City Limits
Draper
Alpine
Lehi
Highland
Cedar Hills
American Fork
Pleasant Grove
Lindon
Cedar Fort
Eagle Mountain
Saratoga Springs
Vineyard
Orem
Provo
Cedar Valley
Springville
Mapleton
Benjamin
Lake Shore
Spanish Fork
West Shore
Salem
Payson
Elk Ridge
Woodland Hills
Genola
Goshen Valley
Santaquin

Population Projection Constraints



Central Utah Project Completion Program

Attachment B

October 2004

UTAH RECLAMATION
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Attachment B

Appendix ~~A~~ B
Summary of Utah Lake Water Rights

						UNAP	Unapproved			
						APP	Approved			
						NC	No Change			
						NOF	No change on File			
Original Water Right Number	Segregated Water Right Number	Owner of Record	Original Water Right Amount ac-ft	Segregated Amount	Reduction in Original Right	Change Application Number	Change Application Status	Original Right Reduced	Volume Diverted Upstream	Volume Diverted Downstream
59-3500		**South Jordan Canal Company**	**29,634.85**							
	51-7534	Woodland Hills		1.09	1.09	a25517	APP	Y	1.09	0
	51-7331	Spanish Fork City		44.46	44.46	a23773	APP	Y	44.46	0
	51-7271	Elk Ridge Town		103.74	103.74	a23014	APP	Y	103.74	0
	51-7204	Woodland Hills		16.20	16.20	a22429	APP	Y	16.2	0
	51-7198	Payson City		224.77	0.00	NOF	NC*	N	0	0
	51-7182	Southern Utah Valley Municipal Assoc.		133.80	133.80	a21820	APP	Y	133.8	0
	51-7045	Santaquin City		224.77	224.77	a20673	APP	Y	224.77	0
	51-6786	South Jordan Canal Company		479.18	479.18	a18786	APP	Y	479.18	0
	51-6794	South Jordan Canal Company		148.20	148.20	a18829	APP	Y	148.2	0
	51-6793	South Jordan Canal Company		138.32	138.32	a18828	APP	Y	138.32	0
	53-1356	South Jordan Canal Company		464.36	464.36	a22231	APP	Y	464.36	0
	54-1021	South Jordan Canal Company		1.95	1.95	a22750	APP	Y	1.95	0
	54-1020	South Jordan Canal Company		1.95	1.95	a22749	APP	Y	1.95	0
	54-1018	South Jordan Canal Company		3.55	3.55	a22688	APP	Y	3.55	0
	55-9708	South Jordan Canal Company		728.65	0.00	a27167	UNAP	N	0	0
	55-9509	Cedar Hills Town		44.46	44.46	a24320	APP	Y	44.46	0
	55-9109	South Jordan Canal Company		74.10	74.10	a20022	APP	Y	74.1	0
	55-9108	South Jordan Canal Company		98.80	98.80	a20021	APP	Y	98.8	0
	55-9107	South Jordan Canal Company		148.20	148.20	a20020	APP	Y	148.2	0
	55-9101	South Jordan Canal Company		523.64	523.64	a19988	APP	Y	523.64	0
	55-9054	South Jordan Canal Company		19.76	19.76	a19813	APP	Y	19.76	0
	59-5380	South Jordan Canal Company		74.10	0.00	a16881	LAP	N	0	0
	59-5659	Jordan Valley Water Conservancy District		1,205.35	1,205.35	a23622	APP	Y	0	1205.35
	53-1031	High Country Limited Partnership		789.00	0.00	a13634	LAP	N	0	0
	53-1032	High Country Limited Partnership		331.38	0.00	a13635	LAP	N	0	0
	59-5270	South Jordan Canal Company		5,384.60	5,384.60	a15004	APP	Y	0	5384.6
	55-8873	South Jordan Canal Company		526.11	526.11	a19096	APP	Y	526.11	0
	55-8925	South Jordan Canal Company		18.89	18.89	a18896	APP	Y	18.887	0
	55-9055	South Jordan Canal Company		14.82	0.00	NOF	NC*	N	0	0
	55-9067	South Jordan Canal Company		24.70	24.70	a20078	APP	Y	24.7	0
	55-9113	South Jordan Canal Company		4.94	4.94	a20049	APP	Y	4.94	0
	51-7052	South Jordan Canal Company		29.64	29.64	a20788	APP	Y	29.64	0
	51-7082	South Jordan Canal Company		0.45	0.45	a20899	APP	Y	0.45	0
	51-7083	South Jordan Canal Company		4.49	4.49	a20901	APP	Y	4.49	0
	53-1406	South Jordan Canal Company		2,642.90	2,642.90	a23104	APP	Y	2642.9	0
	53-1414	South Jordan Irrigation Co.		9.88	9.88	a22276	APP	Y	9.88	0
	51-7244	Payson City		4.94	4.94	a22723	APP	Y	4.94	0
	51-7251	Payson City		51.87	51.87	a22766	APP	Y	51.87	0
	51-7250	Payson City		103.74	103.74	a22765	APP	Y	103.74	0
	51-7254	Alice Zellhuber		9.88	9.88	a22798	APP	Y	9.88	0
	54-1076	John Harr & E. Johnson		9.88	0.00	a22797	WD	N	0	0
	53-1447	South Jordan Irrigation Co.		9.88	9.88	a23015	APP	Y	9.88	0
	55-9500	Cedar Hills Town		69.16	69.16	a24196	APP	Y	69.16	0
	51-7405	South Shore Farms		83.98	83.98	a24305	APP	Y	83.98	0
	55-9707	South Jordan Canal Company & Highland Water Company		303.81	0.00	a27166	UNAP	N	0	0
		Original Right Reduced By:		**12,855.93**						
		Water Right Remaining w/Parent		**16,778.92**					0	16778.923

Original Water Right Number	Segregated Water Right Number	Owner of Record	Original Water Right Amount ac-ft	Segregated Amount	Reduction In Original Right	Change Application Number	Change Application Status	Original Right Reduced	Volume Diverted Upstream	Volume Diverted Downstream
59-3517		**Kennecott Utah Copper Corporation**	**13,750.00**							
	55-9653	Kennecott Utah Copper Corporation		10.00	0.00	a26233	UNAP	N	0	0
	59-5513	JVWCD		5,000.00	5,000.00	a23590	APP	Y	0	5000
		Original Right Reduced By:		**5,000.00**						
		Water Right Remaining w/Parent		**8,750.00**						
57-7637		**East Jordan Irrigation Company**	**48,400.00**							
	51-7580	Payson City and East Jordan Irrigation Co.		4.84	4.84	a25513	APP	Y	4.84	0
	51-7551	Payson City		212.96	212.96	a25118	APP	Y	212.96	0
	51-7461	Spanish Fork City		193.60	193.60	a24500	APP	Y	193.6	0
	51-7336	Payson City		203.28	203.28	a23774	APP	Y	203.28	0
	51-7332	Spanish Fork City		60.50	60.50	a23772	APP	Y	60.5	0
	51-7315	East Jordan Irrigation Company		203.28	203.28	a23464	APP	Y	203.28	0
	51-7314	Payson City		53.24	53.24	a23441	APP	Y	53.24	0
	51-7303	Payson City		9.68	9.68	a23349	APP	Y	9.68	0
	51-7294	Payson City		9.68	9.68	a23259	APP	Y	9.68	0
	51-7268	Payson City		4.84	4.84	a23129	APP	Y	4.84	0
	51-7247	Patterson Construction Company		72.60	72.60	a22725	APP	Y	72.6	0
	51-7197	Payson City		163.35	0.00	NOF	NC*	N	0	0
	51-7192	Payson City		135.52	135.52	a21935	APP	Y	135.52	0
	51-7169	Elk Ridge Town		31.46	0.00	NOF	NC*	N	0	0
	51-7160	Salem City		140.00	140.00	a21662	APP	Y	140	0
	51-7123	R.E. Development		2.42	2.42	a21168	APP	Y	2.42	0
	51-7122	R.E. Development		2.42	2.42	a21167	APP	Y	2.42	0
	51-7121	R.E. Development		2.42	2.42	a21166	APP	Y	2.42	0
						a21165				
	51-7120	R.E. Development		2.42	2.42	a21622	APP	Y	2.42	0
	51-7119	R.E. Development		2.42	2.42	a21164	APP	Y	2.42	0
	51-7118	R.E. Development		2.42	2.42	a21163	APP	Y	2.42	0
	51-7114	Payson City		101.64	101.64	a21053	APP	Y	101.64	0
	51-7113	Payson City		186.34	186.34	a21052	APP	Y	186.34	0
	51-7131	R.E. Development		9.68	9.68	a21336	APP	Y	9.68	0
	53-1460	South Shore Farms		508.20	508.20	a24499	APP	Y	508.2	0
	53-1375	East Jordan Irrigation Company		1,011.56	1,011.56	a19561	APP	Y	1011.56	0
	54-1023	Luis & Donna Ault		42.35	42.35	a22865	APP	Y	42.35	0
	54-1001	Claudia Ruttrell		24.20	24.20	a21159	APP	Y	24.2	0
	55-9581	Lehi City		314.60	314.60	a25446	APP	Y	314.6	0
	55-9511	Lehi City		217.80	217.80	a24340	APP	Y	217.8	0
	55-9508	Cedar Hills Town		43.56	43.56	a24319	APP	Y	43.56	0
	55-9490	Lake Hills Development Co. Llc		48.40	48.40	a24096	APP	Y	48.4	0
	55-9473	Lehi City		79.86	79.86	a23899	APP	Y	79.86	0
	55-9442	East Jordan Irrigation Company		101.64	101.64	a23618	APP	Y	101.64	0
	55-9404	Lehi City		101.64	101.64	a23154	APP	Y	101.64	0
	55-9270	Lehi City		4.84	0.00	NOF	NC*	N	0	0
	55-9263	Lehi City		121.00	121.00	a21611	APP	Y	121	0
	55-9243	Lehi City		333.96	333.96	a21453	APP	Y	333.96	0
	55-9233	Lehi City		50.82	50.82	a21327	APP	Y	50.82	0
	55-9224	Lehi City		503.36	503.36	a21188	APP	Y	503.36	0
	55-9213	Lehi City		101.64	0.00	NOF	NC*	N	0	0
	55-9490	Lake Hills Development Co. Llc		48.40	48.40	a24096	APP	Y	48.4	0
	57-10261	Salt Lake City		200.08	0.00	NOF	NC*	N	0	0
	57-10187	Sandy City Corporation		2,330.46	0.00	NOF	NC*	N	0	0
	57-10186	Salt Lake City Corporation		11,953.59	0.00	a24006	UNAP	N	0	0
	59-5644	East Jordan Irrigation Company		435.60	435.60	a16037	APP	Y	0	435.6
	59-5395	East Jordan Irrigation Company		726.00	726.00		APP	Y	0	726
	59-5268	East Jordan Irrigation Company		7,935.18	7,935.18	a15002	APP	Y	0	7935.18
	53-1378	East Jordan Irrigation Company		58.08	58.08	a19664	APP	Y	58.08	0
	53-1391	East Jordan Irrigation Company		425.92	425.92	a20795	APP	Y	425.92	0
	51-7170	Southern Utah Valley Municipal Assoc.		226.20	226.20	a21684	APP	Y	226.2	0
	55-9284	Alpine Valley Llc.		450.12	450.12	a21958	APP	Y	450.12	0
	55-9285	Lehi City		14.52	14.52	a22214	APP	Y	14.52	0
	55-9319	Lehi City		309.76	309.76	a22101	APP	Y	309.76	0
	51-7203	Payson City and East Jordan Irrigation Co.		48.40	48.40	a22131	APP	Y	48.4	0
	55-9341	East Jordan Irrigation Company		121.00	121.00	a22460	APP	Y	121	0
	55-9344	East Jordan Irrigation Company		111.32	0.00	NOF	NC*	N	0	0
	55-9343	East Jordan Irrigation Company		401.72	401.72	a22549	APP	Y	401.72	0
	51-7224	Payson City		48.40	48.40	a22496	APP	Y	48.4	0
	53-1425	Evan Johnson		87.12	87.12	a22505	APP	Y	87.12	0
	55-9356	Pleasant Grove City		101.64	101.64	a22615	APP	Y	101.64	0
	51-7237	Preston Peterson		116.16	116.16	a22674	APP	Y	116.16	0
	51-7241	Payson City		48.40	48.40	a22703	APP	Y	48.4	0
	51-7242	Springville City		48.40	48.40	a22702	APP	Y	48.4	0
	55-9390	East Jordan Irrigation Company		208.12	208.12	a23027	APP	Y	208.12	0
	53-1440	East Jordan Irrigation Company		1,294.70	1,294.70	a23105	APP	Y	1294.7	0
	51-7278	Mountain View Ranches Llc.		401.74	401.74	a23095	APP	Y	401.74	0
	55-9396	Lehi City		341.22	341.22	a23106	APP	Y	341.22	0
	55-9426	Patterson Construction Company		89.54	89.54	23,642.00	APP	Y	89.54	0
	51-7317	East Jordan Irrigation Company		101.64	101.64	a23485	APP	Y	101.64	0
	54-1045	Evan Johnson		130.68	130.68	a24306	APP	Y	130.68	0
	55-9499	Cedar Hills Town		372.68	372.68	a24195	APP	Y	372.68	0

55-9504	East Jordan Irrigation Company	62.92	0.00	NOF	NC*	N	0	0
51-7403	East Jordan Irrigation Company	48.40	48.40	a24258	APP	Y	48.4	0
55-9503	East Jordan Irrigation Company	62.92	0.00	NOF	NC*	N	0	0
51-7412	East Jordan Irrigation Company	217.80	217.80	a24339	APP	Y	217.8	0
55-9578	East Jordan Irrigation Company	9.68	9.68	a25347	APP	Y	9.68	0
55-9610	Pleasant Grove City	212.96	212.96	a25852	APP	Y	212.96	0
51-7614	Payson City	24.20	24.20	a25944	APP	Y	24.2	0
55-9633	Alpine City	67.76	67.76	a26110	APP	Y	67.76	0
54-1088	East Jordan Irrigation Company	19.36	0.00		UNAP	N	0	0
51-7665	Neil Holbrook	4.84	0.00		UNAP	N	0	0
57-10298	Kent & Marsha Johnson	2.42	0.00		UNAP	N	0	0
	Original Right Reduced By:	**20,291.29**						
	Water Right Remaining w/Parent	**28,108.71**						

Original Water Right Number	Segregated Water Right Number	Owner of Record	Original Water Right Amount ac-ft	Segregated Amount	Reduction in Original Right	Change Application Number	Change Application Status	Original Right Reduced	Volume Diverted Upstream	Volume Diverted Downstream
59-3499		**Utah and Salt Lake Canal Company**	**45,673.30**							
	51-7191	Payson City		41.31	0.00	NOF*	NC*	N	0	0
	54-1086	Utah and Salt Lake Canal Company		201.96	201.96	a26292	APP	Y	201.96	0
	54-1085	Utah and Salt Lake Canal Company		270.81	270.81	a29293	APP	Y	270.81	0
	59-5269	Utah and Salt Lake Canal Company		10,355.04	10,355.04	a15003	APP	Y	0	10355.04
	54-624	Waldo Company		399.33	0.00	a15836	LAP	N	0	0
	59-5385	West Valley City		748.17	748.17	a17201	APP	Y	0	748.17
	53-1377	Utah and Salt Lake Canal Company		454.41	454.41	a19623	APP	Y	454.41	0
	54-982	Ronald & Marsha Paskett		9.23	9.23	a20646	APP	Y	9.23	0
	54-981	Ronald & Marsha Paskett		9.23	9.23	a20645	APP	Y	9.23	0
	54-980	Ronald & Marsha Paskett		7.50	7.50	a20694	APP	Y	7.5	0
	54-979	Ronald & Marsha Paskett		19.94	19.94	a20643	APP	Y	19.94	0
	53-1439	Utah and Salt Lake Canal Company		1,840.59	1,840.59	t23189 a24879	APP	Y	1840.59	0
	59-5601	City of Riverton		757.35	757.35	a23048	APP	Y	0	757.35
	59-5619	Utah and Salt Lake Canal Company		2,882.52	2,882.52	t26617 a23711	APP	Y	0	2882.52
		Original Right Reduced By:		**17,556.75**						
		Water Right Remaining w/Parent		**28,116.55**						

Original Water Right Number	Segregated Water Right Number	Owner of Record	Original Water Right Amount ac-ft	Segregated Amount	Reduction in Original Right	Change Application Number	Change Application Status	Original Right Reduced	Volume Diverted Upstream	Volume Diverted Downstream
59-13*		**Utah Lake Distributing Company**	**43,165.90**							
	54-1024	Louis & Donna Ault		91.98	0.00	a22867	UNAP	N	0	0
	54-1015	Utah Lake Distributing Co.		1.95	1.95	a22680	APP	Y	1.95	0
	54-716	Utah Lake Distributing Co.		10.22	0.00	NOF	NC*	N	0	0
	59-5257	Utah Boys Ranch/Child &Youth Svc.		27.16	0.00	a14669	LAP	N	0	0
	59-5271	Utah Lake Distributing Co.		3,439.03	3,439.03	a15005	APP	Y	0	3439.03
	59-5603	City of Riverton		457.86	457.86	a23047	APP	Y	0	457.86
	55-9655	Utah Lake Distributing Co.		20.44	0.00	NOF	NC*	N	0	0
	55-9572	Utah Lake Distributing Co.		633.64	633.64	a25275	APP	Y	633.64	0
	53-1496	E. Johnson		807.38	807.38	a25719	APP	Y	807.38	0
	55-9629	Pleasant Grove City		235.06	235.06	a26032	APP	Y	235.06	0
	54-1090	E. Johnson		495.67	495.67	a26402	APP	Y	495.67	0
	53-1510	JLC		153.30	153.30	a26638	APP	Y	153.3	0
	51-7680	NL Topham		20.44	20.44	a26872	APP	Y	20.44	0
	55-9693	Mountain View Ranches		919.80	919.80	a26962	APP	Y	919.8	0
	51-7705	Robert Goodrow		15.33	0.00	a27057	UNAP	N	0	0
		Original Right Reduced By:		**7,164.13**						
		Water Right Remaining w/Parent		**36,001.77**						

* See Technical Memorandum for explanation

Original Water Right Number	Segregated Water Right Number	Owner of Record	Original Water Right Amount ac-ft	Segregated Amount	Reduction in Original Right	Change Application Number	Change Application Status	Original Right Reduced	Volume Diverted Upstream	Volume Diverted Downstream
57-23*		**Sandy & Draper Irrigation Company**	**12,500.00**							
	54-1044	Draper Irrigation Company		2,882.75	0.00	a23069	Cert	N	0	0
	55-9661	Highland City & Pleasant Grove City		6,004.40	0.00	a26382	APP	N	0	0
	57-10191	Draper Irrigation Company		4,674.28	0.00	a16627	APP	N	0	0
	59-5273	Draper Irrigation Company & Sandy Canal Co.		2,000.00	2,000.00	a15007	APP	Y	0	2000
		Original Right Reduced By:		**2,000.00**						
		Water Right Remaining w/Parent		**10,500.00**						

* See Technical Memorandum for explanation

Original Water Right Number	Segregated Water Right Number	Owner of Record	Original Water Right Amount ac-ft	Segregated Amount	Reduction in Original Right	Change Application Number	Change Application Status	Original Right Reduced	Volume Diverted Upstream	Volume Diverted Downstream
59-3496		**North Jordan Irrigation Company**	**15,848.00**							
	59-5379			498.60	498.60	a15015	APP	Y	498.6	0
	59-5272			10,000.00	10,000.00	a15006	APP	Y	10000	0
		Original Right Reduced By:		**10,498.60**						
		Water Right Remaining w/Parent		**5349.40**						

Original Water Right Number	Segregated Water Right Number	Owner of Record	Original Water Right Amount ac-ft	Segregated Amount	Reduction In Original Right	Change Application Number	Change Application Status	Original Right Reduced	Volume Diverted Upstream	Volume Diverted Downstream
59-14		CUWCD	43,739.00						0	0
59-15		CUWCD	10,984.00						0	0
59-20		CUWCD	2,350.00						0	0
		Water Right Remaining w/Parents	57,073.00							57073
57-7624		Salt Lake City	39,600.00							
	57-9327	Central Utah Water Conservancy Dist.		25,000.00	25,000.00	E3101	APP	Y	0	25000
		Original Right Reduced By:		25,000.00						
		Water Right Remaining w/Parent		14,600.00						
		Total Primary Storage Rights		192,906.15						
		Total Secondary Storage Rights		112,738.90						
		Total All Storage Rights		305,645.05						
		Total Rights Segregated from Original (Secondary and Primary)		100,366.70						
		Total Rights Remaining w/Parent		205,278.35						
		Total Delivery Diverted Upstream		34,040.00						
		Total Delivery Diverted Downstream		271,605.05						
				Upstream	Downstream					
		Primary Deliveries		30,772.76	162,133.39					
		Secondary Deliveries		3,267.24	109,471.66					

Central Utah Project Completion Program

Attachment C

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Attachment C

TO: Files (ULS)

NOT FOR PUBLIC RELEASE

FROM: Mark A. Breitenbach, P.E.
Project Manager

DATE: March 20, 2000

SUBJECT: Updated Demands Model For Period 1950-1998

The purpose of this memorandum is to document changes made in the demands model of the Spanish Fork-Nephi Irrigation (SFN) system to update it from the hydrologic period 1930-1973 to the period 1950-1998 that will be used in the Utah Lake Drainage Basin Water Delivery System (ULS). This model is a spreadsheet format. As information becomes available for 1999, it will be incorporated into the model.

Project Lands

The amount of Project lands remains unchanged from the SFN system plan. Attachment 1 is Table 3-8 from the Draft Water Supply Appendix that shows a total of 75,570 acres of Project lands served, including 10, 835 acres of dryland farmed area and 64,735 of irrigated area. The amount shown for the Spanish Fork Area (45,688 acres, rounded to 45,690) included 515 acres of land in the Southshore area. This area was not included in the water supply allocation of the SFN system. The updated model does not include the Southshore area, reducing the Spanish Fork Area acreage to 45,173 acres and the total Project acreage from 75,570 to 75,053 acres.

Consumptive Use and Diversion Requirements

Consumptive use, irrigation cropping pattern, water conveyance and application efficiency, and overall unit irrigation diversion requirement is the same as developed for the SFN system (See Attachement 1). A technical committee comprised of various local, county, state and federal agencies developed the water use values used for the SFN system planning. Attachment 2 is Tables 3-9 and 5-5 and Figure 5-3 from the Draft Water Supply Appendix which show the distribution of CUP water under the SFN system for the hydrologic period 1930-1973. Information on the development of irrigation diversion requirements can be found in an unpublished report entitled "Preliminary Water Requirements Report and Appendices, South Utah and East Juab Counties, I&D System, May 1994"

Surface Water Diversions

Historical surface water diversion data was obtained from the State database. It included Spanish Fork River Commissioner data for the Spanish Fork River and USGS gaging records for local streams.

Spanish Fork River Diversions - The river commissioner data was continuous for the period from 1950 through 1998. In the last decade, historical diversions have included interim CUP water deliveries. The historical diversion data was reduced by the amount of reported CUP deliveries. Some discrepancies occur between the River Commissioner Report records and the State database, particularly rounding discrepancies. The State database data was used for the entire period 1950-1998. The river commissioner reports the diversions from the Spanish Fork River under direct diversion rights and the diversions of Strawberry Valley Project (SVP) water. The SVP water is mostly supplied from storage in Strawberry Reservoir under a credit system. The SVP supply is an average of 61,500 acre-feet per year. The historical supply for the period 1950-1998 averaged _____ acre-feet per year. All values were therefore increased by ___ percent so that the average used in the ULS demands model matched 61,500 acre-feet.

Local Streams - USGS gaging records exist for the following streams:

- Salt Creek at Nephi, 1951-1980, 1994-present
- Salt Creek below Nephi Powerplant Div., near Nephi, 1994, 1996-present
- Summit Creek Near Santaquin, 1955-1966
- Hobble Creek Above Diversions, Near Springville, 1945-1974
- Currant Creek near Goshen, 1954-1960
- Currant Creek near Mona, 1979-present

The water supply for the period 1950-1998 for each of the SFN subareas that divert local supplies was determined as discussed following

Nephi- Historical flows in Salt Creek were used. The Salt Creek record was extended in the same manner as under the SFN system by correlation with the Chicken Creek record.

Mona - Local water supply was determined by using 17.2 percent of the Nephi supply, the same procedure as used in the SFN system reports.

Peteetneet - The historical flows of Summit Creek for the period 1955-1966 were used. A correlation by month was made with the extended Salt Creek supply to fill in the missing years:

January	48.73 percent	May	59.75 percent	September	63.24 percent
February	48.07 percent	June	48.35 percent	October	65.72 percent
March	40.92 percent	July	45.98 percent	November	54.98 percent
April	42.35 percent	August	55.70 percent	December	50.75 percent

Highline Canal - The USBR estimates of the flow of Peteetneet Creek and other local water supplies was use for the period 1950-1973. The record was extended by monthly correlation with the extended Salt Creek record to fill in the missing years:

January	--- percent	May	76.70 percent	September	77.99 percent
February	--- percent	June	42.44 percent	October	20.56 percent
March	--- percent	July	59.87 percent	November	--- percent
April	46.26 percent	August	77.17 percent	December	--- percent

Mapleton - The recorded flow of Hobble Creek was used for the period 1950-1974. The record was extended by monthly correlation with the extended Salt Creek record to fill in the missing

years:

January	--- percent	May	32.34 percent	September	42.84 percent
February	--- percent	June	28.72 percent	October	42.81 percent
March	--- percent	July	27.11 percent	November	--- percent
April	17.42 percent	August	37.18 percent	December	--- percent

Elberta - (incomplete)

Groundwater Supply - Records on groundwater pumping are not readily available because most wells are privately owned and operated. The Nephi Irrigation Company operates 5 wells. Power records were collected for those wells during the planning of the East Juab Water Efficiency Project. The Highline Canal company also operates two large wells. According to the USGS, the first irrigation well in Juab County was drilled in 1947. Further irrigation well drilling in that county did not occur until after the extremely dry year of 1961. In south Utah County, well development was not fully developed until the early 1980's. Historical well pumping is therefore not a good indication of present day pumping capability or practice.

The USGS prepared two reports for the CUWCD. The first, UDNR Technical Publication No. 111, entitled "Hydrology and simulation of groundwater flow in southern Utah and Goshen Valley, Utah" reported the historical groundwater pumping for south Utah County for the period 1930-1991. The second report, UDNR Technical Publication No. 114, entitled "Hydrology and simulation of ground-water flow in Juab Valley, Juab County, Utah" reported the historical groundwater pumping for Juab County for the period 1930-1993. The USGS collected power records of wells that were operated for irrigation and other uses. The monthly power records were used to compute annual groundwater pumped by each well. The annual values for each well were entered into 40 acre model cells. In some areas, the USGS used stress periods of several years rather than a single year. In these areas, the pumpage in the model represents the average pumping for the entire stress period.

The boundaries of the irrigation canal companies that would be served by the ULS were overlayed on the USGS groundwater model and the annual pumping for each area was extracted. The results are shown in Attachment 3. Attachment 3 shows the SFN model groundwater pumping (developed by the USBR), the USGS reported historical pumping (power records) and the amount of potential pumping to attempt to meet computed remaining demand in the ULS model assuming the maximum pumping capacity identified by the USBR for each canal company.

TABLE 3-8
SUMMARY OF ANNUAL IRRIGATION DIVERSION REQUIREMENTS BY SFN SYSTEM AREA

Item	Spanish Fork Area	Peteetneet Area	Elberta Area	Mona Subarea	Nephi Subarea	West Mona Subarea	TOTAL
Irrigable Acres							
Irrigated Lands (Supplemental Water)	45,690	4,630	1,890[a]	4,675	7,850	0	64,735
Non-irrigated Lands	0	0	0	2,655	6,260	1,920	10,835
SUBTRACT 515 AC- SOUTH SHORE *TOTAL*	*45,690*	*4,630*	*1,890*	*7,330*	*14,110*	*1,920*	*75,570*
Annual Requirement (acre-feet/acre)							
Consumptive Use Required for Irrigation	2.41	2.42	2.42	2.37	2.37	2.37	
Effective Precipitation	0.54	0.54	0.55	0.37	0.37	0.37	
Usable Groundwater in Root Zone	0.26	0.00	0.00	0.00	0.00	0.00	
Unadjusted Net Crop Water Requirement	1.61	1.88	1.87	2.00	2.00	2.00	
Net Irrigation Requirement (95% of above)	1.53	1.77	1.74	1.90	1.90	1.90	
On-Farm Losses	1.11	1.21	1.13	1.08	1.16	1.12	
Farm Delivery Requirement	2.64	2.98	2.87	2.98	3.06	3.02	
Conveyance Loss	0.22	0.15	0.32	0.16	0.16	0.15	
Diversion Requirement	2.86	3.13	3.19	3.14	3.22	3.17	
Total Annual Requirement (acre-feet)							
Diversion Requirement in SFN System Area							
For Irrigated Lands	130,700[b]	14,500	6,000	14,700	25,300	0	191,200
For Non-irrigated Lands	0	0	0	8,300	20,200	6,100	34,600
TOTAL	*130,700*	*14,500*	*6,000*	*23,000*	*45,500*	*6,100*	*225,800*
Useable Existing Supply	101,200[b]	7,400	2,300[c]	8,100	20,700	0	139,700
Remaining Demand for Bonneville Unit Water							
For Irrigated Lands	29,500	7,100	3,700	6,600	4,600	0	51,500
For Non-irrigated Lands	0	0	0	8,300	20,200	6,100	34,600
TOTAL	*29,500*	*7,100*	*3,700*	*14,900*	*24,800*	*6,100*	*86,100*

[a] In the Elberta area, 6,270 acres have historically been irrigated with an inadequate water supply. The supply of Bonneville Unit water available to the Elberta area is insufficient to provide a full supply for all these acres. The 1,890 acres shown on this table represents the acreage that could be provided with a water supply on par with the acreage in the other agricultural areas of the SFN System.

[b] These amounts are reduced from those estimated for the total irrigated lands shown in the irrigation demand model (140,400 acre-feet shown in Table 3-15) because these amounts are the amounts required for acreage served by the SFN System and exclude acreage served exclusively from other sources.

[c] Amount shown is a pro rata share of the existing Elberta area water supply.

ATTACHMENT 1

TABLE 3-9
AVERAGE ANNUAL IRRIGATION WATER DEMAND, SUPPLY, AND RESULTING SHORTAGES

Area	Modeled Acreage[a] (acres)	Total Demand (acre-feet)	Existing Supply[b] (acre-feet)	SFN System Remaining Demand (acre-feet)	Bonneville Unit Supply (acre-feet)	Supply Shortage (acre-feet)	Shortage as Percentage of Total Demand
Southern Utah County							
Spanish Fork	45,690	130,700	101,200	29,500	21,700	7,800	6.0
Peteetneet[c]	4,630	14,500	7,400	7,100	6,000	1,100	7.6
Elberta	1,890[c]	6,000	2,300	3,700	3,400[e]	300	5.0
Subtotal	*52,210*	*151,200*	*110,900*	*40,300*	*31,100*	*9,200*	*6.1*
Eastern Juab County							
Mona	7,330	23,000	8,100	14,900	13,700	1,200	5.2
Nephi	14,110	45,500	20,700	24,800	22,600	2,200	4.8
West Mona Area	1,920	6,100	0	6,100	5,700[f]	400	6.6
Subtotal	*23,360*	*74,600*	*28,800*	*45,800*	*42,000*	*3,800*	*5.1*
TOTAL	**75,570**	**225,800**	**139,700**	**86,100**	**73,100**	**13,000**	**5.8**

[a] Based on 75,570 acres used in the water supply analysis.
[b] The existing water supply is based on the amounts presently used to meet demands on lands to be served by the SFN System.
[c] This area consists of the Santaquin area served with water from Summit Creek, and the Goosenest area along the High Line Canal near Payson.
[d] In the Elberta area, 6,370 acres would be irrigated with Bonneville Unit water. The 1,890 acres was used in modeling to account for limited Bonneville Unit water supplies that could be diverted to the area.
[e] Provided by return flow collected in Mona Reservoir.
[f] Provided by return flows collected in Mona Reservoir and 4,400 acre-feet of water from Strawberry Reservoir released to Mona Reservoir.

ATTACHMENT 2 1 of 3

TABLE 5-5
COMBINED BONNEVILLE UNIT AND SVP WATER DELIVERIES FROM THE SFN SYSTEM

Purpose	Water from Strawberry Reservoir			Bonneville Unit Return Flows (4)	Total (5)
	In Main Conveyance Aqueduct (1)[a]	In Diamond Fork Creek and Spanish Fork River (2)	Subtotal (3)		
IRRIGATION WATER					
Southern Utah County					
Mapleton to Santaquin	21,600	6,100	27,700	0	27,700
SVP Delivery	50,900	10,600	61,500	0	61,500
Elberta	0	0	0	3,400	3,400
Eastern Juab County					
Mona	13,700	0	13,700	0	13,700
Nephi	22,600	0	22,600	0	22,600
West Mona Area	4,400	0	4,400	1,300	5,700
Irrigation Subtotal	*113,200*	*16,700*	*129,900*	*4,700*	*134,600*
(SVP Water)	*(50,900)*	*(10,600)*	*(61,500)*	*(0)*	*(61,500)*
(Bonneville Unit Water)	*(62,300)*	*(6,100)*	*(68,400)*	*(4,700)*	*(73,100)*
UTAH LAKE, from:					
Spanish Fork River	11,100[b]	22,400[c]	33,500	0	33,500
Southern Utah County	0	0	0	13,800	13,800
Eastern Juab County	0	0	0	7,000	7,000
Utah Lake Subtotal	*11,100*	*22,400*	*33,500*	*20,800*	*54,300*
TOTALS	**124,300**	**39,100**	**163,400**	**25,500**	**188,900**
(SVP Water)	**(50,900)**	**(10,600)**	**(61,500)**	**(0)**	**(61,500)**
(Bonneville Unit Water)	**(73,400)**	**(28,500)**	**(101,900)**	**(25,500)**	**(127,400)**

[a] The amounts shown in Column (1) for the Main Conveyance Aqueduct do not include 4,000 acre-feet of river water conveyed in the aqueduct to the High Line Canal water users by exchange. With the river water the total amount carried in the aqueduct is 128,300 acre-feet.
[b] Includes 8,000 acre-feet exchanged for groundwater pumped for M&I use in southern Utah County.
[c] Includes 3,200 acre-feet exchanged for groundwater pumped for M&I use in southern Utah County.

The 101,900 acre-feet of deliverable Bonneville Unit water from Strawberry Reservoir will be divided between the Main Conveyance Aqueduct (73,400 acre-feet) and Spanish Fork River (28,500 acre-feet). These totals are shown at the bottom of Table 5-5 in columns one and two of the row labelled "(Bonneville Unit Water)."

The 25,500 acre-feet shown at the bottom of column four is the total return flow to Utah Lake estimated from the use of SFN System Bonneville Unit water on Table 4-1. This return flow is also part of the Bonneville Unit water supply. The 25,500 acre-feet consist of 11,700 acre-feet of return flow to Mona Reservoir and 13,800 acre-feet of return flow to Utah Lake from irrigation and M&I deliveries in southern Utah County. Part of the return flow to Mona Reservoir is used for irrigation in the Elberta and west Mona areas and the balance

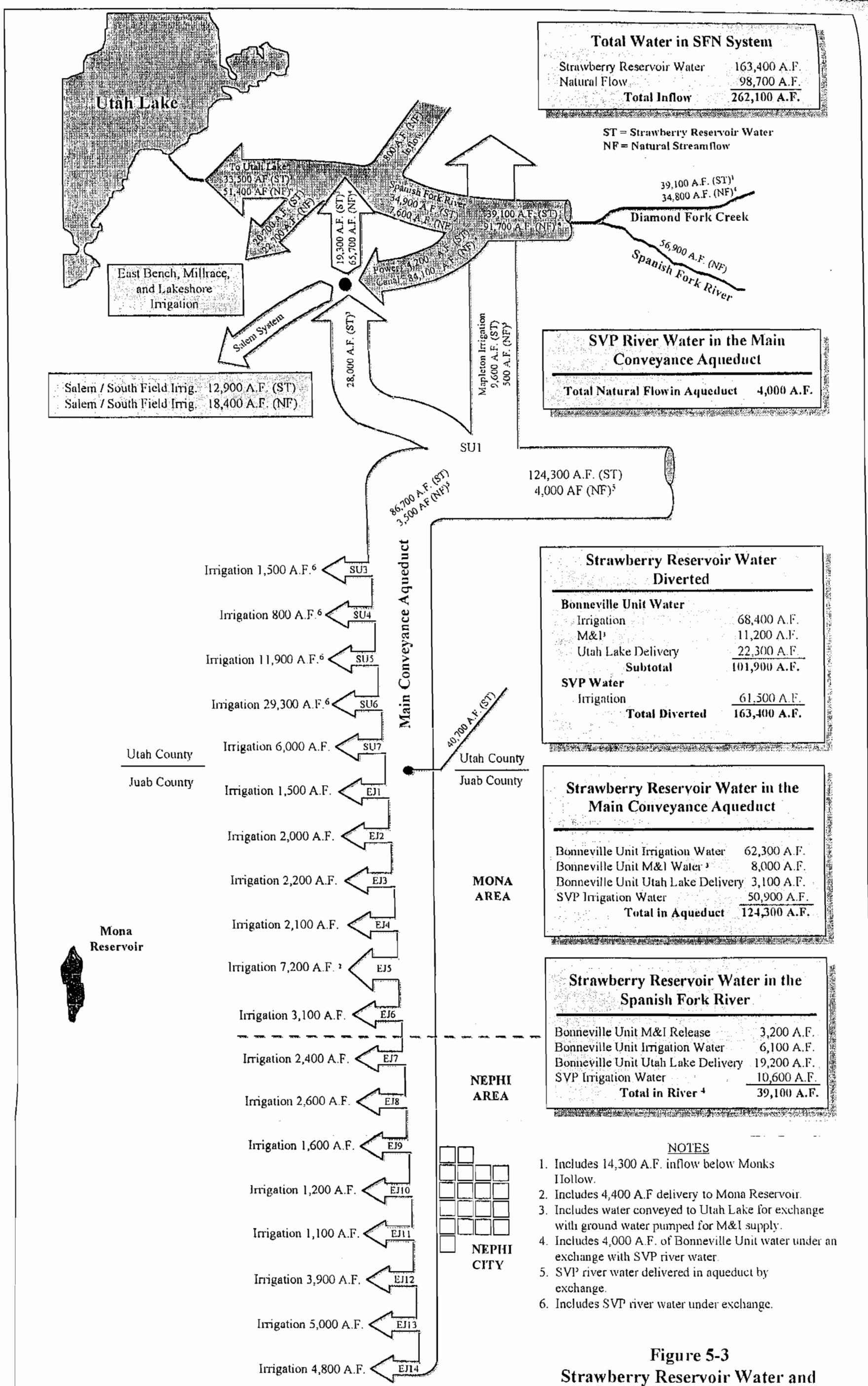


Figure 5-3
Strawberry Reservoir Water and Natural Flow in the SFN System

February 1998

BASED ON SFN PEAK MONTH CAPACITY

ATTACHMENT 3 1 OF 6

Summary Sheets

Maximum Pumping Capacity

YEARS	Nephi Demands Model acre-feet	Nephi USGS Model acre-feet	Nephi Pumping Capacity 4480 acre-feet	Mona Demands Model acre-feet	Mona USGS Model acre-feet	Mona Pumping Capacity 2630 acre-feet
1950	9130	628	13080	5360	517	11192
1951	9770	628	14439	5740	517	11636
1952	5910	628	4761	3470	517	8105
1953	8470	628	12170	4980	517	11463
1954	11340	628	16837	6660	517	11792
1955	13230	4352	15865	7770	676	11907
1956	10100	4352	15002	5930	676	11664
1957	8070	4352	9140	4740	676	10523
1958	7590	4352	11272	4460	676	10224
1959	13230	4352	18144	7770	676	12179
1960	13230	4352	15491	7770	676	11747
1961	14460	7818	19767	8490	4442	12385
1962	8150	7818	11628	4790	4442	10805
1963	9850	7818	13913	5780	4442	11644
1964	9850	7818	13540	5780	4442	11549
1965	8470	7818	10516	4980	4442	11055
1966	10440	7818	16539	6130	4442	11744
1967	9500	7818	12988	5580	4442	11728
1968	8530	7818	10523	5010	4442	10997
1969	7240	8230	11254	4250	5293	10194
1970	8400	8230	10845	4930	5293	11311
1971	9450	13260	11222	5550	5867	11030
1972	13230	13260	17261	7770	5867	12035
1973	7470	13260	9774	4390	5867	9730
1974		13260	8520		5867	10716
1975		13260	15838		5867	11811
1976		13260	19901		5867	12422
1977		13260	9487		5867	10095
1978		13260	12913		5867	10989
1979		8787	6587		4501	8708
1980		8787	17858		4501	11944
1981		8787	11797		4501	10090
1982		8787	2225		4501	6002
1983		8787	3707		4501	7080
1984		3657	10329		909	9908
1985		3657	10901		909	9624
1986		3657	19465		909	12322
1987		3657	18908		909	12237
1988		13325	19114		3903	12188
1989		13325	20141		3903	12449
1990		13325	16407		3903	11882
1991		13325	20308		3903	12478
1992		13325	14214		3903	11166
1993		13325	18999		3903	12268
1994			8872			10947
1995			13475			11333
1996			12930			10835
1997			9376			10118
1998			9376			10118
Total	235110	352849	647623	138080	149257	538368
Average	9796	10231	13217	5753	4322	10987
Time Period	1950-1973	1971-1990	1950-1998	1950-1973	1961-1993	1950-1998

Summary Sheets

Pumping Set to average 1969-1993 USGS Model

YEARS	Nephi Demands Model acre-feet	Nephi USGS Model acre-feet	Nephi Pumping Capacity 2950 acre-feet	Mona Demands Model acre-feet	Mona USGS Model acre-feet	Mona Pumping Capacity 830 acre-feet
1950	9130	628	11050	5360	517	4282
1951	9770	628	11723	5740	517	4517
1952	5910	628	4761	3470	517	3320
1953	8470	628	10001	4980	517	4487
1954	11340	628	12573	6660	517	4516
1955	13230	4352	12484	7770	676	4646
1956	10100	4352	11896	5930	676	4504
1957	8070	4352	7675	4740	676	4459
1958	7590	4352	9047	4460	676	4202
1959	13230	4352	13978	7770	676	4680
1960	13230	4352	12278	7770	676	4521
1961	14460	7818	14906	8490	4442	4779
1962	8150	7818	9164	4790	4442	4150
1963	9850	7818	10980	5780	4442	4642
1964	9850	7818	10787	5780	4442	4691
1965	8470	7818	8951	4980	4442	4370
1966	10440	7818	12328	6130	4442	4510
1967	9500	7818	10396	5580	4442	4629
1968	8530	7818	8656	5010	4442	4467
1969	7240	8230	9132	4250	5293	4150
1970	8400	8230	8807	4930	5293	4618
1971	9450	13260	8955	5550	5867	4236
1972	13230	13260	13325	7770	5867	4629
1973	7470	13260	7859	4390	5867	4064
1974		13260	7830		5867	4679
1975		13260	12117		5867	4614
1976		13260	14910		5867	4770
1977		13260	7710		5867	4150
1978		13260	10419		5867	4292
1979		8787	6587		4501	3551
1980		8787	13520		4501	4505
1981		8787	9524		4501	4126
1982		8787	2225		4501	2490
1983		8787	3707		4501	3320
1984		3657	7924		909	4150
1985		3657	8965		909	3792
1986		3657	14474		909	4650
1987		3657	14318		909	4707
1988		13325	14524		3903	4584
1989		13325	14794		3903	4722
1990		13325	12254		3903	4719
1991		13325	14863		3903	4725
1992		13325	11204		3903	4415
1993		13325	14498		3903	4735
1994			7769			4635
1995			10788			4413
1996			10241			4226
1997			7855			4180
1998			7855			4180
Total	235110	352849	512587	138080	149257	213398
Average	9796	10231	10297	5753	4322	4352
Time Period	1950-1973	1971-1990	1971-1990	1950-1973	1961-1993	1961-1993

Summary Sheets

Pumping Set to average 1950-1973 Demands Model

YEARS	Nephi Demands Model acre-feet	Nephi USGS Model acre-feet	Nephi Pumping Capacity 2670 acre-feet	Mona Demands Model acre-feet	Mona USGS Model acre-feet	Mona Pumping Capacity 1105 acre-feet
1950	9130	628	10210	5360	517	5657
1951	9770	628	10921	5740	517	5892
1952	5910	628	4761	3470	517	4420
1953	8470	628	9441	4980	517	5862
1954	11340	628	11733	6660	517	5891
1955	13230	4352	11644	7770	676	6021
1956	10100	4352	11056	5930	676	5879
1957	8070	4352	7115	4740	676	5834
1958	7590	4352	8487	4460	676	5450
1959	13230	4352	13138	7770	676	6055
1960	13230	4352	11438	7770	676	5896
1961	14460	7818	13786	8490	4442	6154
1962	8150	7818	8604	4790	4442	5525
1963	9850	7818	10140	5780	4442	6017
1964	9850	7818	10227	5780	4442	6066
1965	8470	7818	8391	4980	4442	5745
1966	10440	7818	11488	6130	4442	5885
1967	9500	7818	9836	5580	4442	6004
1968	8530	7818	8096	5010	4442	5842
1969	7240	8230	8572	4250	5293	5418
1970	8400	8230	8247	4930	5293	5993
1971	9450	13260	8395	5550	5867	5611
1972	13230	13260	12485	7770	5867	6004
1973	7470	13260	7299	4390	5867	5164
1974		13260	7439		5867	6054
1975		13260	11277		5867	5989
1976		13260	13790		5867	6145
1977		13260	7150		5867	5525
1978		13260	9859		5867	5667
1979		8787	6430		4501	4651
1980		8787	12622		4501	5880
1981		8787	8964		4501	5226
1982		8787	2225		4501	3315
1983		8787	3707		4501	4296
1984		3657	7364		909	5318
1985		3657	8405		909	4892
1986		3657	13350		909	6025
1987		3657	13408		909	6082
1988		13325	13397		3903	5959
1989		13325	13674		3903	6097
1990		13325	11414		3903	6094
1991		13325	13721		3903	6100
1992		13325	10364		3903	5790
1993		13325	13478		3903	6110
1994			7285			6010
1995			10098			5788
1996			9681			5601
1997			7295			5555
1998			7295			5555
Total	235110	352849	479202	138080	149257	278009
Average	9796	10231	9813	5753	4322	5762
Time Period	1950-1973	1971-1990	1950-1973	1950-1973	1961-1993	1950-1973

Summary Sheets

YEARS	South Canal Demands Model acre-feet	South Canal USGS Model acre-feet	South Canal Pumping Capacity 1000 acre-feet	Highline Demands Model acre-feet	Highline USGS Model acre-feet	Highline Pumping Capacity 5800 acre-feet	Mapleton Demands Model acre-feet	Mapleton USGS Model acre-feet	Mapleton Pumping Capacity 600 acre-feet	Lakeshore Demands Model acre-feet	Lakeshore USGS Model acre-feet	Lakeshore Pumping Capacity 1400 acre-feet	Eastbench Demands Model acre-feet	Eastbench USGS Model acre-feet	Eastbench Pumping Capacity 600 acre-feet	Salem Demands Model acre-feet	Salem USGS Model acre-feet	Salem Pumping Capacity 900 acre-feet	Sp.Fk. Southeast Demands Model acre-feet	Sp.Fk. Southeast USGS Model acre-feet	Sp.Fk. Southeast Pumping Capacity 70 acre-feet	Sp.Fk. Westfield Demands Model acre-feet	Sp.Fk. Westfield USGS Model acre-feet	Sp.Fk. Westfield Pumping Capacity 525 acre-feet	
1950	1900	4	1903	1900	0	8670	0	100	653	2000	0	3311	500	0	599	500	0	405	150		140	1050	0	525	1950
1951	2100	4	2493	3000	0	12391	200	100	480	2200	0	4970	500	0	414	700	0	438	175		140	1225	0	995	1951
1952	1700	4	1770	1100	0	5970	0	100	845	1700	0	3767	500	0	886	500	0	341	150		280	1050	0	1050	1952
1953	2200	4	2159	3200	0	10539	200	100	200	2200	0	4399	500	0	2081	700	0	293	175		210	1225	0	1763	1953
1954	2700	4	2946	6200	39	14053	600	100	1047	2700	0	6020	600	0	1794	1100	0	1243	200		210	1400	0	1330	1954
1955	2300	4	2919	3800	39	13661	300	100	407	2300	0	5207	500	0	1138	800	0	670	188		287	1312	0	836	1955
1956	2800	4	2706	5700	39	13299	400	100	741	2700	0	4789	600	0	1337	1000	0	375	200		212	1400	0	1173	1956
1957	1500	4	2013	1100	39	14503	0	100	800	1500	0	4057	500	0	966	500	0	321	138		210	962	0	1575	1957
1958	2500	4	2009	5100	39	10062	400	100	529	2500	0	4758	500	0	953	900	30	356	188		169	1312	0	1050	1958
1959	2700	4	3515	6300	39	14966	600	100	1481	2700	0	6624	600	0	2335	1200	30	1464	200		338	1400	0	1823	1959
1960	2700	4	2801	7200	39	14528	700	100	1281	3000	0	6125	700	0	1909	1200	30	758	213		188	1487	0	1054	1960
1961	3300	4	4461	10000	39	21913	1000	49	2498	3400	0	6976	900	0	2606	1700	376	2400	225		350	1575	125	2392	1961
1962	2700	4	3063	7200	39	19462	700	169	1600	3000	0	5537	700	513	2623	1200	376	1013	213		270	1487	265	1725	1962
1963	3100	0	3391	8800	143	21257	800	696	2070	3300	0	6052	700	644	2435	1500	340	1175	225		242	1575	260	1569	1963
1964	2100	6	3742	3700	65	14814	300	273	1192	2100	0	6135	500	343	1493	800	342	926	175		217	1225	255	2100	1964
1965	2200	8	2791	3400	0	14788	200	178	927	2300	0	5151	500	355	1610	700	286	445	175		208	1225	367	1734	1965
1966	2700	9	3080	6200	253	13657	600	514	1067	2700	0	5951	600	547	1720	1100	891	645	200		167	1400	357	1571	1966
1967	1700	7	2500	1100	60	9921	0	176	735	1700	0	4712	500	264	1096	500	696	713	150		208	1050	347	1274	1967
1968	1700	3	3860	1200	52	11758	0	235	921	1700	0	5529	500	384	1366	500	523	1330	150		280	1050	387	2400	1968
1969	1700	5	2000	1200	57	10861	0	263	1144	1700	0	4582	500	449	1288	500	542	451	150		140	1050	378	1119	1969
1970	1900	216	2059	1800	0	13068	0	390	801	2000	0	5032	500	528	1650	500	531	291	150		235	1050	368	1107	1970
1971	2200	218	2519	3500	44	11866	200	230	954	2300	0	4616	500	1235	873	700	670	160	175		280	1225	359	1494	1971
1972	2500	228	2675	5200	15	16882	400	670	1411	2600	0	5194	600	1289	2222	1000	981	477	188		140	1312	349	1388	1972
1973	1900	233	2300	2000	14	10113	0	630	1013	2000	0	5363	500	920	767	500	786	300	150		280	1050	339	1470	1973
1974	0	215	2125	0	26	14086	0	719	1962	0	0	7476	0	1061	989	0	1041	507	0		143	0	329	1180	1974
1975	0	215	3061	0	4	14365	0	642	2700	0	0	5934	0	683	1071	0	230	1497	0		210	0	320	1073	1975
1976	0	218	2000	0	0	14044	0	999	2717	0	0	4689	0	1465	800	0	744	724	0		210	0	310	1120	1976
1977	0	219	4212	0	81	19947	0	1067	2185	0	0	6957	0	1231	2738	0	919	2841	0		249	0	301	2335	1977
1978	0	243	3614	0	44	11356	0	1120	2593	0	0	5316	0	945	1471	0	305	160	0		280	0	291	1297	1978
1979	0	249	2819	0	23	11842	0	801	2222	0	0	5643	0	1129	1010	0	941	180	0		140	0	233	1155	1979
1980	0	245	2448	0	2	11039	0	619	2955	0	0	4324	0	804	846	0	187	294	0		210	0	228	1273	1980
1981	0	237	3469	0	0	17190	0	567	2577	0	0	6929	0	507	1200	0	204	864	0		280	0	50	1734	1981
1982	0	215	2186	0	0	13426	0	594	2299	0	1	4295	0	505	605	0	185	117	0		280	0	50	1619	1982
1983	0	200	3300	0	0	23723	0	523	3449	0	1	5653	0	505	1711	0	278	1100	0		350	0	50	2400	1983
1984	0	205	3154	0	1	23788	0	564	2788	0	1	5071	0	551	1107	0	255	890	0		207	0	50	1875	1984
1985	0	205	2300	0	0	15828	0	523	2216	0	1	3544	0	72	1022	0	385	789	0		280	0	50	1350	1985
1986	0	218	2950	0	4	18083	0	523	2208	0	1	5285	0	459	764	0	389	572	0		212	0	50	1534	1986
1987	0	231	3347	0	4	16464	0	523	1644	0	1	6600	0	459	1298	0	568	1095	0		268	0	50	1361	1987
1988	0	205	2949	0	4	15197	0	741	793	0	1	6031	0	459	1575	0	599	701	0		296	0	51	1440	1988
1989	0	209	3572	0	4	17782	0	778	2101	0	1	6699	0	459	2041	0	954	815	0		277	0	51	1657	1989
1990	0	208	2922	0	208	18857	0	911	2335	0	1	6847	0	436	2330	0	959	1258	0		261	0	51	1354	1990
1991	0		3792	0		20273	0		1981	0		6898	0		2030	0		1362	0		280	0		2400	1991
1992	0		4521	0		18678	0		2114	0		6640	0		3500	0		2153	0		243	0		2400	1992
1993	0		3613	0		16189	0		2664	0		6271	0		1700	0		738	0		213	0		1864	1993
1994	0		4003	0		19286	0		2354	0		6035	0		2300	0		1713	0		280	0		2143	1994
1995	0		3300	0		20882	0		2963	0		5633	0		2411	0		2030	0		247	0		1875	1995
1996	0		2823	0		13979	0		2892	0		4734	0		1700	0		740	0		271	0		2033	1996
1997	0		2607	0		16604	0		3700	0		4890	0		1900	0		461	0		280	0		1498	1997
1998	0		2802	0		16498	0		3247	0		3314	0		1300	0		699	0		280	0		1350	1998
Total	54600	4722	143386	99900	1459	742216	7600	17883	86458	56300	9	267566	13500	19202	75581	20300	16471	41294	4303	0	11650	30099	6671	75834	
Average	2275	221	2926	4163	40	15147	317	559	1764	2346	0	5461	563	662	1542	846	546	843	179	0	238	1254	222	1548	
Time Period	1950-1973	1970-1990	1950-1998	1950-1973	1963-1990	1950-1998	1950-1973	1961-1990	1950-1998	1950-1973	1968-1990	1950-1998	1950-1973	1962-1990	1950-1998	1950-1973	1961-1990	1950-1998	1950-1973		1950-1998	1950-1973	1961-1990	1950-1998	

Summary Sheets

Pumping set to Average USGS Model

YEARS	South Canal Demands Model acre-feet	South Canal USGS Model acre-feet	South Canal Pumping Capacity 53 acre-feet	Highline Demands Model acre-feet	Highline USGS Model acre-feet	Highline Pumping Capacity 7 acre-feet	Mapleton Demands Model acre-feet	Mapleton USGS Model acre-feet	Mapleton Pumping Capacity 126 acre-feet	Lakeshore Demands Model acre-feet	Lakeshore USGS Model acre-feet	Lakeshore Pumping Capacity 0 acre-feet	Eastbench Demands Model acre-feet	Eastbench USGS Model acre-feet	Eastbench Pumping Capacity 190 acre-feet	Salem Demands Model acre-feet	Salem USGS Model acre-feet	Salem Pumping Capacity 260 acre-feet	Sp.Fk. Southeast Demands Model acre-feet	Sp.Fk. Southeast USGS Model acre-feet	Sp.Fk. Southeast Pumping Capacity 0 acre-feet	Sp.Fk. Westfield Demands Model acre-feet	Sp.Fk. Westfield USGS Model acre-feet	Sp.Fk. Westfield Pumping Capacity 58 acre-feet	
1950	1900	4	106	1900	0	28	0	100	252	2000	0	0	500	0	191	500	0	260	150		0	1050	0	58	1950
1951	2100	4	212	3000	0	35	200	100	266	2200	0	0	500	0	380	700	0	351	175		0	1225	0	116	1951
1952	1700	4	106	1100	0	28	0	100	252	1700	0	0	500	0	466	500	0	341	150		0	1050	0	116	1952
1953	2200	4	159	3200	0	35	200	100	126	2200	0	0	500	0	760	700	0	293	175		0	1225	0	232	1953
1954	2700	4	212	6200	39	42	600	100	252	2700	0	0	600	0	760	1100	0	598	200		0	1400	0	174	1954
1955	2300	4	251	3800	39	35	300	100	274	2300	0	0	500	0	706	800	0	519	188		0	1312	0	116	1955
1956	2600	4	191	5700	39	42	400	100	378	2700	0	0	600	0	570	1000	0	260	200		0	1400	0	174	1956
1957	1500	4	119	1100	39	42	0	100	252	1500	0	0	500	0	711	500	0	321	138		0	962	0	174	1957
1958	2500	4	159	5100	39	35	400	100	225	2500	0	0	500	0	533	900	30	358	188		0	1312	0	116	1958
1959	2700	4	265	6300	39	35	600	100	517	2700	0	0	600	0	1007	1200	30	781	200		0	1400	0	232	1959
1960	2700	4	233	7200	39	42	700	100	378	3000	0	0	700	0	760	1200	30	478	213		0	1487	0	120	1960
1961	3300	4	265	10000	39	35	1000	49	730	3400	0	0	900	0	966	1700	376	907	225		0	1575	125	290	1961
1962	2700	4	212	7200	39	42	700	169	378	3000	0	0	700	513	1069	1200	376	645	213		0	1487	265	232	1962
1963	3100	0	265	8800	143	35	800	696	597	3300	0	0	700	644	950	1500	340	589	225		0	1575	260	232	1963
1964	2100	6	265	3700	65	42	300	273	304	2100	0	0	500	343	783	800	342	836	175		0	1225	255	232	1964
1965	2200	8	265	3400	0	42	200	178	378	2300	0	0	500	355	930	700	286	445	175		0	1225	367	232	1965
1966	2700	9	265	6200	253	42	600	614	318	2700	0	0	600	547	743	1100	891	398	200		0	1400	357	263	1966
1967	1700	7	265	1100	60	28	0	176	252	1700	0	0	500	264	445	500	696	613	150		0	1050	347	231	1967
1968	1700	3	265	1200	52	42	0	235	505	1700	0	0	500	384	760	500	523	819	150		0	1050	387	290	1968
1969	1700	5	106	1200	57	35	0	263	378	1700	0	0	500	449	729	500	542	451	150		0	1050	378	174	1969
1970	1900	216	159	1800	0	35	0	380	378	2000	0	0	500	528	950	500	531	291	150		0	1050	368	173	1970
1971	2200	218	212	3500	44	42	200	230	252	2300	0	0	500	1235	380	700	670	160	175		0	1225	359	290	1971
1972	2500	228	265	5200	15	42	400	570	504	2600	0	0	600	1289	760	1000	981	449	188		0	1312	349	232	1972
1973	1900	233	159	2000	14	42	0	630	352	2000	0	0	500	920	447	500	786	300	150		0	1050	339	232	1973
1974	0	215	184	0	26	42	0	719	648	0	0	0	0	1061	434	0	1041	456	0		0	0	329	174	1974
1975	0	215	212	0	4	42	0	642	756	0	0	0	0	683	626	0	230	820	0		0	0	320	139	1975
1976	0	218	106	0	0	42	0	999	756	0	0	0	0	1465	380	0	744	658	0		0	0	310	174	1976
1977	0	219	318	0	81	49	0	1067	561	0	0	0	0	1231	950	0	919	1297	0		0	0	301	290	1977
1978	0	243	305	0	44	42	0	1120	756	0	0	0	0	945	856	0	305	160	0		0	0	291	232	1978
1979	0	249	235	0	23	42	0	801	648	0	0	0	0	1129	570	0	941	180	0		0	0	233	174	1979
1980	0	245	265	0	2	42	0	619	756	0	0	0	0	804	570	0	187	294	0		0	0	228	216	1980
1981	0	237	265	0	0	42	0	567	754	0	0	0	0	507	380	0	204	537	0		0	0	50	232	1981
1982	0	215	159	0	0	49	0	594	630	0	1	0	0	505	409	0	185	117	0		0	0	50	218	1982
1983	0	200	212	0	0	56	0	523	882	0	1	0	0	505	760	0	278	560	0		0	0	50	290	1983
1984	0	205	265	0	1	56	0	564	756	0	1	0	0	551	570	0	255	652	0		0	0	50	232	1984
1985	0	205	159	0	0	49	0	523	756	0	1	0	0	72	570	0	385	620	0		0	0	50	174	1985
1986	0	218	212	0	4	56	0	523	651	0	1	0	0	459	570	0	389	554	0		0	0	50	232	1986
1987	0	231	265	0	4	49	0	523	404	0	1	0	0	459	570	0	568	720	0		0	0	50	185	1987
1988	0	205	265	0	4	56	0	741	357	0	1	0	0	459	624	0	599	558	0		0	0	51	232	1988
1989	0	209	212	0	4	42	0	778	756	0	1	0	0	459	760	0	954	602	0		0	0	51	304	1989
1990	0	208	265	0	208	56	0	911	630	0	1	0	0	436	896	0	959	720	0		0	0	51	178	1990
1991	0		265	0		56	0		585	0		0	0		760	0		862	0		0	0		290	1991
1992	0		318	0		49	0		625	0		0	0		1140	0		928	0		0	0		290	1992
1993	0		265	0		49	0		756	0		0	0		570	0		709	0		0	0		290	1993
1994	0		318	0		49	0		756	0		0	0		760	0		929	0		0	0		322	1994
1995	0		212	0		56	0		805	0		0	0		950	0		1080	0		0	0		232	1995
1996	0		265	0		49	0		756	0		0	0		570	0		624	0		0	0		290	1996
1997	0		212	0		56	0		882	0		0	0		760	0		461	0		0	0		232	1997
1998	0		212	0		42	0		882	0		0	0		570	0		560	0		0	0		174	1998
Total	54600	4722	10953	99900	1459	2121	7600	17883	26001	56300	9	0	13500	19202	33333	20300	16471	27130	4301	0	0	30099	6671	10529	
Average	2275	221	224	4163	40	44	317	559	559	2346	0	0	563	662	670	846	546	547	179	0	0	1254	222	226	
Time Period	1950-1973	1970-1990	1970-1990	1950-1973	1963-1990	1963-1990	1950-1973	1961-1990	1961-1990	1950-1973	1968-1990	1968-1990	1950-1973	1962-1990	1962-1990	1950-1973	1961-1990	1961-1990	1950-1973		1950-1973	1950-1973	1961-1990	1961-1990	

Summary Sheets

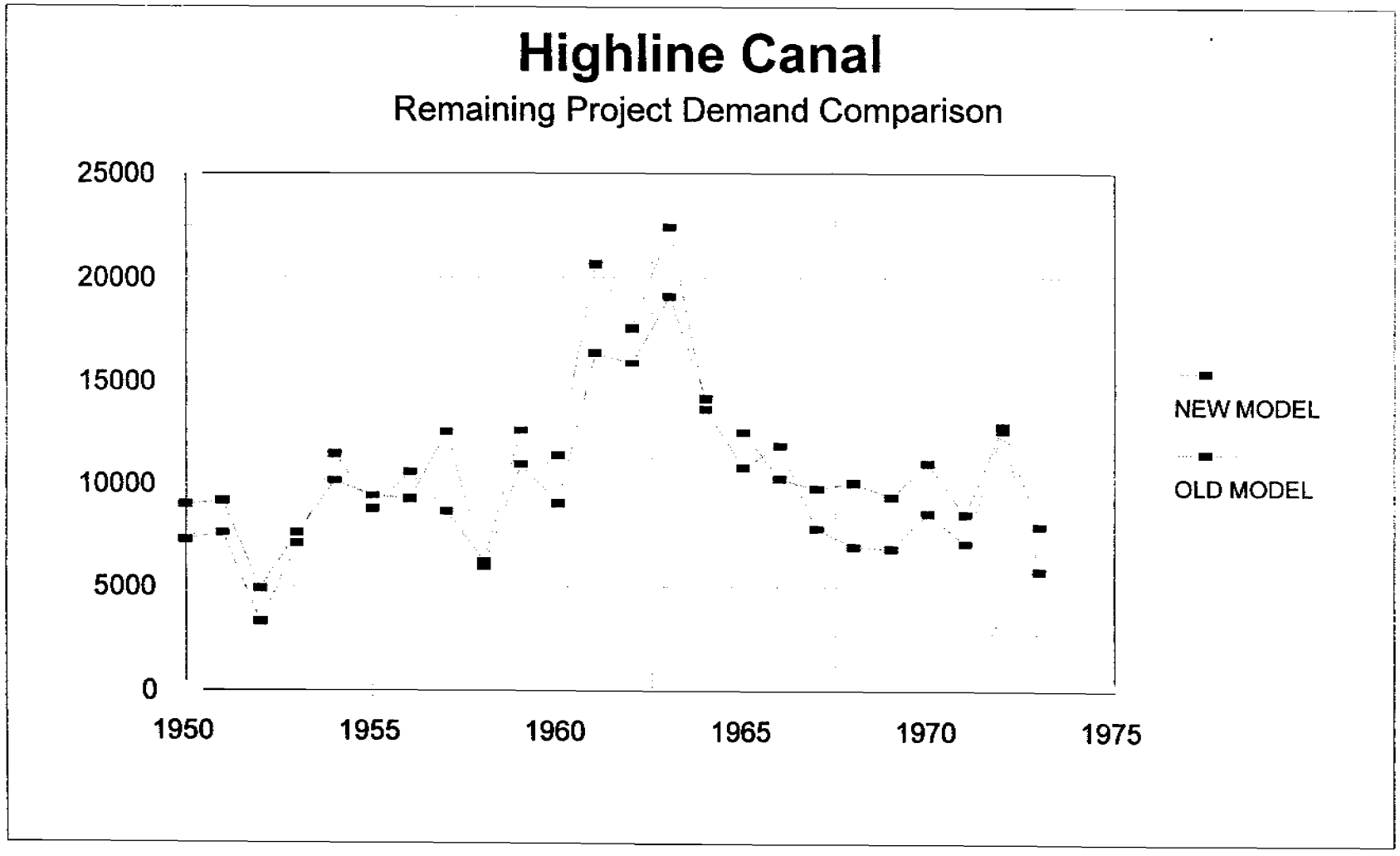
Pumping set to Average 1950-1973 Demands Model

YEARS	South Canal Demands Model acre-feet	South Canal USGS Model acre-feet	South Canal Pumping Capacity 783 acre-feet	Highline Demands Model acre-feet	Highline USGS Model acre-feet	Highline Pumping Capacity 1021 acre-feet	Mapleton Demands Model acre-feet	Mapleton USGS Model acre-feet	Mapleton Pumping Capacity 111 acre-feet	Lakeshore Demands Model acre-feet	Lakeshore USGS Model acre-feet	Lakeshore Pumping Capacity 439 acre-feet	Eastbench Demands Model acre-feet	Eastbench USGS Model acre-feet	Eastbench Pumping Capacity 150 acre-feet	Salem Demands Model acre-feet	Salem USGS Model acre-feet	Salem Pumping Capacity 900 acre-feet	Sp.Fk. Southeast Demands Model acre-feet	Sp.Fk. Southeast USGS Model acre-feet	Sp.Fk. Southeast Pumping Capacity 55 acre-feet	Sp.Fk. Westfield Demands Model acre-feet	Sp.Fk. Westfield USGS Model acre-feet	Sp.Fk. Westfield Pumping Capacity 446 acre-feet	
1950	1900	4	1566	1900	0	3163	0	100	222	2000	0	1315	500	0	151	500	0	405	150		110	1050	0	446	1950
1951	2100	4	2059	3000	0	4184	200	100	251	2200	0	2195	500	0	300	700	0	438	175		110	1225	0	892	1951
1952	1700	4	1553	1100	0	2406	0	100	222	1700	0	2217	500	0	336	500	0	341	150		220	1050	0	892	1952
1953	2200	4	1892	3200	0	2931	200	100	111	2200	0	2219	500	0	600	700	0	293	175		165	1225	0	1526	1953
1954	2700	4	2412	6200	39	4446	600	100	222	2700	0	2744	600	0	600	1100	0	1243	200		165	1400	0	1172	1954
1955	2300	4	2465	3800	39	4184	300	100	259	2300	0	2135	500	0	586	800	0	670	188		227	1312	0	757	1955
1956	2600	4	2272	5700	39	4285	400	100	333	2700	0	2166	600	0	450	1000	0	375	200		167	1400	0	1015	1956
1957	1500	4	1579	1100	39	5173	0	100	222	1500	0	2213	500	0	591	500	0	321	138		165	962	0	1338	1957
1958	2500	4	1792	5100	39	4051	400	100	210	2500	0	2368	500	0	453	900	30	356	188		139	1312	0	892	1958
1959	2700	4	2864	6300	39	4184	600	100	457	2700	0	2622	600	0	828	1200	30	1464	200		275	1400	0	1586	1959
1960	2700	4	2367	7200	39	4487	700	100	333	3000	0	2634	700	0	600	1200	30	758	213		161	1487	0	896	1960
1961	3300	4	3644	10000	39	5105	1000	49	655	3400	0	2634	900	0	773	1700	376	2400	225		275	1575	125	2076	1961
1962	2700	4	2629	7200	39	5205	700	169	333	3000	0	2195	700	513	869	1200	376	1013	213		220	1487	265	1567	1962
1963	3100	0	2740	8800	143	4926	800	696	537	3300	0	2583	700	644	750	1500	340	1175	225		212	1575	260	1411	1963
1964	2100	6	3091	3700	65	4110	300	273	274	2100	0	2741	500	343	623	800	342	926	175		172	1225	255	1784	1964
1965	2200	8	2357	3400	0	5025	200	178	333	2300	0	2195	500	355	750	700	286	445	175		175	1225	367	1576	1965
1966	2700	9	2646	6200	253	4219	600	614	288	2700	0	2552	600	547	617	1100	891	645	200		137	1400	357	1413	1966
1967	1700	7	2066	1100	60	2706	0	176	222	1700	0	2013	500	264	365	500	696	713	150		178	1050	347	1116	1967
1968	1700	3	3211	1200	52	4284	0	235	445	1700	0	2798	500	384	600	500	523	1330	150		220	1050	387	2084	1968
1969	1700	5	1566	1200	57	3617	0	263	333	1700	0	2251	500	449	600	500	542	451	150		110	1050	378	961	1969
1970	1900	216	1625	1800	0	3815	0	380	333	2000	0	2141	500	528	750	500	531	291	150		190	1050	368	949	1970
1971	2200	218	2085	3500	44	4260	200	230	222	2300	0	2274	500	1235	300	700	670	160	175		220	1225	359	1336	1971
1972	2500	228	2241	5200	15	5205	400	870	444	2600	0	2224	600	1289	600	1000	981	477	188		110	1312	349	1230	1972
1973	1900	233	1866	2000	14	3947	0	630	322	2000	0	2395	500	920	367	500	796	300	150		220	1050	339	1312	1973
1974	0	215	1691	0	26	4943	0	719	573	0	0	2334	0	1061	354	0	1041	507	0		113	0	329	1022	1974
1975	0	215	2430	0	4	4382	0	642	666	0	0	2672	0	683	505	0	230	1497	0		165	0	320	915	1975
1976	0	218	1566	0	0	4228	0	999	666	0	0	2294	0	1465	300	0	744	724	0		165	0	310	962	1976
1977	0	219	3561	0	81	6226	0	1067	501	0	0	2834	0	1231	750	0	919	2841	0		204	0	301	2019	1977
1978	0	243	3139	0	44	4715	0	1120	666	0	0	2809	0	945	696	0	305	160	0		220	0	291	1139	1978
1979	0	249	2385	0	23	4825	0	801	573	0	0	2834	0	1129	450	0	941	180	0		110	0	233	997	1979
1980	0	245	2231	0	2	4907	0	619	666	0	0	2422	0	804	450	0	187	294	0		165	0	228	1115	1980
1981	0	237	2818	0	0	4892	0	567	666	0	0	2587	0	507	300	0	204	864	0		220	0	50	1497	1981
1982	0	215	1911	0	0	4288	0	594	555	0	1	2387	0	505	329	0	185	117	0		220	0	50	1382	1982
1983	0	200	2649	0	0	6274	0	523	777	0	1	2593	0	505	600	0	278	1100	0		275	0	50	2084	1983
1984	0	205	2720	0	1	6127	0	564	666	0	1	2395	0	551	450	0	255	890	0		165	0	50	1638	1984
1985	0	205	1866	0	0	6225	0	523	666	0	1	2263	0	72	450	0	385	789	0		220	0	50	1192	1985
1986	0	218	2516	0	4	8426	0	523	576	0	1	2460	0	459	450	0	389	572	0		167	0	50	1376	1986
1987	0	231	2913	0	4	5605	0	523	359	0	1	2834	0	459	450	0	568	1095	0		220	0	50	1203	1987
1988	0	205	2515	0	4	5555	0	741	327	0	1	2571	0	459	504	0	599	701	0		239	0	51	1282	1988
1989	0	209	2921	0	4	4714	0	778	666	0	1	2595	0	459	600	0	954	815	0		220	0	51	1499	1989
1990	0	208	2388	0	208	5732	0	911	555	0	1	2634	0	436	736	0	859	1258	0		216	0	51	1196	1990
1991	0		3344	0		5658	0		525	0		2708	0		600	0		1362	0		220	0		2084	1991
1992	0		3996	0		6228	0		555	0		2634	0		900	0		2153	0		198	0		2084	1992
1993	0		2981	0		4551	0		666	0		2834	0		450	0		738	0		183	0		1705	1993
1994	0		3352	0		5405	0		666	0		2634	0		600	0		1713	0		220	0		1985	1994
1995	0		2649	0		5736	0		715	0		2812	0		750	0		2030	0		202	0		1638	1995
1996	0		2389	0		3842	0		666	0		2727	0		450	0		740	0		220	0		1796	1996
1997	0		2173	0		5139	0		777	0		2834	0		600	0		461	0		220	0		1340	1997
1998	0		2368	0		4384	0		777	0		1579	0		450	0		699	0		220	0		1192	1998
Total	54600	4722	120081	99900	1459	230904	7600	17883	23053	56300	9	120502	13500	19202	26685	20300	16471	41294	4301	0	9332	30099	6671	68567	
Average	2275	221	2275	4163	40	4162	317	559	316	2346	0	2347	563	862	563	846	546	708	179	0	181	1254	222	1259	
Time Period	1950-1973	1970-1990	1950-1973	1950-1973	1963-1990	1950-1973	1950-1973	1961-1990	1950-1973	1950-1973	1968-1990	1950-1973	1950-1973	1962-1990	1950-1973	1950-1973	1961-1990	1950-1973	1950-1973		1950-1973	1950-1973	1961-1990	1950-1973	

Water Delivery Comparisons

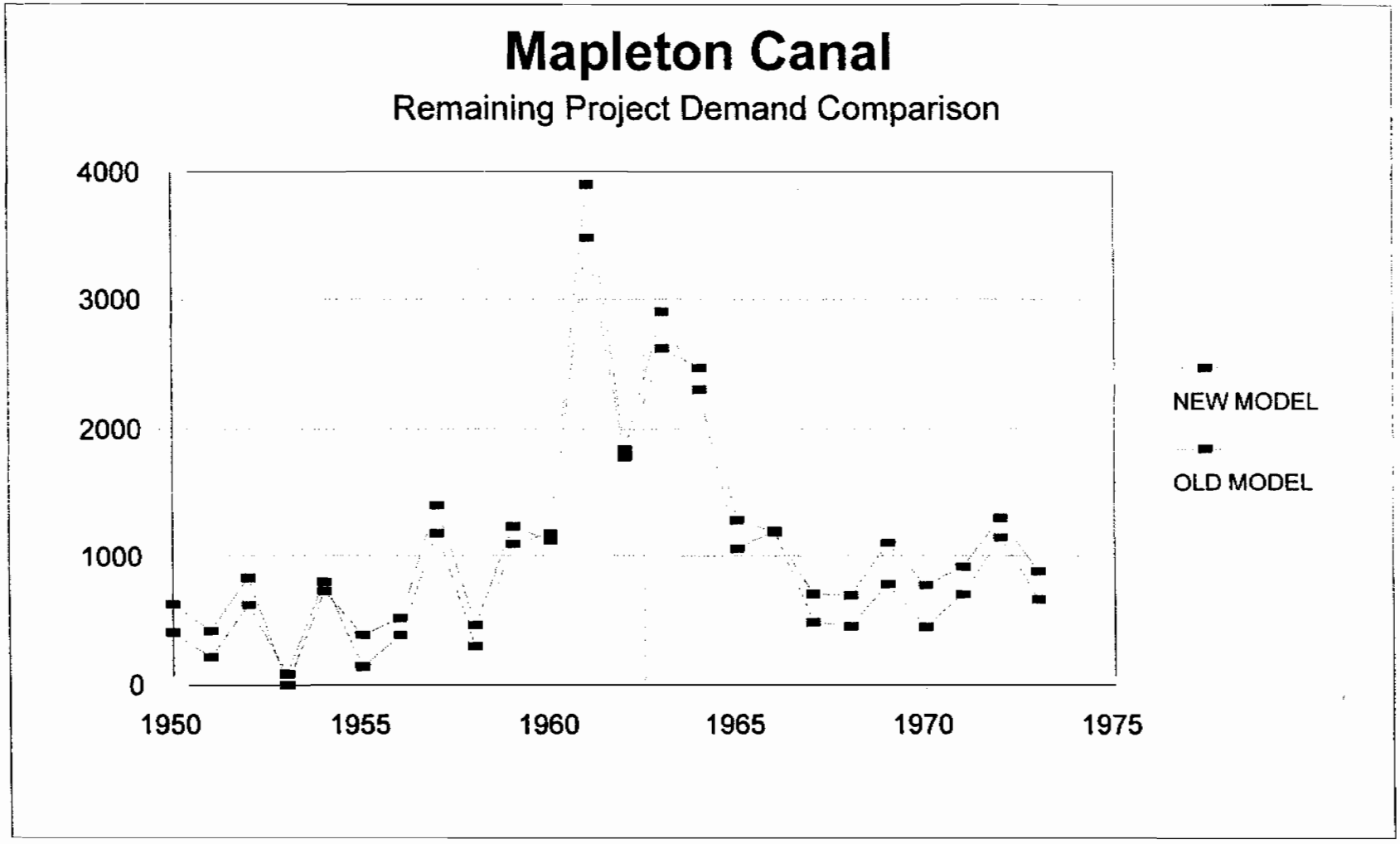
old model

	HIGHLINE CANAL									
	STRAWBERRY VALLEY PROJECT WATER	DELIVERY FROM SPANISH FORK RIVER RIGHTS	TOTAL SVP & RIVER DELIVERY	TOTAL DELIVERY	DEMAND MET BY LOCAL SURFACE SUPPLIES	DEMAND MET BY WELLS AVERAGE/MO 1,022	DEMAND MET BY WELLS	HEAD OF CANAL DIV. REQ. TOTAL ACRES 19,940	REMAINING DEMAND: PROJ. LANDS ACREAGE = 18,514	REMAINING DEMAND
1950	40,839	8,234	49,073	48,925	9,200	3,166	1,900	57,700	7,266	8,998
1951	35,936	10,380	46,316	46,464	6,100	4,188	3,000	57,700	7,173	9,138
1952	35,121	11,682	46,803	46,824	14,500	2,408	1,100	57,700	3,308	4,892
1953	43,251	3,428	46,679	46,680	7,400	2,933	3,200	57,700	7,063	7,604
1954	40,229	233	40,462	40,461	5,700	4,450	6,200	57,700	11,472	10,160
1955	37,103	1,547	38,651	38,652	8,500	4,188	3,800	57,700	8,796	9,433
1956	39,618	1,679	41,297	41,478	5,700	4,268	5,700	57,700	10,572	9,261
1957	28,994	6,055	35,049	35,142	9,000	5,177	1,100	57,700	8,215	12,545
1958	35,977	8,405	44,382	44,382	10,400	4,054	5,100	57,700	6,212	5,994
1959	39,020	307	39,326	39,328	4,000	4,188	6,300	57,700	12,629	10,945
1960	40,765	0	40,765	40,764	5,900	4,491	7,200	57,700	11,402	9,072
1961	27,477	952	28,429	28,727	3,100	5,110	10,000	57,700	20,213	16,395
1962	21,414	12,462	33,876	33,937	8,500	5,210	7,200	57,700	17,080	15,898
1963	22,859	2,374	25,233	25,234	5,700	4,930	8,800	57,700	22,434	19,118
1964	29,331	4,623	33,954	33,953	5,800	4,113	3,700	57,700	13,664	14,177
1965	24,882	17,661	42,543	42,542	10,300	5,029	3,400	57,700	10,829	12,527
1966	37,480	1,357	38,837	38,837	7,300	4,223	6,200	57,700	11,858	10,267
1967	33,022	13,729	46,750	46,752	7,600	2,708	1,100	57,700	7,815	9,771
1968	30,922	11,333	42,255	42,256	8,300	4,288	1,200	57,700	6,492	10,857
1969	35,372	13,450	48,822	48,822	12,500	3,620	1,200	57,700	6,834	10,081
1970	32,573	9,330	41,903	41,903	8,100	3,818	1,800	57,700	8,588	11,867
1971	34,237	9,299	43,536	43,536	8,900	4,263	3,500	57,700	7,059	8,525
1972	36,047	1,848	37,895	37,894	7,400	5,210	5,200	57,700	12,226	12,828
1973	32,725	8,486	41,212	41,211	9,500	3,950	2,000	57,700	5,185	7,914
1974	36,888	8,392	45,280		12,300	3,605		57,700	5,774	
1975	33,084	11,851	44,935		5,300	3,985		57,700	5,738	
1976	41,030	2,273	43,302		2,400	4,188		57,700	9,537	
1977	35,962	0	35,962		14,100	5,210		57,700	7,802	
1978	34,662	12,262	46,924		9,900	3,010		57,700	4,250	
1979	37,695	11,441	49,135		21,900	2,301		57,700	2,889	
1980	34,231	15,154	49,385		4,500	4,131		57,700	4,092	
1981	38,844	934	39,778		15,100	3,166		57,700	7,439	
1982	31,011	12,971	43,982		51,700	2,440		57,700	1,696	
1983	14,208	15,905	30,113		73,000	4,188		57,700	3,073	
1984	21,720	8,995	30,714		15,500	4,310		57,700	10,309	
1985	33,209	7,186	40,395		19,500	4,230		57,700	6,390	
1986	31,707	5,980	37,686		1,900	6,232		57,700	11,311	
1987	38,190	64	38,253		2,300	5,499		57,700	11,220	
1988	41,722	0	41,722		2,200	5,259		57,700	8,373	
1989	40,587	261	40,848		1,400	4,718		57,700	12,593	
1990	36,556	0	36,556		4,900	4,552		57,700	10,598	
1991	29,518	2,481	31,999		1,000	5,363		57,700	17,511	
1992	36,605	0	36,605		8,400	5,210		57,700	11,431	
1993	29,928	8,155	38,082		2,700	4,188		57,700	12,651	
1994	37,696	156	37,852		11,300	4,188		57,700	5,892	
1995	24,526	2,954	27,480		7,900	4,839		57,700	16,966	
1996	31,474	8,384	39,858		10,000	3,166		57,700	10,741	
1997	29,375	9,595	38,970		13,900	4,188		57,700	7,251	
1998	32,528	10,610	43,138		13,900	3,166		57,700	4,989	
Averages	33,636	6,426	40,061	40,613	10,539	4,190	4,163	57,700	9,284	10,761


Highline Canal
Remaining Project Demand Comparison
25000
20000
15000
10000
5000
0
1950
1955
1960
1965
1970
1975
NEW MODEL
OLD MODEL

MAPLETON CANAL

	STRAWBERRY VALLEY PROJECT WATER	DELIVERY FROM SPANISH FORK RIVER RIGHTS	TOTAL SVP & RIVER DELIVERY	TOTAL DELIVERY	DEMAND MET BY LOCAL SURFACE SUPPLIES	DEMAND MET BY WELLS AVERAGE/MO 112	DEMAND MET BY WELLS	HEAD OF CANAL DIV. REQ. TOTAL ACRES 3,825	REMAINING DEMAND: PROJ. LANDS ACREAGE = 3,673	REMAINING DEMAND:
1950	10,389	425	10,814	10,815	4,600	224	0	12,800	136	627
1951	9,389	771	10,160	10,161	4,700	252	200	12,800	218	422
1952	4,565	1,519	6,083	6,084	8,400	224	0	12,800	488	830
1953	10,885	127	11,011	11,012	4,800	112	200	12,800	0	0
1954	11,260	0	11,260	11,240	2,800	224	600	12,800	799	726
1955	10,471	0	10,471	10,474	3,300	260	300	12,800	142	391
1956	10,583	151	10,734	10,735	4,200	336	400	12,800	358	519
1957	8,767	280	9,047	9,044	5,200	224	0	12,800	1,099	1,398
1958	9,084	684	9,768	9,769	5,300	211	400	12,800	305	464
1959	9,669	0	9,669	9,668	1,900	461	600	12,800	1,042	1,234
1960	10,277	0	10,277	10,278	2,100	336	700	12,800	1,109	1,121
1961	7,290	0	7,290	7,289	1,000	660	1,000	12,800	3,725	3,485
1962	6,684	979	7,662	7,662	4,100	336	700	12,800	1,569	1,784
1963	5,632	52	5,684	5,683	4,100	541	800	12,800	2,844	2,626
1964	7,516	759	8,275	8,275	3,000	276	300	12,800	2,303	2,472
1965	4,757	2,128	6,885	6,885	6,300	336	200	12,800	973	1,285
1966	9,864	87	9,951	9,951	3,300	290	600	12,800	1,198	1,188
1967	8,254	1,904	10,158	10,158	4,300	224	0	12,800	443	707
1968	7,405	1,138	8,543	8,542	4,500	449	0	12,800	285	0
1969	8,404	2,877	11,281	11,280	6,200	336	0	12,800	735	0
1970	8,492	1,041	9,533	9,573	4,300	336	0	12,800	114	0
1971	9,143	2,115	11,258	11,258	4,000	224	200	12,800	447	916
1972	10,005	104	10,109	10,095	3,100	448	400	12,800	881	1,300
1973	7,880	2,958	10,838	10,838	4,500	324	0	12,800	289	877
1974	9,323	2,476	11,799		6,200	336		12,800	171	
1975	6,308	1,132	7,440		2,900	436		12,800	2,640	
1976	10,447	0	10,447		1,300	660		12,800	1,098	
1977	9,766	0	9,766		6,800	258		12,800	127	
1978	8,706	1,508	10,214		4,900	180		12,800	242	
1979	9,695	1,536	11,231		10,400	50		12,800	0	
1980	7,045	2,138	9,181		2,400	491		12,800	1,750	
1981	10,739	129	10,868		6,900	165		12,800	10	
1982	6,758	1,866	8,624		25,400	112		12,800	121	
1983	2,572	2,994	5,566		33,100	0		12,800	0	
1984	5,440	2,459	7,899		7,600	112		12,600	370	
1985	7,865	1,652	9,516		8,900	212		12,800	1,340	
1986	8,486	1,590	10,075		1,300	374		12,800	1,696	
1987	12,038	0	12,038		1,200	224		12,800	379	
1988	12,697	0	12,697		1,100	112		12,800	0	
1989	10,295	756	11,051		700	578		12,800	700	
1990	10,194	0	10,194		2,400	436		12,800	1,113	
1991	8,198	508	8,706		500	517		12,800	3,741	
1992	10,127	0	10,127		3,700	336		12,800	1,454	
1993	6,836	1,414	8,249		1,400	548		12,800	2,808	
1994	10,194	0	10,194		5,700	170		12,800	0	
1995	4,454	754	5,208		3,900	560		12,800	3,356	
1996	6,894	1,075	7,969		4,800	428		12,800	1,140	
1997	5,080	1,271	6,351		6,800	448		12,800	1,120	
1998	4,760	1,582	6,342		6,800	448		12,800	1,055	
Averages	8,400	958	9,357	9,449	5,247	323	317	12,800	978	1,015

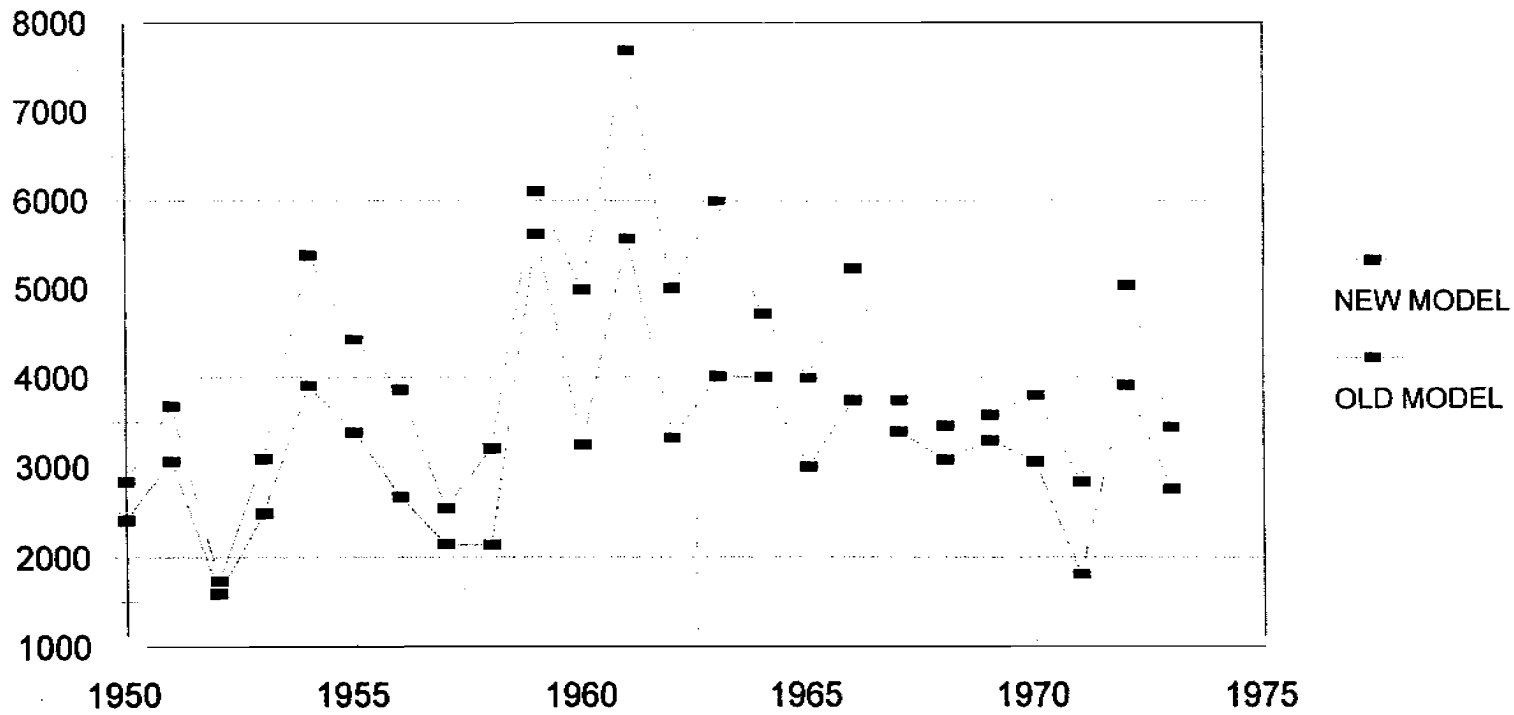

Mapleton Canal
Remaining Project Demand Comparison
4000
3000
2000
1000
0
1950
1955
1960
1965
1970
1975
NEW MODEL
OLD MODEL

LAKESHORE CANAL

	STRAWBERRY VALLEY PROJECT WATER	DELIVERY FROM SPANISH FORK RIVER RIGHTS	TOTAL SVP & RIVER DELIVERY	TOTAL DELIVERY	DEMAND MET BY LOCAL SURFACE SUPPLIES	DEMAND MET BY WELLS AVERAGE/MO 439	DEMAND MET BY WELLS	HEAD OF CANAL DIV. REQ. TOTAL ACRES 4,274	REMAINING DEMAND: PROJ. LANDS ACREAGE = 4,207	REMAINING DEMAND:
1950	2,858	6,380	9,238	9,238	0	1,815	2,000	12,800	2,840	2,411
1951	2,638	5,138	7,775	7,776	0	2,195	2,200	12,800	3,632	3,069
1952	871	9,291	10,162	9,160	0	2,217	1,700	12,800	1,733	1,601
1953	2,844	4,666	7,510	7,509	0	2,219	2,200	12,800	3,092	2,483
1954	3,325	1,260	4,585	5,016	0	2,744	2,700	12,800	5,385	3,904
1955	2,843	3,745	6,588	6,587	0	2,135	2,300	12,800	4,424	3,397
1956	2,867	4,885	7,752	7,752	0	2,166	2,700	12,800	3,863	2,668
1957	2,700	5,917	8,617	8,617	0	2,213	1,500	12,800	2,543	2,145
1958	2,949	5,045	7,994	8,014	0	2,368	2,500	12,800	3,211	2,144
1959	2,734	1,883	4,616	3,640	0	2,622	2,700	12,800	6,111	5,617
1960	2,812	2,554	5,366	5,365	0	2,634	3,000	12,800	4,930	3,254
1961	1,801	1,284	3,086	3,086	0	2,634	3,400	12,800	7,687	5,573
1962	2,093	4,496	6,589	6,589	0	2,195	3,000	12,800	4,951	3,333
1963	1,428	4,594	6,022	6,020	0	2,583	3,300	12,800	5,997	4,010
1964	2,484	2,778	5,262	5,262	0	2,741	2,100	12,800	4,723	4,002
1965	864	6,967	7,831	7,832	0	2,195	2,300	12,800	3,994	3,005
1966	2,488	3,596	6,084	6,084	0	2,552	2,700	12,800	5,237	3,755
1967	1,904	5,274	7,178	7,180	0	2,013	1,700	12,800	3,752	3,403
1968	1,816	4,665	6,481	6,481	0	2,798	1,700	12,800	3,406	0
1969	1,494	6,351	7,845	7,845	0	2,251	1,700	12,800	3,585	0
1970	1,995	5,490	7,484	7,484	0	2,141	2,000	12,800	3,806	0
1971	2,120	5,950	8,070	8,070	0	2,274	2,300	12,800	2,842	1,814
1972	1,527	4,616	6,143	6,142	0	2,224	2,600	12,800	4,978	3,916
1973	366	6,702	7,068	7,069	0	2,395	2,000	12,800	3,388	2,754
1974	24	0	24		0	2,834		12,800	9,750	
1975	1,717	4,409	6,126		0	2,672		12,800	3,879	
1976	3,095	3,795	6,890		0	2,294		12,800	3,559	
1977	2,514	976	3,490		0	2,634		12,800	7,218	
1978	1,961	3,333	5,294		0	2,809		12,800	4,623	
1979	1,712	4,190	5,902		0	2,834		12,800	3,978	
1980	1,833	5,851	7,684		0	2,422		12,800	2,750	
1981	2,792	1,514	4,306		0	2,587		12,800	6,135	
1982	787	7,784	8,570		0	2,387		12,800	2,246	
1983	0	6,230	6,230		0	2,593		12,800	3,855	
1984	0	7,741	7,741		0	2,395		12,800	2,577	
1985	1,779	6,927	8,706		0	2,263		12,800	1,742	
1986	54	6,690	6,744		0	2,460		12,800	3,540	
1987	3,119	972	4,091		0	2,634		12,800	6,183	
1988	2,530	2,534	5,064		0	2,571		12,800	5,477	
1989	2,931	1,976	4,908		0	2,595		12,800	5,885	
1990	2,834	611	3,446		0	2,634		12,800	6,590	
1991	1,922	1,589	3,511		0	2,708		12,800	8,418	
1992	3,450	0	3,450		0	2,634		12,800	7,504	
1993	1,519	3,834	5,354		0	2,834		12,800	4,480	
1994	2,514	1,741	4,255		0	2,634		12,800	6,029	
1995	676	4,192	4,868		0	2,612		12,800	5,177	
1996	1,726	5,359	7,085		0	2,727		12,800	2,881	
1997	372	6,400	6,772		0	2,834		12,800	3,084	
1998	3,154	6,813	9,967		0	1,579		12,800	2,090	
Averages	1,976	4,265	6,241	6,826	0	2,459	2,346	12,800	4,440	2,844

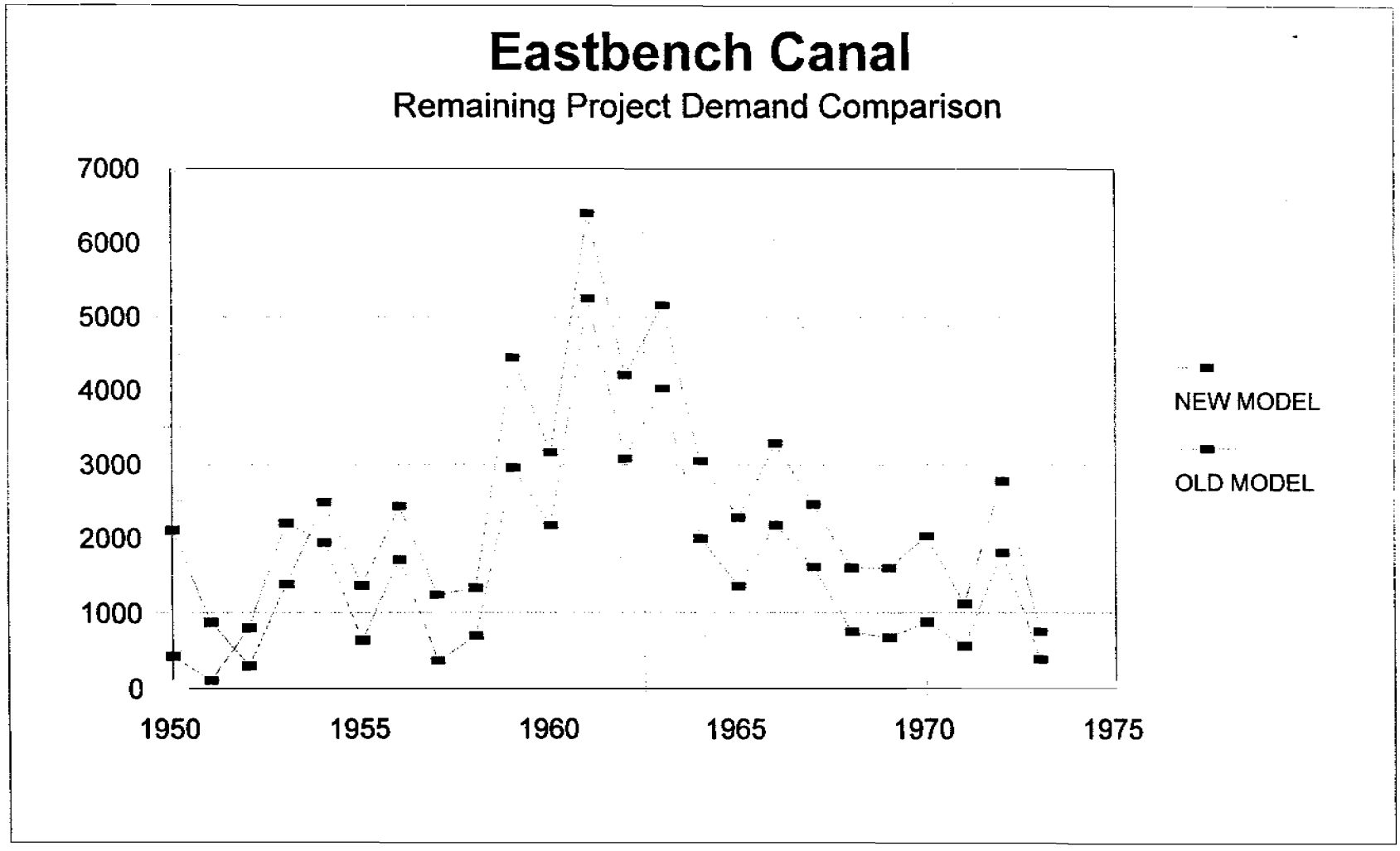
Lakeshore Canal

Remaining Project Demand Comparison



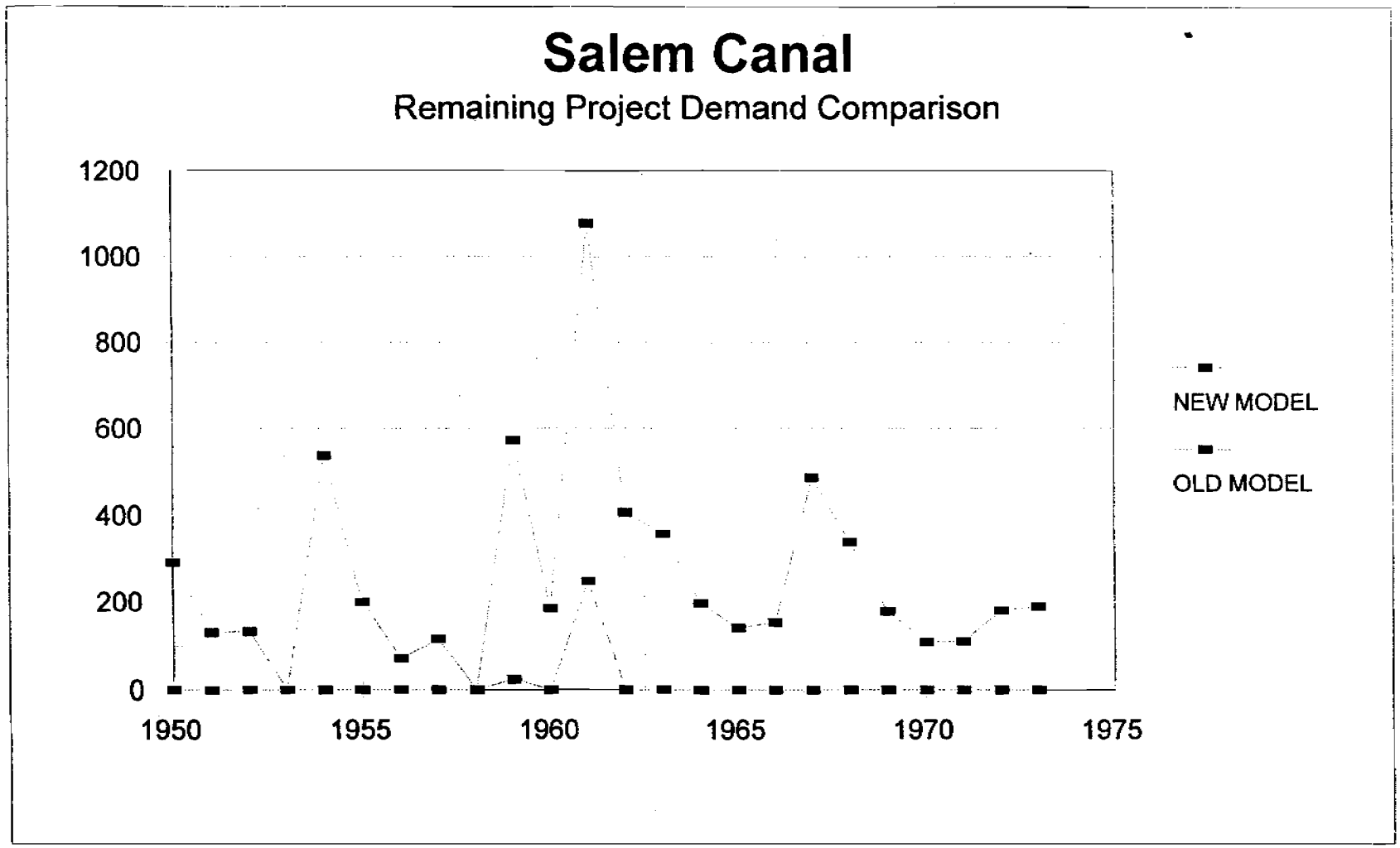
EASTBENCH CANAL

	STRAWBERRY VALLEY PROJECT WATER	DELIVERY FROM SPANISH FORK RIVER RIGHTS	TOTAL SVP & RIVER DELIVERY	TOTAL DELIVERY	DEMAND MET BY LOCAL SURFACE SUPPLIES	DEMAND MET BY WELLS AVERAGE/MO	DEMAND MET BY WELLS	HEAD OF CANAL DIV. REQ TOTAL ACRES	REMAINING DEMAND: PROJ. LANDS ACREAGE =	REMAINING DEMAND:
						150		4,251	4,169	
1950	7,193	6,961	14,154	13,052	0	151	500	12,800	439	2,116
1951	3,110	12,375	15,485	14,154	0	300	500	12,800	0	881
1952	6,734	6,772	13,505	15,484	0	386	500	12,800	757	308
1953	7,092	6,092	13,184	13,503	0	600	500	12,800	2,212	1,382
1954	8,176	3,271	11,447	11,994	0	600	600	12,600	1,605	2,489
1955	7,373	5,110	12,483	12,484	0	586	500	12,800	592	1,366
1956	6,662	6,190	12,852	12,875	0	450	600	12,800	1,559	2,430
1957	6,247	6,653	12,900	12,898	0	591	500	12,800	319	1,243
1958	6,607	8,235	14,843	14,842	0	453	500	12,800	647	1,337
1959	6,798	2,252	9,050	9,049	0	828	600	12,800	2,936	4,454
1960	6,515	4,467	10,982	10,981	0	600	700	12,800	1,871	3,161
1961	5,423	2,184	7,607	7,606	0	773	900	12,800	5,220	6,404
1962	4,749	6,587	11,336	11,336	0	869	700	12,600	2,744	4,215
1963	4,086	5,886	9,972	9,973	0	750	700	12,800	3,824	5,161
1964	5,963	4,344	10,307	10,304	0	623	500	12,800	1,761	3,051
1965	3,736	9,176	12,913	12,913	0	750	500	12,800	1,018	2,292
1966	6,832	5,436	12,268	12,268	0	617	600	12,800	2,000	3,287
1967	5,373	7,742	13,115	13,116	0	365	500	12,800	1,341	2,464
1968	5,872	7,314	13,186	13,184	0	600	500	12,800	359	0
1969	6,001	9,883	15,885	15,885	0	600	500	12,800	489	0
1970	6,326	6,917	13,243	13,223	0	750	500	12,800	728	0
1971	6,782	8,934	15,716	15,717	0	300	500	12,800	334	1,116
1972	7,468	5,741	13,209	13,209	0	600	600	12,800	1,472	2,782
1973	5,567	9,177	14,744	14,744	0	367	500	12,800	0	752
1974	5,896	9,559	15,455		0	354		12,800	991	
1975	6,559	6,319	12,878		0	505		12,800	1,495	
1976	8,650	6,284	14,934		0	300		12,800	548	
1977	6,862	1,880	8,742		0	750		12,800	3,657	
1978	6,056	6,756	12,811		0	696		12,800	367	
1979	7,436	8,785	16,221		0	450		12,800	456	
1980	6,397	10,352	16,749		0	450		12,800	324	
1981	8,961	3,461	12,422		0	300		12,800	1,814	
1982	5,799	10,542	16,341		0	329		12,800	0	
1983	0	13,581	13,581		0	600		12,800	1,617	
1984	0	13,798	13,798		0	450		12,800	252	
1985	6,341	10,490	16,831		0	450		12,800	168	
1986	4,651	11,966	16,616		0	450		12,800	75	
1987	8,862	3,164	12,026		0	450		12,800	1,998	
1988	8,932	5,089	14,021		0	504		12,800	858	
1989	7,283	3,362	10,645		0	600		12,800	3,523	
1990	7,063	3,240	10,303		0	736		12,800	2,636	
1991	6,292	5,482	11,775		0	600		12,800	1,634	
1992	6,473	1,644	8,116		0	900		12,800	4,257	
1993	5,069	7,937	13,007		0	450		12,800	1,339	
1994	6,645	3,526	10,171		0	600		12,800	2,586	
1995	2,830	7,717	10,546		0	750		12,800	2,450	
1996	5,019	8,134	13,153		0	450		12,800	1,712	
1997	2,458	9,725	12,183		0	600		12,800	1,290	
1998	4,831	8,859	13,691		0	450		12,800	1,439	
Averages	5,960	6,926	12,886	12,700	0	545	563	12,800	1,463	2,195


Eastbench Canal
Remaining Project Demand Comparison
7000
6000
5000
4000
3000
2000
1000
0
1950
1955
1960
1965
1970
1975
NEW MODEL
OLD MODEL

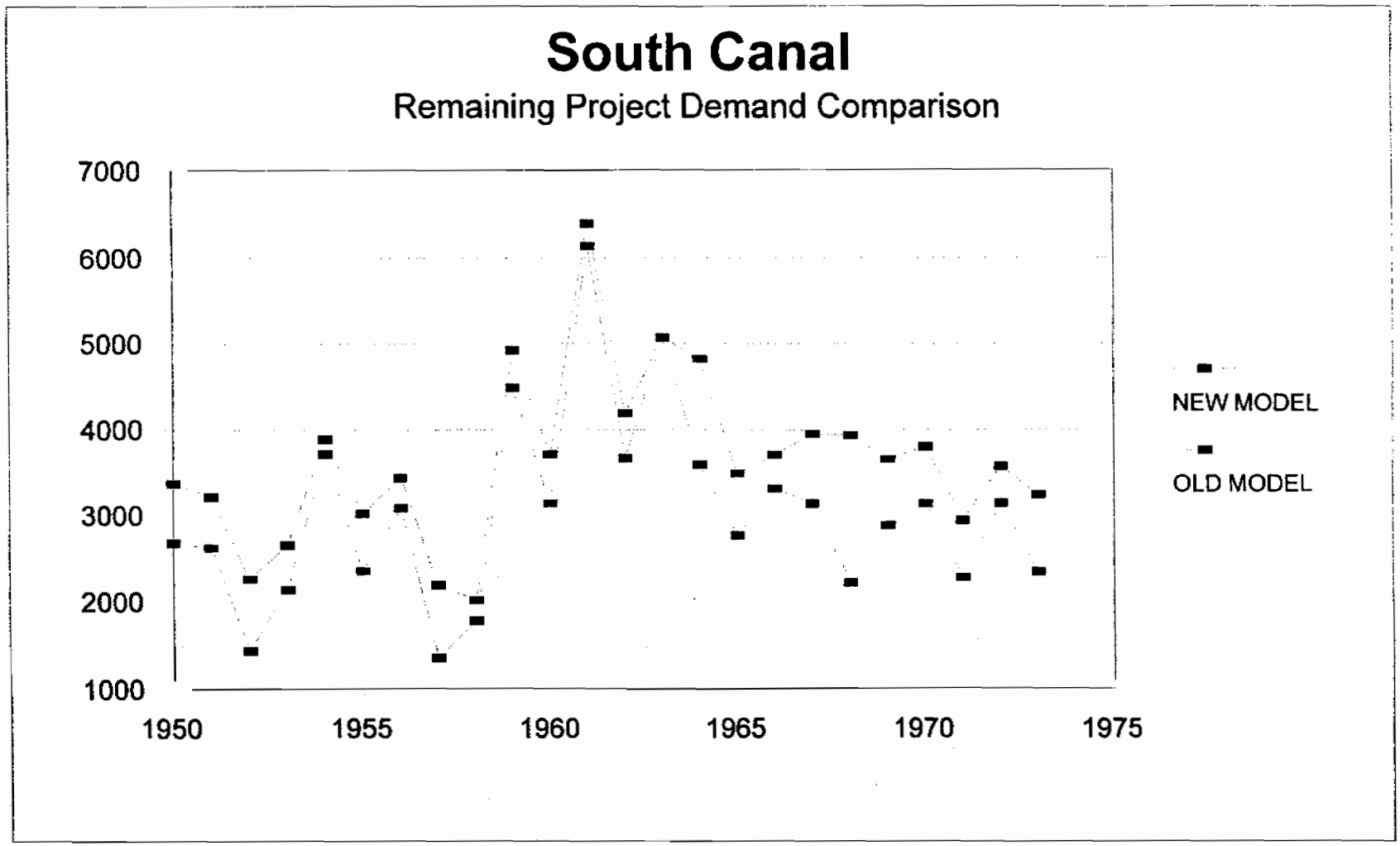
SALEM CANAL

	STRAWBERRY VALLEY PROJECT WATER	DELIVERY FROM SPANISH FORK RIVER RIGHTS	TOTAL SVP & RIVER DELIVERY	TOTAL DELIVERY	DEMAND MET BY LOCAL SURFACE SUPPLIES	DEMAND MET BY WELLS AVERAGE/MO 300	DEMAND MET BY WELLS	HEAD OF CANAL DIV. REQ. TOTAL ACRES 2,035	REMAINING DEMAND: PROJ LANDS ACREAGE = 1,936	REMAINING DEMAND:
1950	0	7,705	7,705	7,706	0	300	500	5,900	100	290
1951	390	7,398	7,788	7,788	0	401	700	5,900	35	131
1952	0	7,634	7,634	7,673	0	341	500	5,900	0	134
1953	306	8,005	8,311	8,311	0	293	700	5,900	0	0
1954	518	5,231	5,749	5,750	0	678	1,100	5,900	537	537
1955	409	5,911	6,319	6,321	0	559	800	5,900	106	201
1956	508	7,103	7,611	7,610	0	300	1,000	5,900	71	71
1957	439	6,980	7,419	7,329	0	321	500	5,900	0	115
1958	395	7,503	7,898	7,898	0	356	900	5,900	0	0
1959	490	4,504	4,994	4,974	0	864	1,200	5,900	595	572
1960	323	5,691	6,014	6,015	0	518	1,200	5,900	228	187
1961	389	3,151	3,540	3,540	0	1,027	1,700	5,900	1,555	1,080
1962	297	6,136	6,433	6,431	0	685	1,200	5,900	313	408
1963	201	6,523	6,724	6,722	0	669	1,500	5,900	482	358
1964	404	4,710	5,115	5,111	0	876	800	5,900	48	197
1965	16	7,415	7,432	7,430	0	445	700	5,900	0	141
1966	395	6,001	6,396	6,396	0	438	1,100	5,900	197	154
1967	163	6,820	6,984	6,965	0	653	500	5,900	57	487
1968	0	6,304	6,304	6,196	0	899	500	5,900	410	0
1969	0	8,069	8,069	8,180	0	451	500	5,900	0	0
1970	360	6,242	6,602	6,602	0	291	500	5,900	0	0
1971	13	7,050	7,063	7,062	0	160	700	5,900	0	109
1972	465	6,719	7,184	7,183	0	477	1,000	5,900	0	180
1973	0	7,674	7,674	7,675	0	300	500	5,900	0	190
1974	287	8,209	8,496		0	496		5,900	11	
1975	14	5,586	5,601		0	900		5,900	568	
1976	507	6,135	6,641		0	724		5,900	0	
1977	217	2,724	2,940		0	1,457		5,900	1,497	
1978	569	6,320	6,889		0	160		5,900	0	
1979	506	6,372	6,878		0	180		5,900	0	
1980	18	6,883	6,901		0	294		5,900	0	
1981	446	5,451	5,897		0	593		5,900	258	
1982	0	8,457	8,457		0	117		5,900	0	
1983	0	5,798	5,798		0	600		5,900	476	
1984	0	7,579	7,579		0	692		5,900	189	
1985	0	6,197	6,197		0	660		5,900	123	
1986	0	6,430	6,430		0	572		5,900	0	
1987	310	5,151	5,462		0	800		5,900	281	
1988	629	5,476	6,104		0	598		5,900	98	
1989	538	5,038	5,576		0	642		5,900	165	
1990	483	4,766	5,249		0	800		5,900	436	
1991	605	4,047	4,652		0	942		5,900	400	
1992	985	3,150	4,135		0	1,008		5,900	1,273	
1993	416	6,261	6,677		0	738		5,900	0	
1994	514	4,438	4,952		0	1,049		5,900	631	
1995	0	5,262	5,262		0	1,200		5,900	790	
1996	0	6,320	6,320		0	664		5,900	72	
1997	0	6,632	6,632		0	461		5,900	0	
1998	75	6,416	6,490		0	600		5,900	94	
Averages	278	6,155	6,432	6,787	0	597	846	5,900	247	231


Salem Canal
Remaining Project Demand Comparison
1200
1000
800
600
400
200
0
1950
1955
1960
1965
1970
1975
NEW MODEL
OLD MODEL

SOUTH CANAL

	STRAWBERRY VALLEY PROJECT WATER	DELIVERY FROM SPANISH FORK RIVER RIGHTS	TOTAL SVP & RIVER DELIVERY	TOTAL DELIVERY	DEMAND MET BY LOCAL SURFACE SUPPLIES	DEMAND MET BY WELLS AVERAGE/MO 783	DEMAND MET BY WELLS	HEAD OF CANAL DIV. REQ. TOTAL ACRES 515	REMAINING DEMAND: PROJ. LANDS ACREAGE = 515	REMAINING DEMAND:
1950	3,100	12,298	15,397	17,100	0	1,566	1,900	17,100	2,684	3,370
1951	3,469	10,157	13,626	17,100	0	2,059	2,100	17,100	2,628	3,219
1952	1,719	14,843	16,562	17,100	0	1,553	1,700	17,100	1,454	2,266
1953	4,760	10,952	15,712	17,100	0	1,892	2,200	17,100	2,149	2,660
1954	4,508	7,373	11,881	17,100	0	2,412	2,700	17,100	3,725	3,892
1955	4,337	8,076	12,412	17,100	0	2,485	2,300	17,100	2,360	3,027
1956	3,981	9,907	13,888	17,100	0	2,272	2,600	17,100	3,091	3,448
1957	3,528	12,495	16,024	17,100	0	1,579	1,500	17,100	1,366	2,194
1958	4,050	11,386	15,436	17,100	0	1,792	2,500	17,100	1,760	2,018
1959	3,843	6,714	10,557	17,100	0	2,864	2,700	17,100	4,492	4,922
1960	4,562	7,943	12,505	17,100	0	2,367	2,700	17,100	3,140	3,713
1961	3,146	4,453	7,599	17,100	0	3,644	3,300	17,100	6,137	6,393
1962	2,658	8,710	11,368	17,100	0	2,629	2,700	17,100	3,673	4,192
1963	2,304	8,715	11,019	17,100	0	2,740	3,100	17,100	5,069	5,077
1964	4,052	6,520	10,572	17,100	0	3,091	2,100	17,100	3,604	4,624
1965	1,405	11,311	12,716	17,100	0	2,357	2,200	17,100	2,769	3,488
1966	3,819	8,623	12,442	17,100	0	2,646	2,700	17,100	3,323	3,708
1967	2,539	10,453	12,992	17,100	0	2,066	1,700	17,100	3,140	3,947
1968	2,713	9,418	12,131	17,100	0	3,211	1,700	17,100	2,228	0
1969	3,274	12,243	15,518	17,100	0	1,566	1,700	17,100	2,880	0
1970	2,726	10,526	13,252	17,100	0	1,625	1,900	17,100	3,135	0
1971	3,176	10,905	14,081	17,100	0	2,085	2,200	17,100	2,280	2,941
1972	3,811	10,312	14,123	17,100	0	2,241	2,500	17,100	3,140	3,574
1973	1,663	12,429	14,091	17,100	0	1,866	1,900	17,100	2,349	3,239
1974	2,835	11,794	14,629		0	1,691		17,100	2,640	
1975	3,606	9,349	12,955		0	2,430		17,100	3,385	
1976	4,420	9,529	13,949		0	1,566		17,100	2,731	
1977	4,346	5,128	9,473		0	3,561		17,100	5,242	
1978	2,866	8,730	11,596		0	3,139		17,100	2,366	
1979	2,620	9,629	12,249		0	2,385		17,100	2,863	
1980	1,570	12,092	13,662		0	2,231		17,100	1,882	
1981	3,054	8,460	11,514		0	2,818		17,100	3,997	
1982	1,514	12,786	14,300		0	1,911		17,100	1,612	
1983	0	11,367	11,367		0	2,649		17,100	3,646	
1984	0	12,601	12,601		0	2,720		17,100	2,316	
1985	2,583	12,440	15,023		0	1,866		17,100	1,804	
1986	1,830	12,342	14,172		0	2,516		17,100	891	
1987	4,647	7,884	12,531		0	2,913		17,100	2,925	
1988	5,698	8,298	13,996		0	2,515		17,100	2,162	
1989	4,769	7,124	11,893		0	2,921		17,100	3,427	
1990	4,698	7,612	12,310		0	2,388		17,100	3,697	
1991	3,616	7,308	10,923		0	3,344		17,100	3,669	
1992	4,387	4,696	9,082		0	3,996		17,100	4,881	
1993	1,460	9,121	10,581		0	2,981		17,100	3,584	
1994	4,012	6,403	10,415		0	3,352		17,100	3,490	
1995	1,440	7,696	9,136		0	2,649		17,100	6,403	
1996	2,199	10,049	12,248		0	2,389		17,100	2,587	
1997	1,428	11,638	13,067		0	2,173		17,100	2,378	
1998	1,996	11,658	13,655		0	2,368		17,100	2,391	
Averages	3,076	9,643	12,719	17,100	0	2,451	2,275	17,100	3,052	3,171

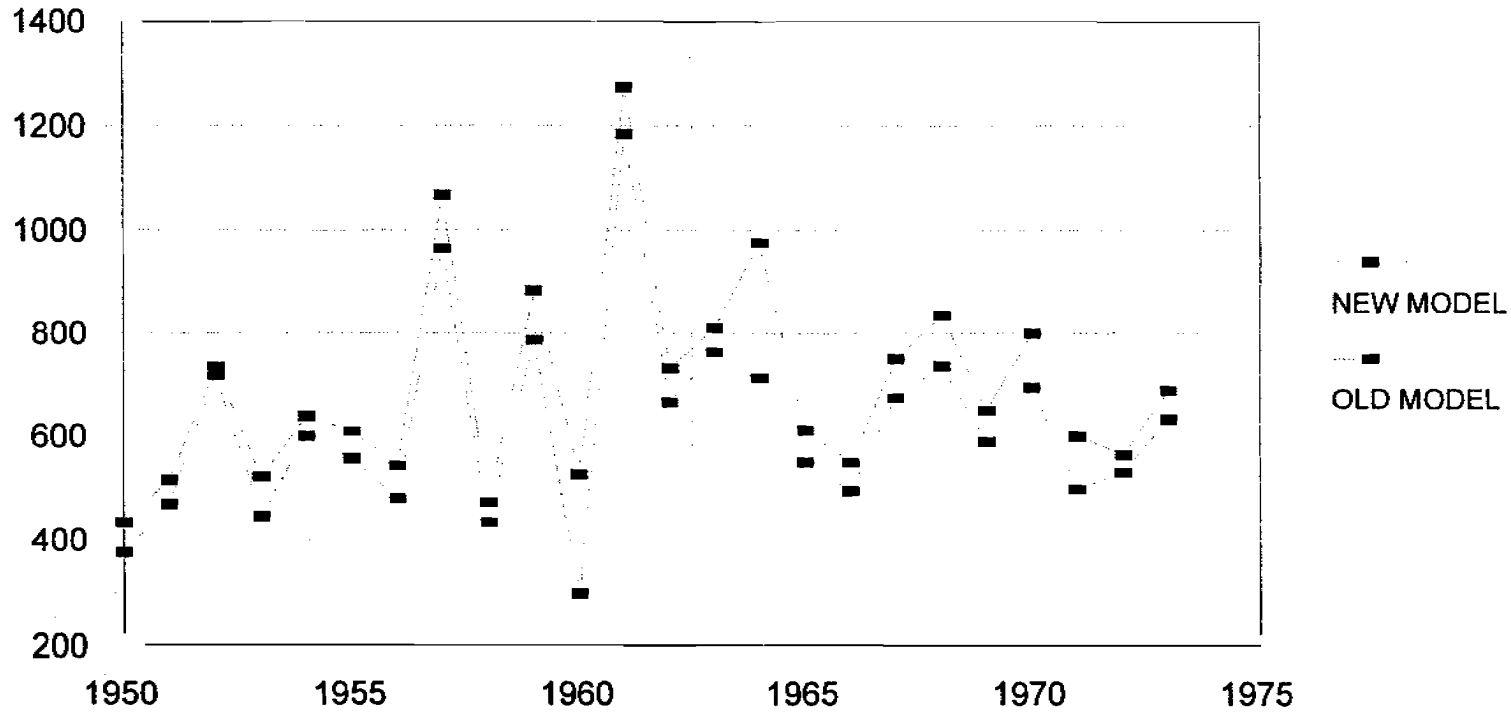

South Canal
Remaining Project Demand Comparison
7000
6000
5000
4000
3000
2000
1000
1950
1955
1960
1965
1970
1975
NEW MODEL
OLD MODEL

SOUTHEASTFIELD CANAL

	STRAWBERRY VALLEY PROJECT WATER	DELIVERY FROM SPANISH FORK RIVER RIGHTS	TOTAL SVP & RIVER DELIVERY	TOTAL DELIVERY	DEMAND MET BY LOCAL SURFACE SUPPLIES	DEMAND MET BY WELLS AVERAGE/MO 55	DEMAND MET BY WELLS	HEAD OF CANAL DIV. REQ. TOTAL ACRES 947	REMAINING DEMAND: PROJ. LANDS ACREAGE = 914	REMAINING DEMAND:
1950	169	2,705	2,875	2,659	0	110	150	2,500	377	434
1951	249	2,203	2,452	2,204	0	110	175	2,500	470	516
1952	(95)	1,998	1,903	2,047	0	220	150	2,500	694	734
1953	206	2,622	2,829	2,622	0	165	175	2,500	446	521
1954	217	2,024	2,241	2,024	0	165	200	2,500	600	639
1955	26	1,865	1,891	1,864	0	227	188	2,500	526	609
1956	158	2,031	2,189	2,028	0	167	200	2,500	480	543
1957	134	1,815	1,948	1,816	0	165	138	2,500	964	1,068
1958	39	2,235	2,274	2,251	0	139	188	2,500	434	472
1959	0	1,623	1,624	1,623	0	275	200	2,500	787	884
1960	238	1,878	2,116	1,877	0	161	213	2,500	298	526
1961	197	1,173	1,370	1,174	0	275	225	2,500	1,185	1,274
1962	161	1,605	1,765	1,606	0	220	213	2,500	666	732
1963	138	1,579	1,717	1,578	0	212	225	2,500	763	811
1964	195	1,493	1,688	1,494	0	172	175	2,500	714	975
1965	206	1,855	2,061	1,854	0	175	175	2,500	549	612
1966	250	2,063	2,313	2,062	0	137	200	2,500	495	549
1967	229	1,678	1,907	1,679	0	178	150	2,500	675	750
1968	16	1,521	1,537	1,538	0	220	150	2,500	736	0
1969	208	2,121	2,328	2,122	0	110	150	2,500	591	0
1970	229	1,718	1,947	1,719	0	190	150	2,500	696	0
1971	208	1,904	2,113	1,905	0	220	175	2,500	497	601
1972	188	2,047	2,235	2,046	0	110	188	2,500	530	564
1973	161	1,777	1,938	1,778	0	220	150	2,500	634	689
1974	157	2,269	2,426		0	113		2,500	400	
1975	229	1,823	2,052		0	165		2,500	458	
1976	171	2,069	2,240		0	165		2,500	440	
1977	219	1,135	1,354		0	204		2,500	1,299	
1978	229	1,664	1,893		0	220		2,500	431	
1979	229	2,015	2,244		0	110		2,500	285	
1980	208	1,793	2,001		0	165		2,500	427	
1981	252	1,730	1,982		0	220		2,500	804	
1982	229	1,746	1,975		0	220		2,500	605	
1983	252	540	792		0	275		2,500	1,383	
1984	221	1,603	1,824		0	165		2,500	572	
1985	221	1,581	1,802		0	220		2,500	855	
1986	243	1,781	2,024		0	167		2,500	654	
1987	276	1,555	1,831		0	220		2,500	835	
1988	267	1,684	1,951		0	239		2,500	557	
1989	391	1,682	2,073		0	220		2,500	634	
1990	195	1,745	1,939		0	216		2,500	711	
1991	221	1,385	1,605		0	220		2,500	876	
1992	276	1,916	2,192		0	198		2,500	685	
1993	221	1,639	1,860		0	183		2,500	729	
1994	208	1,664	1,872		0	220		2,500	628	
1995	187	1,322	1,509		0	202		2,500	1,035	
1996	221	2,160	2,381		0	220		2,500	285	
1997	221	1,863	2,084		0	220		2,500	517	
1998	220	1,359	1,579		0	220		2,500	1,014	
Averages	194	1,781	1,974	1,899	0	190	179	2,500	651	604

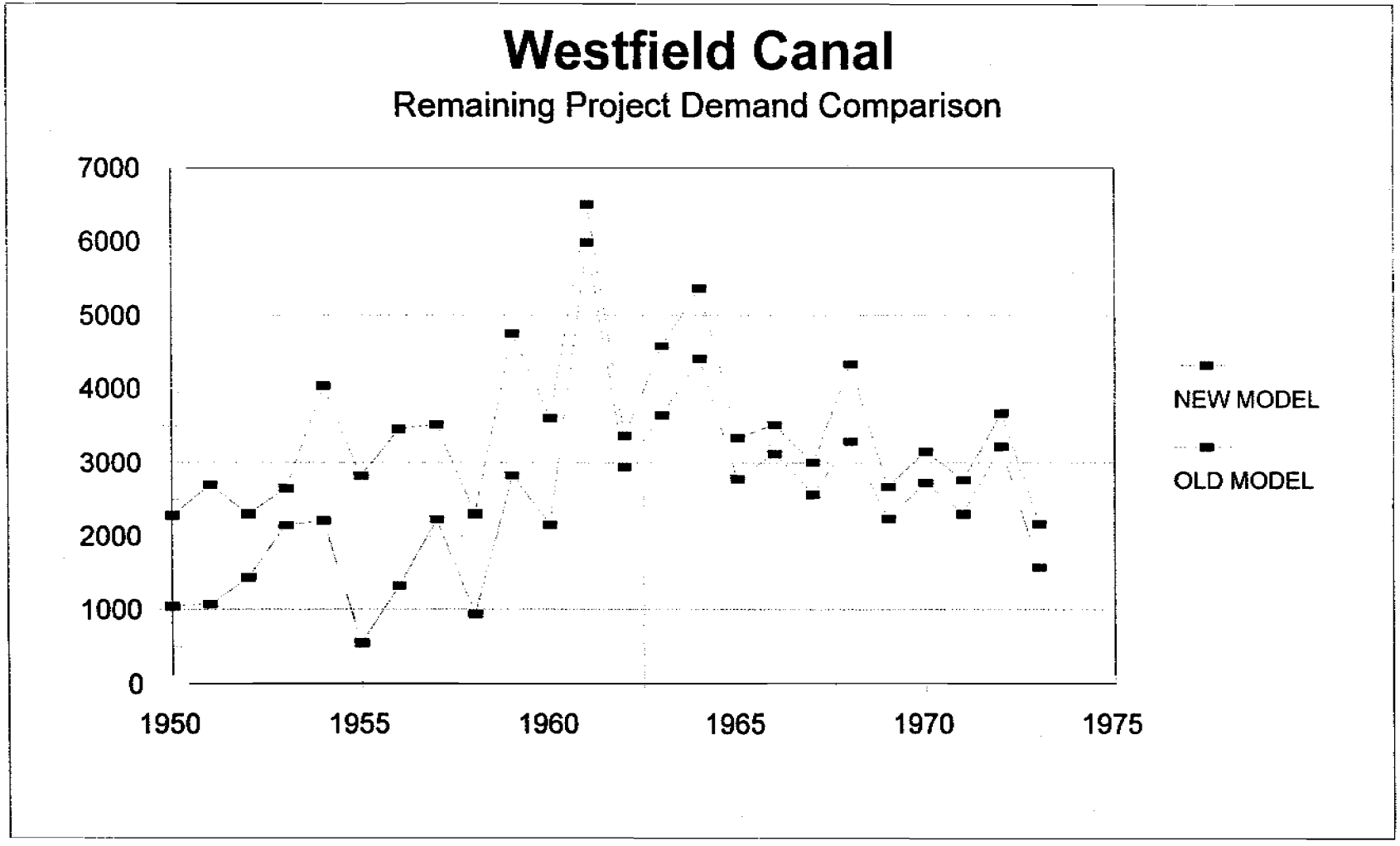
Southeast Canal

Remaining Project Demand Comparison



WESTFIELD CANAL

	STRAWBERRY VALLEY PROJECT WATER	DELIVERY FROM SPANISH FORK RIVER RIGHTS	TOTAL SVP & RIVER DELIVERY	TOTAL DELIVERY	DEMAND MET BY LOCAL SURFACE SUPPLIES	DEMAND MET BY WELLS AVERAGE/MO 446	DEMAND MET BY WELLS	HEAD OF CANAL DIV. REQ. TOTAL ACRES 6,628	REMAINING DEMAND: PROJ. LANDS ACREAGE = 5,323	REMAINING DEMAND:
1950	2,175	15,500	17,674	15,590	0	446	1,050	17,100	1,041	2,287
1951	2,808	15,529	18,337	15,538	0	892	1,225	17,100	1,068	2,694
1952	3,815	15,847	19,662	15,791	0	892	1,050	17,100	1,432	2,309
1953	(821)	15,527	14,706	15,537	0	1,526	1,225	17,100	1,311	2,648
1954	2,657	12,372	15,030	12,381	0	1,172	1,400	17,100	2,219	4,043
1955	3,152	14,493	17,645	14,506	0	757	1,312	17,100	556	2,814
1956	2,711	15,281	17,993	15,289	0	1,015	1,400	17,100	1,328	3,463
1957	1,491	13,852	15,343	13,863	0	1,338	962	17,100	2,223	3,520
1958	2,275	15,234	17,509	15,244	0	892	1,312	17,100	931	2,303
1959	2,083	12,266	14,349	12,276	0	1,586	1,400	17,100	2,819	4,750
1960	3,132	12,972	16,104	12,981	0	896	1,487	17,100	2,159	3,602
1961	2,279	8,391	10,670	8,400	0	2,076	1,575	17,100	5,989	6,514
1962	2,067	12,488	14,555	12,497	0	1,567	1,487	17,100	2,947	3,372
1963	1,368	11,718	13,086	11,937	0	1,411	1,575	17,100	3,647	4,581
1964	2,582	7,667	10,249	10,147	0	1,784	1,225	17,100	4,409	5,382
1965	2,760	12,590	15,350	12,679	0	1,576	1,225	17,100	2,784	3,345
1966	2,985	12,982	15,967	12,991	0	1,413	1,400	17,100	3,126	3,513
1967	3,030	13,911	16,941	13,922	0	1,116	1,050	17,100	2,571	2,999
1968	3,066	11,245	14,311	11,255	0	2,084	1,050	17,100	3,291	0
1969	3,067	16,185	19,252	16,185	0	961	1,050	17,100	2,240	0
1970	3,067	14,459	17,526	14,488	0	949	1,050	17,100	2,717	0
1971	3,091	14,257	17,348	14,267	0	1,336	1,225	17,100	2,306	2,759
1972	3,068	13,058	16,125	13,059	0	1,230	1,312	17,100	3,222	3,674
1973	3,067	14,341	17,408	14,351	0	1,312	1,050	17,100	1,568	2,166
1974	3,040	16,646	19,686		0	1,022		17,100	1,616	
1975	3,067	12,486	15,553		0	915		17,100	2,378	
1976	3,354	13,534	16,887		0	962		17,100	2,276	
1977	3,029	9,279	12,308		0	2,019		17,100	5,566	
1978	3,067	12,744	15,811		0	1,139		17,100	1,622	
1979	3,067	13,814	16,881		0	997		17,100	2,039	
1980	3,296	12,945	16,242		0	1,115		17,100	2,365	
1981	3,272	12,587	15,858		0	1,497		17,100	3,562	
1982	3,087	13,451	16,538		0	1,382		17,100	2,333	
1983	3,374	7,956	11,329		0	2,084		17,100	3,502	
1984	3,067	10,366	13,433		0	1,638		17,100	3,303	
1985	3,067	13,988	17,055		0	1,192		17,100	2,482	
1986	3,374	14,451	17,825		0	1,376		17,100	1,663	
1987	3,872	15,147	19,020		0	1,203		17,100	2,440	
1988	3,710	14,401	18,111		0	1,282		17,100	2,362	
1989	3,471	13,257	16,728		0	1,499		17,100	2,531	
1990	3,105	13,843	16,948		0	1,196		17,100	3,428	
1991	3,063	8,950	12,012		0	2,084		17,100	5,375	
1992	3,072	11,754	14,826		0	2,084		17,100	3,779	
1993	3,075	12,138	15,214		0	1,706		17,100	2,945	
1994	3,127	12,566	15,692		0	1,985		17,100	2,530	
1995	2,576	9,165	11,741		0	1,638		17,100	5,840	
1996	3,067	10,636	13,703		0	1,796		17,100	4,002	
1997	3,067	13,918	16,984		0	1,340		17,100	2,205	
1998	2,793	13,997	16,791		0	1,192		17,100	2,024	
Averages	2,860	12,983	15,843	13,549	0	1,359	1,254	17,100	2,695	3,031


Westfield Canal
Remaining Project Demand Comparison
7000
6000
5000
4000
3000
2000
1000
0
1950
1955
1960
1965
1970
1975
NEW MODEL
OLD MODEL

Water Delivery Comparisons

old model

	PETEETNET											
	HEAD OF CANAL DIV. REQ. TOTAL ACRES= 4,630	HISTORICAL DIVERSIONS	HISTORICAL DIVERSIONS	WELL WATER	DEMAND MET	DEMAND MET	REMAINING DEMAND: TOTAL AREA	REMAINING DEMAND: TOTAL AREA	REMAINING DEMAND: PROJECT LANDS-ACREAGE = 4,630	REMAINING DEMAND: PROJECT LANDS-	SURPLUS DIVERSIONS HISTORICAL	SURPLUS DIVERSIONS HISTORICAL
1950	14,500	9,111	10,700	2,916	7,360	8,676	7,030	5,794	7,030	5,794	2,687	3,240
1951	14,500	6,936	9,300	2,916	6,804	7,576	7,586	6,894	7,586	6,894	1,717	2,840
1952	14,500	25,004	22,900	2,916	11,819	11,077	2,571	3,393	2,571	3,393	13,814	12,960
1953	14,500	10,783	9,000	2,916	8,402	7,676	5,988	6,794	5,988	6,794	1,709	1,640
1954	14,500	6,516	4,300	2,916	5,990	4,696	8,400	9,774	8,400	9,774	1,134	920
1955	14,500	7,178	7,200	2,916	6,905	7,078	7,485	7,394	7,486	7,394	1,634	1,840
1956	14,500	6,807	6,800	2,916	6,300	6,476	8,090	7,994	8,090	7,994	1,511	1,740
1957	14,500	13,023	13,000	2,916	9,845	9,877	4,545	4,593	4,545	4,593	4,098	4,360
1958	14,500	12,083	12,000	2,916	8,133	8,176	6,257	6,294	6,257	6,294	4,225	4,740
1959	14,500	5,172	5,200	2,916	5,276	5,396	9,114	9,074	9,114	9,074	507	820
1960	14,500	6,187	6,200	2,916	6,256	6,376	8,134	8,094	8,134	8,094	1,460	1,640
1961	14,500	3,657	3,500	2,916	4,828	4,796	9,564	9,674	9,564	9,674	338	520
1962	14,500	9,937	4,200	2,916	7,915	5,396	6,475	9,074	6,475	9,074	3,438	420
1963	14,500	6,116	6,000	2,916	6,117	6,176	8,273	8,294	8,273	8,294	700	940
1964	14,500	8,064	8,100	2,916	7,653	7,676	6,737	6,794	6,737	6,794	1,893	2,140
1965	14,500	9,839	9,900	2,916	6,411	8,476	5,979	5,994	5,979	5,994	2,175	2,440
1966	14,500	7,349	7,300	2,916	6,073	6,176	8,317	8,294	8,317	8,294	1,921	2,240
1967	14,500	8,270	7,500	2,916	8,022	7,176	6,368	7,294	6,368	7,294	1,330	1,640
1968	14,500	10,726	10,300	2,916	6,918	8,176	5,472	6,294	5,472	6,294	2,738	2,840
1969	14,500	15,451	15,700	2,916	8,582	10,253	5,808	4,217	5,808	4,217	7,010	4,940
1970	14,500	11,150	10,700	2,916	6,739	8,376	5,651	6,094	5,651	6,094	2,222	3,040
1971	14,500	11,328	11,400	2,916	8,577	8,576	5,813	5,894	5,813	5,894	2,823	3,340
1972	14,500	6,328	4,800	2,916	5,691	6,176	8,499	8,294	8,499	8,294	544	540
1973	14,500	14,793	14,900	2,916	9,290	9,976	5,100	4,494	5,100	4,494	8,851	4,740
1974	14,500	12,073		2,916	10,119		4,271		4,271		3,132	
1975	14,500	6,812		2,916	6,108		8,282		8,282		1,288	
1976	14,500	3,200		2,916	4,627		9,763		9,763		198	
1977	14,500	13,532		2,916	9,595		4,795		4,795		5,379	
1978	14,500	10,541		2,916	7,455		6,935		6,935		3,608	
1979	14,500	20,914		2,916	10,997		3,393		3,393		10,017	
1980	14,500	5,388		2,916	5,762		8,628		8,628		848	
1981	14,500	15,099		2,916	6,230		6,160		6,160		7,137	
1982	14,500	48,810		2,916	12,772		1,618		1,618		34,052	
1983	14,500	64,840		2,916	12,154		2,236		2,236		49,929	
1984	14,500	16,817		2,916	9,054		5,336		5,336		7,021	
1985	14,500	19,967		2,916	6,746		5,642		5,642		10,502	
1986	14,500	2,917		2,916	3,896		10,492		10,492		493	
1987	14,500	2,218		2,916	4,532		9,858		9,858		353	
1988	14,500	2,259		2,916	4,133		10,257		10,257		858	
1989	14,500	1,459		2,916	3,839		10,551		10,551		316	
1990	14,500	4,375		2,916	5,759		8,651		8,651		1,219	
1991	14,500	1,419		2,916	3,448		10,942		10,942		309	
1992	14,500	7,704		2,916	6,611		7,779		7,779		3,304	
1993	14,500	3,167		2,916	4,787		9,623		9,623		282	
1994	14,500	11,143		2,916	9,876		4,514		4,514		2,583	
1995	14,500	8,260		2,916	5,934		7,456		7,456		2,567	
1996	14,500	10,435		2,916	7,215		7,175		7,175		4,149	
1997	14,500	13,588		2,916	9,638		4,752		4,752		5,100	
1998	14,500	13,588		2,916	9,638		4,752		4,752		5,100	
Averages	14,500	11,273	9,204	2,916	7,510	7,520	6,880	6,950	6,880	6,950	4,649	2,772

MONA

	HEAD OF CANAL DIV. REQ. TOT. ACRES= 4,675 acre-feet	SURFACE WATER DIVERSION 17.20% acre-feet	SURFACE WATER DIVERSION	GROUND WATER DIVERSION 830 peak/mo acre-feet	GROUND WATER DIVERSION	HISTORICAL DIVERSIONS (S&G) acre-feet	HISTORICAL DIVERSIONS (S&G)	DEMAND MET BY SURFACE WATER acre-feet	DEMAND MET BY SURFACE WATER	DEMAND MET BY GROUND WATER acre-feet	DEMAND MET BY GROUND WATER	DEMAND MET acre-feet	DEMAND MET	REMAINING DEMAND: TOTAL AREA acre-feet	REMAINING DEMAND: TOTAL AREA	REMAINING DEMAND: PROJ. LANDS- ACREAGE = 4,675 acre-feet	REMAINING DEMAND: PROJ. LANDS- ACREAGE = acre-feet
1950	14,700	3,027	3,000	4,282	5,360	7,310	8,360	2,374	2,400	4,282	5,350	6,656	7,750	8,044	6,950	8,044	6,950
1951	14,700	2,337	2,600	4,517	5,740	6,854	8,340	1,848	2,000	4,517	5,730	6,364	7,730	8,336	6,970	8,336	6,970
1952	14,700	8,248	8,300	3,320	3,470	11,568	11,770	6,174	6,000	3,320	3,470	9,494	9,470	5,206	5,230	5,206	5,230
1953	14,700	3,581	3,600	4,487	4,980	8,068	8,580	2,409	2,900	4,487	4,970	6,896	7,870	7,804	6,830	7,804	6,830
1954	14,700	2,181	2,200	4,516	6,660	6,676	8,860	1,391	1,700	4,516	6,650	5,907	8,350	8,793	6,350	8,793	6,350
1955	14,700	2,007	2,100	4,646	7,770	6,653	9,870	1,451	1,600	4,646	7,770	6,097	9,370	8,603	5,330	8,603	5,330
1956	14,700	2,395	2,400	4,504	5,930	6,899	8,330	1,731	1,900	4,504	5,930	6,235	7,830	8,465	6,570	8,465	6,570
1957	14,700	4,035	4,000	4,459	4,740	8,495	8,740	3,457	3,200	4,459	4,740	7,916	7,940	6,784	6,760	6,784	6,760
1958	14,700	4,674	4,600	4,202	4,460	8,875	9,060	3,654	3,600	4,202	4,460	7,856	8,060	6,844	6,640	6,844	6,640
1959	14,700	1,733	1,800	4,680	7,770	6,413	9,570	984	1,400	4,680	7,770	5,664	9,170	9,036	5,530	9,036	5,530
1960	14,700	2,108	2,100	4,521	7,770	6,629	9,870	1,614	1,600	4,521	7,770	6,135	9,370	8,565	5,330	8,565	5,330
1961	14,700	1,051	1,000	4,779	8,490	5,829	9,490	588	900	4,779	8,480	5,367	9,380	9,333	5,320	9,333	5,320
1962	14,700	3,955	3,900	4,150	4,790	8,105	8,690	3,063	3,100	4,150	4,780	7,213	7,880	7,487	6,820	7,487	6,820
1963	14,700	2,544	2,500	4,642	5,780	7,185	8,280	1,791	1,900	4,642	5,780	6,432	7,680	8,268	7,020	8,268	7,020
1964	14,700	2,555	2,500	4,691	5,780	7,247	8,280	2,075	1,900	4,691	5,780	6,766	7,680	7,934	7,020	7,934	7,020
1965	14,700	3,603	3,600	4,370	4,980	7,972	8,580	2,920	2,900	4,370	4,970	7,290	7,870	7,410	6,830	7,410	6,830
1966	14,700	2,206	2,100	4,510	6,130	6,716	8,230	1,407	1,500	4,510	6,130	5,917	7,630	8,783	7,070	8,783	7,070
1967	14,700	2,758	2,800	4,629	5,580	7,387	8,380	2,133	2,200	4,629	5,570	6,761	7,770	7,939	6,930	7,939	6,930
1968	14,700	3,555	3,500	4,467	5,010	8,021	8,510	2,878	2,800	4,467	5,000	7,345	7,800	7,355	6,900	7,355	6,900
1969	14,700	5,167	5,200	4,150	4,250	9,317	9,450	3,690	3,900	4,150	4,250	7,840	8,150	6,860	6,550	6,860	6,550
1970	14,700	3,663	3,700	4,618	4,930	8,280	8,630	2,633	3,000	4,618	4,930	7,251	7,930	7,449	6,770	7,449	6,770
1971	14,700	3,624	3,800	4,236	5,550	8,061	9,350	2,852	2,900	4,236	5,550	7,089	8,450	7,611	6,250	7,611	6,250
1972	14,700	2,103	1,900	4,629	7,770	6,732	9,670	1,164	1,300	4,629	7,770	5,793	9,070	8,907	5,630	8,907	5,630
1973	14,700	4,798	4,800	4,064	4,390	8,862	9,190	4,198	3,600	4,064	4,390	8,262	7,990	6,438	6,710	6,438	6,710
1974	14,700	3,977		4,679		8,656		3,453		4,679		8,132		6,568		6,568	
1975	14,700	2,233		4,614		6,846		1,460		4,614		5,074		8,626		8,626	
1976	14,700	1,062		4,770		5,832		633		4,770		5,403		9,297		9,297	
1977	14,700	4,554		4,150		6,704		3,881		4,150		8,031		6,669		6,669	
1978	14,700	3,472		4,292		7,764		2,675		4,292		6,967		7,733		7,733	
1979	14,700	6,926		3,551		10,477		5,468		3,551		9,019		5,681		5,681	
1980	14,700	1,785		4,505		6,290		1,243		4,505		5,748		8,952		8,952	
1981	14,700	5,016		4,126		9,143		3,762		4,126		7,888		6,812		6,812	
1982	14,700	15,991		2,490		18,481		8,560		2,490		11,050		3,650		3,650	
1983	14,700	20,584		3,320		23,904		7,323		3,320		10,643		4,057		4,057	
1984	14,700	5,623		4,150		9,773		3,980		4,150		8,130		6,570		6,570	
1985	14,700	6,803		3,792		10,595		4,276		3,792		8,068		6,632		6,632	
1986	14,700	958		4,650		5,608		505		4,650		5,155		9,545		9,545	
1987	14,700	723		4,707		5,429		643		4,707		5,350		9,350		9,350	
1988	14,700	788		4,584		5,371		639		4,584		5,223		9,477		9,477	
1989	14,700	497		4,722		5,219		420		4,722		5,142		9,558		9,558	
1990	14,700	1,390		4,719		6,109		1,285		4,719		6,004		8,696		8,696	
1991	14,700	488		4,725		5,212		290		4,725		5,015		9,685		9,685	
1992	14,700	2,540		4,415		6,955		2,274		4,415		6,689		8,011		8,011	
1993	14,700	1,033		4,735		5,769		686		4,735		5,421		9,279		9,279	
1994	14,700	3,705		4,635		8,340		3,183		4,635		7,818		6,882		6,882	
1995	14,700	2,718		4,413		7,131		2,158		4,413		6,571		8,129		8,129	
1996	14,700	3,486		4,226		7,712		2,772		4,226		6,999		7,701		7,701	
1997	14,700	4,543		4,180		8,724		3,926		4,180		8,107		6,593		6,593	
1998	14,700	4,543		4,180		8,724		3,926		4,180		8,107		6,593		6,593	
Averages	14,700	3,745	3,250	4,355	5,753	8,100	9,003	2,610	2,508	4,355	5,750	6,965	8,258	7,735	6,430	7,735	6,430

Water Delivery Comparisons

old model

	NEPHI																	
	HEAD OF CANAL DIV. REQ. TOT. ACRES= 7,850	SURFACE WATER DIVERSION	SURFACE WATER DIVERSION	GROUND WATER DIVERSION 2,950 peak/mo	GROUND WATER DIVERSION	HISTORICAL DIVERSIONS (S&G)	HISTORICAL DIVERSIONS (S&G)	DEMAND MET BY SURFACE WATER	DEMAND MET BY SURFACE WATER	DEMAND MET BY GROUND WATER	DEMAND MET BY GROUND WATER	DEMAND MET	DEMAND MET	REMAINING DEMAND: TOTAL AREA	REMAINING DEMAND: TOTAL AREA	REMAINING DEMAND: PROJ. LANDS-ACREAGE = 7,850	REMAINING DEMAND: PROJ. LANDS-ACREAGE =
	acre-feet	acre-feet	acre-feet	acre-feet		acre-feet		acre-feet		acre-feet		acre-feet		acre-feet		acre-feet	acre-feet
1950	25,300	17,600	17,600	11,050	9,130	28,650	28,730	11,600	11,600	11,050	8,900	22,650	20,500	2,650	4,790	2,650	4,790
1951	25,300	13,590	15,000	11,723	9,770	25,312	24,770	9,904	10,000	11,723	9,800	21,627	19,800	3,673	5,530	3,673	5,530
1952	25,300	47,952	48,000	4,761	5,910	52,713	53,910	20,539	20,500	4,761	4,000	25,300	24,500	0	800	0	800
1953	25,300	20,819	20,900	10,001	8,470	30,820	29,370	13,095	13,100	10,001	8,500	23,097	21,600	2,203	3,750	2,203	3,750
1954	25,300	12,563	12,500	12,573	11,340	25,135	23,840	7,343	7,300	12,573	11,300	19,916	18,600	5,384	6,660	5,384	6,660
1955	25,300	11,667	12,100	12,484	13,230	24,151	25,330	8,452	8,500	12,484	13,300	20,936	21,800	4,364	3,570	4,364	3,570
1956	25,300	13,925	13,900	11,896	10,100	25,821	24,000	9,250	9,300	11,896	10,100	21,146	19,400	4,154	5,900	4,154	5,900
1957	25,300	23,460	23,400	7,675	8,070	31,135	31,470	16,160	16,100	7,675	7,400	23,834	23,500	1,466	1,800	1,466	1,800
1958	25,300	27,172	27,000	9,047	7,590	36,218	34,590	14,028	13,900	9,047	7,600	23,075	21,500	2,225	3,810	2,225	3,810
1959	25,300	10,074	10,200	13,978	13,230	24,052	23,430	5,819	5,900	13,978	13,300	19,797	19,200	5,503	6,170	5,503	6,170
1960	25,300	12,254	12,200	12,278	13,230	24,532	25,430	8,672	8,600	12,278	13,300	20,950	21,900	4,350	3,470	4,350	3,470
1961	25,300	6,110	6,100	14,906	14,460	21,016	20,570	3,519	3,500	14,906	14,300	18,425	17,800	6,875	7,480	6,875	7,480
1962	25,300	22,995	22,900	9,164	8,150	32,159	31,050	13,616	13,500	9,184	8,100	22,779	21,600	2,521	3,650	2,521	3,650
1963	25,300	14,788	14,800	10,980	9,850	25,769	24,850	10,398	10,400	10,980	9,900	21,379	20,300	3,921	5,050	3,921	5,050
1964	25,300	14,856	14,800	10,787	9,850	25,643	24,650	11,248	11,200	10,787	9,900	22,035	21,100	3,265	4,250	3,265	4,250
1965	25,300	20,946	20,900	8,951	8,470	29,897	29,370	14,784	14,900	8,951	7,800	23,735	22,700	1,565	2,630	1,565	2,630
1966	25,300	12,828	13,000	12,328	10,440	25,156	23,440	7,402	7,500	12,328	10,400	19,730	17,900	5,570	7,360	5,570	7,360
1967	25,300	16,038	16,000	10,396	9,500	26,433	25,500	12,312	12,400	10,396	9,400	22,708	21,800	2,592	3,480	2,592	3,480
1968	25,300	20,666	20,800	8,656	8,530	29,322	29,130	14,760	14,800	8,656	8,300	23,416	23,100	1,884	2,290	1,884	2,290
1969	25,300	30,040	30,000	9,132	7,240	39,172	37,240	14,046	14,000	9,132	7,200	23,178	21,200	2,122	4,060	2,122	4,060
1970	25,300	21,295	21,300	8,807	8,400	30,101	29,700	14,455	14,500	8,807	8,000	23,261	22,500	2,039	2,780	2,039	2,780
1971	25,300	22,235	22,200	8,955	9,450	31,190	31,650	14,078	14,000	8,955	9,400	23,033	23,400	2,267	1,850	2,267	1,850
1972	25,300	12,226	12,200	13,325	13,230	25,551	25,430	6,683	6,700	13,325	13,300	20,008	20,000	5,292	5,370	5,292	5,370
1973	25,300	27,896	28,000	7,859	7,470	35,755	35,460	15,526	15,600	7,859	7,400	23,384	23,000	1,916	2,240	1,916	2,240
1974	25,300	23,124		7,830		30,954		16,780		7,830		24,610		690		690	
1975	25,300	12,981		12,117		25,098		8,315		12,117		20,432		4,868		4,868	
1976	25,300	6,177		14,910		21,087		3,782		14,910		18,692		6,608		6,608	
1977	25,300	26,478		7,710		34,188		15,813		7,710		23,523		1,777		1,777	
1978	25,300	20,188		10,419		30,607		11,826		10,419		22,246		3,054		3,054	
1979	25,300	40,265		6,587		46,852		18,713		6,587		25,300		0		0	
1980	25,300	10,377		13,520		23,897		6,423		13,520		19,943		5,357		5,357	
1981	25,300	29,165		9,524		38,689		13,354		9,524		22,878		2,422		2,422	
1982	25,300	92,972		2,225		95,196		23,075		2,225		25,300		0		0	
1983	25,300	119,677		3,707		123,385		21,593		3,707		25,300		0		0	
1984	25,300	32,693		7,924		40,617		14,971		7,924		22,895		2,405		2,405	
1985	25,300	39,550		8,965		48,516		14,399		8,965		23,364		1,936		1,936	
1986	25,300	5,568		14,474		20,042		2,973		14,474		17,447		7,853		7,853	
1987	25,300	4,202		14,318		18,520		3,839		14,318		18,157		7,143		7,143	
1988	25,300	4,579		14,524		19,104		3,321		14,524		17,846		7,454		7,454	
1989	25,300	2,891		14,794		17,685		2,544		14,794		17,338		7,962		7,962	
1990	25,300	8,079		12,254		20,333		7,570		12,254		19,824		5,476		5,476	
1991	25,300	2,836		14,863		17,699		1,787		14,863		16,650		8,650		8,650	
1992	25,300	14,767		11,204		25,971		10,208		11,204		21,410		3,890		3,890	
1993	25,300	6,008		14,498		20,506		4,088		14,498		18,584		6,716		6,716	
1994	25,300	21,540		7,769		29,310		16,428		7,769		24,197		1,103		1,103	
1995	25,300	15,803		10,788		26,591		10,769		10,788		21,557		3,743		3,743	
1996	25,300	20,265		10,241		30,506		11,376		10,241		21,617		3,683		3,683	
1997	25,300	26,414		7,855		34,269		15,924		7,855		23,779		1,521		1,521	
1998	25,300	26,414		7,855		34,269		15,924		7,855		23,779		1,521		1,521	
Averages	25,300	21,776	18,983	10,461	9,796	32,237	28,780	11,295	11,575	10,461	9,821	21,756	21,196	3,544	4,114	3,544	4,114

South Utah County	NEPHI/MONA	Elberta/West Mona	Peteetnet	SUMMARY

	IRRIGATED S. UTAH	IRRIGATED NEPHI/MONA	DRY NEPHI	DRY MONA	IRRIGATED ELBERTA	DRY W.MONA	IRRIGATED PETEETNET	TOTAL IRRIGATED	TOTAL DRY	TOTAL
Total Ac	48,567	12,525								
Proj/Dry Ac.	45,173	12,525	6260	2,655		1920				
	TOTALS	TOTALS	3.22	3.14	TOTALS	3.17	TOTALS			
1950	14,882	10,694	20,157	8,337	0	6,086	7,030	32,606	14,423	47,029
1951	15,224	12,009	20,157	8,337	0	6,086	7,586	34,819	14,423	49,242
1952	9,866	5,206	20,157	8,337	0	6,086	2,571	17,644	14,423	32,067
1953	16,272	10,007	20,157	8,337	0	6,086	5,988	32,268	14,423	46,691
1954	26,342	14,177	20,157	8,337	0	6,086	8,400	48,919	14,423	63,343
1955	17,500	12,967	20,157	8,337	0	6,086	7,485	37,952	14,423	52,375
1956	21,321	12,620	20,157	8,337	0	6,086	8,090	42,031	14,423	56,454
1957	18,729	8,249	20,157	8,337	0	6,086	4,545	29,524	14,423	43,947
1958	13,519	9,070	20,157	8,337	0	6,086	6,257	28,845	14,423	43,269
1959	31,411	14,540	20,157	8,337	0	6,086	9,114	55,065	14,423	69,488
1960	25,136	12,915	20,157	8,337	0	6,086	8,134	46,186	14,423	60,609
1961	51,713	16,208	20,157	8,337	0	6,086	9,564	77,485	14,423	91,908
1962	33,942	10,008	20,157	8,337	0	6,086	6,475	50,424	14,423	64,848
1963	45,060	12,189	20,157	8,337	0	6,086	8,273	65,522	14,423	79,945
1964	31,225	11,199	20,157	8,337	0	6,086	6,737	49,160	14,423	63,583
1965	22,915	8,975	20,157	8,337	0	6,086	5,979	37,869	14,423	52,292
1966	27,432	14,353	20,157	8,337	0	6,086	8,317	50,102	14,423	64,525
1967	19,795	10,531	20,157	8,337	0	6,086	6,368	36,693	14,423	51,116
1968	17,206	9,240	20,157	8,337	0	6,086	5,472	31,918	14,423	46,341
1969	17,354	8,983	20,157	8,337	0	6,086	5,808	32,144	14,423	46,567
1970	19,783	9,488	20,157	8,337	0	6,086	5,651	34,922	14,423	49,346
1971	15,765	9,876	20,157	8,337	0	6,086	5,813	31,456	14,423	45,879
1972	26,448	14,199	20,157	8,337	0	6,086	8,499	49,146	14,423	63,569
1973	13,413	8,354	20,157	8,337	0	6,086	5,100	26,867	14,423	41,290
1974	15,578	7,258	20,157	8,337	0	6,086	4,271	27,107	14,423	41,530
1975	14,803	13,494	20,157	8,337	0	6,086	8,282	36,579	14,423	51,002
1976	10,651	15,905	20,157	8,337	0	6,086	9,763	36,319	14,423	50,742
1977	24,607	8,446	20,157	8,337	0	6,086	4,795	37,849	14,423	52,272
1978	9,651	10,788	20,157	8,337	0	6,086	6,935	27,374	14,423	41,797
1979	9,621	5,681	20,157	8,337	0	6,086	3,393	16,696	14,423	33,119
1980	9,497	14,309	20,157	8,337	0	6,086	8,628	32,434	14,423	46,857
1981	16,580	9,234	20,157	8,337	0	6,086	6,160	31,975	14,423	46,398
1982	6,917	3,650	20,157	8,337	0	6,086	1,618	12,186	14,423	26,609
1983	14,479	4,057	20,157	8,337	0	6,086	2,236	20,771	14,423	35,194
1984	9,579	8,975	20,157	8,337	0	6,086	5,336	23,889	14,423	38,312
1985	8,515	8,568	20,157	8,337	0	6,086	5,642	22,726	14,423	37,149
1986	8,519	17,398	20,157	8,337	0	6,086	10,492	36,409	14,423	50,832
1987	15,041	16,494	20,157	8,337	0	6,086	9,858	41,393	14,423	55,816
1988	11,514	16,931	20,157	8,337	0	6,086	10,257	38,702	14,423	53,125
1989	16,665	17,520	20,157	8,337	0	6,086	10,551	44,736	14,423	59,160
1990	18,611	14,171	20,157	8,337	0	6,086	8,651	41,433	14,423	55,856
1991	22,114	18,335	20,157	8,337	0	6,086	10,942	51,391	14,423	65,814
1992	23,832	11,901	20,157	8,337	0	6,086	7,779	43,512	14,423	57,935
1993	15,885	15,995	20,157	8,337	0	6,086	9,623	41,503	14,423	55,926
1994	15,895	7,985	20,157	8,337	0	6,086	4,514	28,394	14,423	42,817
1995	25,051	11,871	20,157	8,337	0	6,086	7,456	44,378	14,423	58,801
1996	12,677	11,385	20,157	8,337	0	6,086	7,175	31,236	14,423	45,659
1997	10,593	8,114	20,157	8,337	0	6,086	4,752	23,460	14,423	37,883
1998	10,106	8,114	20,157	8,337	0	6,086	4,752	22,973	14,423	37,396
MAXIMUM	51,713	18,335	20,157	8,337	0	6,086	10,942	77,485	14,423	91,908
MINIMUM	6,917	3,650	20,157	8,337	0	6,086	1,618	12,186	14,423	26,609
AVERAGE	18,515	11,278	20,157	8,337	0	6,086	6,880	36,673	14,423	51,096

	SVP
1950	66,723
1951	57,987
1952	52,729
1953	68,523
1954	70,889
1955	65,714
1956	67,088
1957	52,299
1958	61,376
1959	64,636
1960	68,623
1961	48,003
1962	40,123
1963	38,016
1964	52,526
1965	38,627
1966	64,113
1967	54,513
1968	51,810
1969	57,819
1970	55,768
1971	58,769
1972	62,577
1973	51,429
1974	58,450
1975	54,586
1976	71,673
1977	62,914
1978	58,115
1979	62,960
1980	54,598
1981	68,360
1982	49,185
1983	20,406
1984	30,448
1985	55,063
1986	50,343
1987	71,315
1988	76,184
1989	70,265
1990	65,128
1991	53,433
1992	65,374
1993	48,524
1994	64,909
1995	36,688
1996	50,600
1997	42,001
1998	50,357
AVG	**56,379**

	South Utah County Remaining Project Demand									Nephi / Mona Remaining Project Demand			Elberta / West Mona Remaining Project Demand		Peteetnet Remaining Project Demand		SUMMARY
	HIGHLINE	MAPLETON	LAKESHORE	EASTBENCH	SALEM	SOUTH	SOUTHEAST	WESTFIELD	S. UTAH	NEPHI	MONA	NEPHI/MONA	ELBERTA	WEST MONA	SUMMIT CREEK		
Total Ac	19,940	3,825	4,274	4,251	2,035	6,667	947	6,628	48,567	7,850	4,675	12,525			4630		
Project Ac	18,514	3,673	4,207	4,169	1,936	6,437	914	5,323	45,173	7,850	4,675	12,525			4630		
	acre-feet	acre-feet	acre-feet	acre-feet	acre-feet	acre-feet	acre-feet	acre-feet	TOTALS	acre-feet	acre-feet	TOTALS		TOTALS	acre-feet	TOTALS	TOTALS
1950	7,266	136	2,840	439	100	2,684	377	1,041	14,882	2,650	8,044	10,694		0	7,030	7,030	32,606
1951	7,173	218	3,632	0	35	2,628	470	1,068	15,224	3,673	8,336	12,009		0	7,586	7,586	34,819
1952	3,308	488	1,733	757	0	1,454	694	1,432	9,866	0	5,206	5,206		0	2,571	2,571	17,644
1953	7,063	0	3,092	2,212	0	2,149	446	1,311	16,272	2,203	7,804	10,007		0	5,988	5,988	32,268
1954	11,472	799	5,385	1,605	537	3,725	600	2,219	26,342	5,384	8,793	14,177		0	8,400	8,400	48,919
1955	8,796	142	4,424	592	106	2,360	526	556	17,500	4,364	8,603	12,967		0	7,485	7,485	37,952
1956	10,572	358	3,863	1,559	71	3,091	480	1,328	21,321	4,154	8,465	12,620		0	8,090	8,090	42,031
1957	8,215	1,099	2,543	319	0	1,366	964	2,223	16,729	1,466	6,784	8,249		0	4,545	4,545	29,524
1958	6,212	305	3,211	647	0	1,780	434	931	13,519	2,225	6,844	9,070		0	6,257	6,257	28,845
1959	12,629	1,042	6,111	2,936	595	4,492	787	2,819	31,411	5,503	9,036	14,540		0	9,114	9,114	55,065
1960	11,402	1,109	4,930	1,871	228	3,140	298	2,159	25,136	4,350	8,565	12,915		0	8,134	8,134	46,186
1961	20,213	3,725	7,687	5,220	1,555	6,137	1,185	5,989	51,713	6,875	9,333	16,208		0	9,564	9,564	77,485
1962	17,080	1,569	4,951	2,744	313	3,673	666	2,947	33,942	2,521	7,487	10,008		0	6,475	6,475	50,424
1963	22,434	2,844	5,997	3,824	482	5,069	763	3,647	45,060	3,921	8,268	12,189		0	8,273	8,273	65,522
1964	13,664	2,303	4,723	1,761	48	3,604	714	4,409	31,225	3,265	7,934	11,199		0	6,737	6,737	49,160
1965	10,829	973	3,994	1,018	0	2,769	549	2,784	22,915	1,565	7,410	8,975		0	5,979	5,979	37,869
1966	11,858	1,198	5,237	2,000	197	3,323	495	3,126	27,432	5,570	8,783	14,353		0	8,317	8,317	50,102
1967	7,815	443	3,752	1,341	57	3,140	675	2,571	19,795	2,592	7,939	10,531		0	6,368	6,368	36,693
1968	6,492	285	3,406	359	410	2,228	736	3,291	17,206	1,884	7,355	9,240		0	5,472	5,472	31,918
1969	6,834	735	3,585	489	0	2,880	591	2,240	17,354	2,122	6,860	8,983		0	5,808	5,808	32,144
1970	8,588	114	3,806	728	0	3,135	696	2,717	19,783	2,039	7,449	9,488		0	5,651	5,651	34,922
1971	7,059	447	2,842	334	0	2,280	497	2,306	15,765	2,267	7,611	9,878		0	5,813	5,813	31,456
1972	12,226	881	4,978	1,472	0	3,140	530	3,222	26,448	5,292	8,907	14,199		0	8,499	8,499	49,146
1973	5,185	289	3,388	0	0	2,349	634	1,568	13,413	1,916	6,438	8,354		0	5,100	5,100	26,867
1974	5,774	171	9,750	991	11	2,640	400	1,616	21,351	690	6,568	7,258		0	4,271	4,271	32,881
1975	5,738	2,640	3,879	1,495	568	3,385	458	2,378	20,541	4,868	8,626	13,494		0	8,282	8,282	42,317
1976	9,537	1,098	3,559	548	0	2,731	440	2,276	20,188	6,608	9,297	15,905		0	9,763	9,763	45,856
1977	7,802	127	7,218	3,657	1,497	5,242	1,299	5,566	32,408	1,777	6,669	8,446		0	4,795	4,795	45,650
1978	4,250	242	4,623	367	0	2,366	431	1,622	13,901	3,054	7,733	10,788		0	6,935	6,935	31,624
1979	2,889	0	3,978	456	0	2,863	285	2,039	12,511	0	5,681	5,681		0	3,393	3,393	21,586
1980	4,092	1,750	2,750	324	0	1,882	427	2,365	13,589	5,357	8,952	14,309		0	8,628	8,628	36,526
1981	7,439	10	6,135	1,814	258	3,997	804	3,562	24,019	2,422	6,812	9,234		0	6,160	6,160	39,414
1982	1,696	121	2,246	0	0	1,612	605	2,333	8,613	0	3,650	3,650		0	1,618	1,618	13,881
1983	3,073	0	3,855	1,617	476	3,646	1,383	3,502	17,552	0	4,057	4,057		0	2,236	2,236	23,844
1984	10,309	370	2,577	252	189	2,316	572	3,303	19,888	2,405	6,570	8,975		0	5,336	5,336	34,198
1985	6,390	1,340	1,742	168	123	1,804	855	2,482	14,905	1,936	6,632	8,568		0	5,642	5,642	29,116
1986	11,311	1,696	3,540	75	0	891	654	1,663	19,830	7,853	9,545	17,398		0	10,492	10,492	47,720
1987	11,220	379	6,183	1,998	281	2,925	835	2,440	26,261	7,143	9,350	16,494		0	9,858	9,858	52,612
1988	8,373	0	5,477	858	98	2,162	557	2,362	19,887	7,454	9,477	16,931		0	10,257	10,257	47,075
1989	12,593	700	5,685	3,523	165	3,427	634	2,531	29,258	7,962	9,558	17,520		0	10,551	10,551	57,330
1990	10,598	1,113	6,590	2,636	436	3,697	711	3,428	29,209	5,476	8,696	14,171		0	8,651	8,651	52,031
1991	17,511	3,741	6,418	1,634	400	3,669	876	5,375	39,625	8,650	9,685	18,335		0	10,942	10,942	68,902
1992	11,431	1,454	7,504	4,257	1,273	4,881	685	3,779	35,264	3,890	8,011	11,901		0	7,779	7,779	54,943
1993	12,651	2,808	4,480	1,339	0	3,584	729	2,945	28,536	6,716	9,279	15,995		0	9,623	9,623	54,154
1994	5,892	0	6,029	2,586	631	3,490	628	2,530	21,787	1,103	6,882	7,985		0	4,514	4,514	34,286
1995	16,966	3,356	5,177	2,450	790	6,403	1,035	5,840	42,016	3,743	8,129	11,871		0	7,456	7,456	61,344
1996	10,741	1,140	2,881	1,712	72	2,587	285	4,002	23,418	3,683	7,701	11,385		0	7,175	7,175	41,977
1997	7,251	1,120	3,084	1,290	0	2,378	517	2,205	17,845	1,521	6,593	8,114		0	4,752	4,752	30,711
1998	4,989	1,055	2,090	1,439	94	2,391	1,014	2,024	15,095	1,521	6,593	8,114		0	4,752	4,752	27,962
MAXIMUM	22,434	3,741	9,750	5,220	1,555	6,403	1,383	5,989	51,713	8,650	9,685	18,335		0	10,942	10,942	77,485
MINIMUM	1,696	0	1,733	0	0	891	285	556	8,613	0	3,650	3,650		0	1,618	1,618	13,881
AVERAGE	9,284	978	4,440	1,463	247	3,052	651	2,695	22,811	3,544	7,735	11,278		0	6,880	6,880	40,970

SPANISH FORK CITY EXAMPLE OF HOW AGRICULTURAL CONVERSIONS WERE MADE

Appendix C
Agricultural Conversions

The irrigated lands receive as their principal sources of water supply, storage water from Strawberry Reservoir and direct flow from the Spanish Fork River. The irrigated area in south Utah County is served by the following canal companies.

- Highline Canal
- Mapleton Lateral
- East Bench Canal
- Salem Canal
- Spanish Fork South Canal
- Spanish Fork Southeast Canal
- Spanish Fork Westfield Canal
- Lake Shore Canal

The following steps were undertaken to determine at what future date during the ULS planning horizon of the year 2050 the remaining SVP lands would have a firm water supply. After that date the SVP water could be considered as surplus to the remaining agricultural lands. **As an example, the rate of conversion of agricultural lands to municipal use in the city of Spanish Fork is used to illustrate the analysis.** The following paragraphs describe the steps by which the analysis was conducted. Several tables that accompany this discussion are included as printouts from the spreadsheets. The analysis for the other communities in south Utah County with a significant agricultural component are presented in Appendix D.

- Step 1 - Determine the existing distribution of agricultural lands by cities and canal company.
- Step 2 - Determine the amount of acreage the city could potentially grown onto and the yield in acre-feet per acre of this acreage.
    - Steps 2A and 2B have been superceded.
    - (2A) Determine the acreage under each canal company and city where zoning restrictions would be a constraint to growth
    - (2B) - Determine the projected future yield of agricultural lands urbanized in acre-feet per acre
- Step 3 - Using population projections determine the amount of acreage required for growth.
- Step 4 - Allocate the urbanization of agricultural lands between lands with SVP water and lands with Spanish Fork River water.
    - 4(A) Determine the Portion of Agricultural Lands That Could Possibly be Urbanized
    - 4 (B) Allocate between SVP lands and Spanish Fork River Lands
- Step 5 - Determine the Amount of Water Made Available Through Urbanization
- Step 6 – Determine the Projected Remaining Agricultural Water on Irrigated Lands not Urbanized

- Step 7 - Determine by community and Canal Company the Projected Surplus or deficit in irrigation water supplies
    - (7A) Determine the net irrigation requirement (acre-feet per acre) for agricultural lands
    - (7B) Determine any surplus water from SVP lands as lands under each canal company are urbanized that can be reapplied to the remaining SVP lands which are projected to have irrigation shortages.
- Step 8 - Allocate Surplus SVP water, Groundwater, and Other SVP Non-Canal Water
    - (8A) Determine the amount of groundwater pumping by canal companies
    - (8B) Determine the amount of groundwater pumping within each city's declaration boundary
    - (8C) Determine the amount of SVP water required for lands under no canal company
    - (8D) Determine any surplus or deficit in irrigation water supplies
- Step 9 - Draw conclusions on resulting firm irrigation water supply, need for supplemental irrigation water, and future amount of Spanish Fork River water converted to M&I use.

4.1.1 Step 1 - Determine the Existing Distribution of Agricultural Lands by City and Canal Company

Table 1 contains a reconnaissance level estimate of the canal acreage for the various south Utah County communities that have irrigated acreage.[1] As noted in the report cited in footnote 1, the service boundaries of some irrigation companies includes more than one city area. For example, the Spanish Fork South Field Irrigation Company serves both Spanish Fork City and Salem City. The water supply from an irrigation company is allocated to a city as a fraction of its total delivery quantity, based on the amount of area it serves within a particular city's declaration boundary. The fraction is calculated by dividing the irrigation company's service area, within the city's declaration boundary, by the total service area of the irrigation company.

The following description, from the report cited in footnote 1, of the canal companies with acreage in Spanish Fork City is used for illustration purposes.

> *Spanish Fork South Irrigation Company* - The Spanish Fork South Irrigation Company, commonly known as "Southfield" Irrigation Company, serves irrigated acres in both Spanish Fork City and Salem City. In Spanish Fork it serves approximately 3,056 acres within the Spanish Fork City declaration boundary, which represents about 51 percent of the canals service area. Therefore, it was assumed that 50.93 percent of the canal company's water supply can be allocated to Spanish Fork City.

[1] Source of information on percentages of canal companies within the various south Utah County Communities is the report entitled, "Water Rights Analysis, Future Demands and Needs Inventory", for the South Utah Valley Municipal Water Association, March 1996, prepared by JUB Engineers, Inc.

Table 1
Distribution of Agricultural Acreage

	Total Acres (see footnote 1)	Genola		Mapleton		Payson		Salem		Spanish Fork		Springville		West Mountain		Other Irrigated Lands 4/
		Percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	
Highline Canal	18,514	27.61%	5,112		0	45.88%	8,494	11.92%	2,207	1.17%	217					2,485
Mapleton Canal	3,673		0	98.81%	3,629		0		0	1.19%	44					0
East Bench Canal	4,169		0	23.87%	995		0		0	76.13%	3,174					0
Salem Canal	1,936		0		0	6.98%	135	74.28%	1,438		0					363
Spanish Fork South Canal	6,437		0		0		0	10.18%	655	50.93%	3,278					2,503
Spanish Fork Southeast Canal	914		0		0		0		0	100.00%	914					0
Westfield Canal	5,323		0		0		0		0	100.00%	5,323					0
Lakeshore	4,207		0		0		0		0					75.00%	3155	1,052
South Shore (see footnote 2)	515		0		0		0		0							515
Totals	**45,688**		**5,112**		**4,624**		**8,629**		**4,300**		**12,950**		**Footnote 3**			6,917

Footnote 1 - The total acres for the various canal companies is taken from the Bonneville Unti, Draft Water Supply Appendix, Volume 1, Table 3-14, page 3-29, dated March 1998.

Footnote 2 - In the most recent history about 515 acres of land are now irrigated in South Shore area of West Mountain and Utah Lake

Footnote 3 - Historically 4,500 acres has been irrigated in Springville.

Footnote 4 - Of the 6,917 acres of land the analysis in this report considered that 515 acres from South Shore and 4,500 acres in Springville were part of this remaining amount. By subtracting the lands South Shore and Springville would leave 1,902 acres remaining to be considered in accounting for all irrigated lands. This information is used in determining the rate of conversion of agricultural lands. For example, The amount of SVP that has historically been associated with the Springville area is 4,500 acre-feet. Subtracting the existing SVP M&I of 1,051 acre-feet from this historical irrigation water would leave a balance of 3,449 acre-feet for the irrigated lands in Springville. This amount was used in projecting the amount of agricultual water that is available for conversion and future use on other SVP lands.

Spanish Fork Southeast Irrigation Company - The Spanish Fork Southeast Irrigation Company serves approximately 1,173 acres. All of this acreage is within Spanish Fork City's declaration boundary. Therefore, it is assumed that all (100%) of the canal company's supply can be allocated to the Spanish Fork Area.

East Bench Irrigation Company - The East Bench Irrigation Company serves other communities other than Spanish Fork City. It serves about 2,908 acres within Spanish Fork City's declaration boundary, which is about 76 percent of the total acres served by the East Bench Canal. Therefore, it is assumed that 76 percent of the canal company's water supply can be allocated to Spanish Fork City as these agricultural lands are urbanized.

Spanish Fork Westfield Irrigation Company. The Spanish Fork Westfield Irrigation Company serves about 6,887 acres near Spanish Fork. All of this acreage is within the declaration boundary of Spanish Fork City. Therefore, it is assumed that all of the water supply can be allocated to the Spanish Fork area.

Strawberry Highline Canal Company - The Strawberry Highline Canal company is the largest canal company in south Utah County. However it serves only a very small area of approximately 242 acres within Spanish Fork City's declaration boundary. This 242 acres represents less than 1% of the irrigation company's total acreage. For analysis purposes it was assumed that 1% of water delivered by the Strawberry Highline Canal could be allocated to the Spanish Fork Area.

Mapleton Irrigation Company - The Mapleton Irrigation Company serves primarily the Mapleton and Springville Area. However it does serve about 45 acres within the Spanish Fork City declaration boundary which represents about 1% of the total irrigated acres served by the canal company. Therefore, it is assumed that 1% of the company's irrigation water deliveries can be allocated to the Spanish Fork area as urbanization grows onto the agricultural lands.

4.1.2 Step 2 - Determine the Amount of Acreage the City Could Potentially Grow Onto and the Yield in Acre-Feet per Acre of This Acreage

Four incremental steps under Step 2, with results presented in Tables 2 and 3 were undertaken to determine the amount of acreage the city would potentially grow onto and the projected yield in acre-feet per acre from the agricultural lands that were historically urbanized and those projected for future urbanization. These are:

- Step 2A (Now superceded)
- Step 2 B (Now supercede)
- Step 2 C - Determine the acreage under each canal company and city where zoning restrictions would be a constraint to growth and
- Step 2 D - Determine the projected future yield of agricultural lands urbanized

TABLE 2
SPANISH FORK CITY
(computation of reduction in SVP acres from present M&I)

M&I of	0	equals		divided by	12950	equals		0.00	acre-feet per acre
Corresponding acreage for		0	equals	0	divided by	0.00	equals		0 acres

Note: Table 2 has been superceded and not used in the analysis.

TABLE 3

SPANISH FORK CITY

Amount of Agricultural Acreage City Could Potentially Grow Onto

	Acreage Reduction for M&I		Acreage City Could Potentially Grow Onto			Yield of Water Supply		
	Step 2A & Step 2 B		Step 2 C			Step 2 D		
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
	Canal acreage in City Declaration Boundary	Acreageafter reduction for SVP M&I	% of acreage city could potentially grow on to (information from Spanish Fork City's engineer)	Adjusted acreage	Remaining agriculture lands on which no growth is expected to occur	AverageYear Yield	Historical Year (af/ac)	Projected Future Yield in af/ac
Lands with SVP water								
								Adjusted for Enlarged Strawberry (see footnote 1)
Highline Canal	217	217	100.00%	217	0	325	1.50	1.50
Mapleton Canal	44	44	100.00%	44	0	87	1.98	1.98
East Bench Canal	3,174	3,174	100.00%	3,174	0	4,129	1.30	1.30
Spanish Fork South Canal	3,278	3,278	20.00%	656	2,622	1,602	0.49	0.49
Spanish Fork Southeast Canal	914	914	0.00%	0	914	197	0.22	0.22
Spanish Fork Westfield	5,323	5,323	50.00%	2,662	2,662	2,279	0.43	0.43
	12950	12,950		6,752	6,198	8619	0.67	0.67
Lands with Spanish Fork River water								
								Adjusted for Spanish Fork Average Flow of 46,338 AF (see footnote 2)
Highline Canal	217	217	100.00%	217	0	70	0.32	0.32
Mapleton Canal	44	44	100.00%	44	0	12	0.26	0.26
East Bench Canal	3,174	3,174	100.00%	3174	0	4,553	1.43	1.43
Spanish Fork South Canal	3,278	3,276	20.00%	656	2622	4,922	1.50	1.50
Spanish Fork Southeast Canal	914	914	0.00%	0	914	1,896	2.07	2.07
Spanish Fork Westfield	5,323	5,323	50.00%	2662	2662	12,469	2.34	2.34
	12950	12,950		6752	6198	23921	1.85	1.85
						32540		

Step 2C - Determine the Acreage Under Each Canal Company and City Where Zoning Restrictions would be a Constraint to Growth

The next step in the step-wise procedure was to determine the acreage on which the population of Spanish Fork City could potentially to grow onto. (Note: Results the analysis of Step 2C are presented in Table 4, Columns 3, 4 and 5). A necessary component of this process is working with the local communities concerning their zoning plans and areas of expected growth. From these discussions an estimate of the percentage of growth that would occur on non-agricultural lands and agricultural lands was made. In the case of Spanish Fork, the engineering department, provided an estimate of growth they expect to occur under each of the canal companies within Spanish Fork City's declaration boundary. They information in Table 4 was provided by Spanish Fork City's engineering department.

Table 4
Spanish Fork City
Constraints to Growth on Agricultural Lands
(Source of information: Spanish Fork City Engineering Department)

Canal Company	Percent of the Canal Acreage Located Within the City's Declaration Boundary that the City Could Potentially Grow On To
Highline Canal	100 % of the 217 acres
Mapleton Canal	100% of the 44 acres
Salem Canal	No acreage
East Bench Canal	100% of the 3,174 acres
Spanish Fork South Canal	20% of the 3,278acres
Spanish Fork Southeast Canal	0 % of the 914 acres
Spanish Fork Westfield Canal	50% of the 5,323 acres

This information was used as shown in Table 3 Columns 3, 4 and 5 to determine the adjusted acreage on which growth could occur and the acreage on which growth through zoning restrictions would not occur.

Step 2D - Determine the Projected Future Yield of Agricultural Lands Urbanized in Acre-Feet per Acre

Because of several important factors it was necessary to keep a separate accounting for the Strawberry Valley Project (SVP) water and the Spanish Fork River water. Among these factors are:

(1) The historical dry 1961 dry year yield of the SVP water is 1.01 acre-feet per acre while the corresponding dry year yield of the Spanish Fork River was 0.53 acre-feet per acre.
(2) There are legal restrictions on the future conversion of SVP water. Under these restrictions the SVP water on agricultural lands that become urbanized revert back to the Strawberry Water Users for use on other agricultural lands of the SVP that have remaining irrigation shortages

(3) For the Spanish Fork River, the most likely scenario is that developers would purchase the water rights for new subdivisions and the water would be applied back to these lands for outdoor watering. Therefore this water was included as being available to meet future M&I supplies of the city under which the land is urbanized.
(4) In estimating future irrigation shortages the approach was to use average annual conditions. To do this the yield of the SVP water and the Spanish Fork River water could best be handled in separate accounting. The historical dry year yield was adjusted to replicate an average year yield.

Enlarged Strawberry Reservoir Future Yield in Acre-Feet per Acre. The 1961 historical yield of lands with SVP water are based on records prior to the construction of Soldier Creek Dam which enlarged the capacity of the Strawberry Reservoir to provide a storage facility for Bonneville Unit water. Under future operation of the Strawberry Reservoir the yield of the SVP water will be 61,000 acre-feet. To determine the future yield for irrigation water a conversion factor is required. The enlarged Strawberry Reservoir yield was adjusted by taking the average future yield of 61,000 acre-feet and then subtracting (1) 4% river loss of 2,440 acre-feet , and (2) the 10,177 acre-feet of SVP water that is being used by the cities to get a net yield of 48,363 acre-feet of water that is projected to be available on an average annual basis to provide water to SVP irrigated lands.

4.1.4 Step 3 - Using Population Projections Determine the Amount of Acreage Required for Growth

Step 3 A -

In computing the acreage required for growth of Spanish Fork City is was assumed that growth would require approximately 1 acre for each increase in population of 9 people. It should be noted, that for early planning purposes the value of 6 people acre was used in the analysis in the Draft Plan Formulation Report of February 2002. The Utah Division of Water Resources uses 9 people were acre in Utah County in their modeling. In this revised assessment of M&I needs the value of 9 was used to be consistent with the State of Utah. Refer to Table 5 for information on the acreage required for urban growth for the time periods of 2010, 2020, 2030, 2040, and 2050.

TABLE 5
SPANISH FORK CITY
(COMPUTATION OF RATE OF URBANIZATION OF AGRICULTURAL LANDS)

		2000	2010	2020	2030	2040	2050
Population		20,246	27,693	32,745	35,771	50,900	66,028
Declaration Boundary (acres)	17,881						
Existing Size of City (acres)	8,102						
Historical Irrigated acreage	12,950						
Project Land Acreage for growth			827	1,389	1,725	3,406	5,087
Percent on agricultural lands	72%						
Incremental agricultural			595	562	336	1,681	1,681
Cumulative agricultural			595	1,157	1,493	3,174	4,855

Step 3B - Determine the Portion of Agricultural Lands That Could Possibly Be Urbanized

In lieu of any detailed urban planning computerized model, it appears that a rational approach would be to take the percentage of the agricultural land to the total declaration boundary as the percentage of agricultural lands that could be urbanized. The assumptions for each the communities are presented in Table 6. For Spanish Fork City the irrigated acreage is 12,950 acres and the total declaration boundary is 17,881 acres. By dividing 12,950 acres by the 17,881 acres for the declaration boundary a percentage of 72% is arrived at. This percentage was then multiplied by the land requirements computed in Step 3 A to support the projected population growth shown in Table 5. For example, from Table 5 at year 2010 the total is 827 acres. This value time 72% equals 659 acres of agricultural lands that are projected for future urbanization.

TABLE 6
PERCENTAGE OF GROWTH
BETWEEN AGRICULTURAL AND NON-AGRICULTURAL LANDS

Community	Percentage of Growth on Mixture of agricultural and non-Agricultural Lands	Percentage of Growth on Agricultural Lands
Genola	49%	51%
Mapleton	41%	59%
Payson	65%	35%
Salem	60%	40%
Spanish Fork	28%	72%
Springville	61%	37%
West Mountain	58%	42%

4.1.5 Step 4 - Allocate the Urbanization of Agricultural Lands Between Lands with SVP Water and Lands with Spanish Fork River Water.

As stated previously, because the yield of the water supply from Strawberry Reservoir and the Spanish Fork River are different it is necessary in the analysis to keep a separate accounting.

The information generated in previous steps is a constraint to the amount of urbanization that could occur on irrigated lands. For example, the total lands urbanized under the Mapleton Canal could not exceed the 44 acres (see Table 3, column 4). Because of the commingling of agricultural lands that use SVP water and Spanish Fork River water and the absence of any other available mathematical approach it was assumed for this illustrative example of Spanish Fork City that for the 72% growth onto agricultural lands that 60% of the growth would be on lands with SVP water and 40% on lands with Spanish Fork River water. This distribution is different for the various communities that have agricultural lands. Table 7 shows this distribution. The

results of the analytical analysis for the rate of urbanization for Spanish Fork City are shown in Table 8.

TABLE 7
ASSUMED PERCENTAGES OF GROWTH
BETWEEN SVP LANDS AND SPANISH FORK RIVER LANDS

	Percent of Growth on SVP Lands	Percent of Growth On Lands with Spanish Fork River Water
Genola	90%	10%
Mapleton	90%	10%
Payson	90%	10%
Salem	50%	50%
Spanish Fork	60%	40%
Springville	60%	40% 1/
West Mountain	50%	50%

1/ The 40% in Springville is Hobble Creek water instead of Spanish Fork River water.

4.1.6 Step 5 - Determine the Amount of Water Made Available Through Urbanization

The calculation of amount of water made available through urbanization and shown is Table 9 is a straight-forward calculation using the agricultural acres urbanized in Table 8 and the adjusted future yield in acre-feet per acre in Table 3, Column 9.

Urbanization of SVP Water. As an example, using the 159 acres projected for urbanization for the Spanish Fork Westfield Canal at the year 2020 under the land with SVP water multiplied times the average year yield of 0.43 acre-feet per acre from Table 3, Column 8 results in 68 acre-feet of SVP water as shown in Table 9.

Urbanization of Spanish Fork River Water. Since the yield of the Spanish Fork River is substantially more at 2.34 (from Table 3, Column 8) acre-feet per acre the yield is 557 acre-feet as shown in Table 9 at year 2020 for the Spanish Fork Westfield Canal. As stated earlier it was assumed that a likely scenario for lands with Spanish Fork River water that are urbanized the water associated with the lands would remain on the land as a future water supply for outdoor use. The calculations in this table are an input to the water demand sheets in Appendix D.

Water Demand Sheets. Continuing with Spanish Fork City as an example, the following projected amounts of water (from Table 9) made available by urbanization of lands with Spanish Fork River water are entered into the computations for the Spanish Fork City Water Demand Sheet on the following page in Table 10.

Table 8

SPANISH FORK CITY

Projected Urbanization of Agricultural Lands by Canal Company

(Units in Acres)

(For Analysis Purposes the Growth Was Apportioned

To Be 40% on Lands with SVP Water and 60% To Lands with Spanish Fork River Water)

SVP %	0.40	Spanish Fork	0.60				
Lands with SVP water 1/		**Portion of Lands Converted with SVP water (in acres)**					
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		8	13	16	32	47
Mapleton Canal		2	3	3	6	10
East Bench Canal		113	189	235	464	693
Spanish Fork South Canal		23	39	49	96	143
Spanish Fork Southeast Canal		0	0	0	0	0
Spanish Fork Westfield		94	159	197	389	581
	Subtotal	***240***	***402***	***500***	***987***	***1,474***
Lands with Spanish Fork River water 2		**Portion of Lands Converted with Spanish Fork River water (in acres)**				
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		12	19	24	48	71
Mapleton Canal		2	4	5	10	14
East Bench Canal		169	284	352	696	1,039
Spanish Fork South Canal		35	59	73	144	215
Spanish Fork Southeast Canal		0	0	0	0	0
Spanish Fork Westfield		142	238	295	583	871
	Subtotal	***300***	***503***	***750***	***1,480***	***2,210***
	Total acres urbanized	**539**	**905**	**1,249**	**2,467**	**3,684**

1/ SVP water that becomes available becomes supplemental irrigation water. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 9

SPANISH FORK CITY

Projected Amount of Agricultural Water Resulting from Urbanization

Lands with SVP water 1/	SVP water (in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		12	19	24	47	71
Mapleton Canal		3	5	6	13	19
East Bench Canal		147	246	306	603	901
Spanish Fork South Canal		11	19	24	47	70
Spanish Fork Southeast Canal		0	0	0	0	0
Spanish Fork Westfield		40	68	84	167	249
	Subtotal	**213**	**358**	**444**	**877**	**1310**
Lands with Spanish Fork River water 2/	**Spanish Fork River water (in acres)**					
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		4	6	8	15	23
Mapleton Canal		1	1	1	3	4
East Bench Canal		242	407	505	998	1490
Spanish Fork South Canal		52	88	109	216	322
Spanish Fork Southeast Canal		0	0	0	0	0
Spanish Fork Westfield		332	557	692	1367	2041
	Subtotal	**631**	**1059**	**1316**	**2598**	**3880**
	Total (acre-feet)	**844**	**1417**	**1760**	**3475**	**5190**

Table 10
Spanish Fork

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 17,881 acres (from Brown & Caldwell Report, Table 2, September 1999) Irrigated acres = 14,226acres (from JUB Report, Table 4, March 1996)						
Population Projections (State of Utah - Office of Planning and Budget)	20,246	27,693	32,745	35,771	50,900	66,028
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050) but limited to 190 gpcd						
Acre-feet/capita/year[1]	0.261	0.258	0.254	0.251	0.248	0.246
Acre-feet/year[2]	5,284	7,135	8,327	8,976	12,601	16,272
Total Water Use Gallons per capita per day[3]	233	230	227	224	221	220
Potable Demand (gpcd)	203	195	187	179	171	165
Indoor demand[4]	78	77	76	75	74	73
Outdoor demand[4]	75	70	65	60	55	52
Institutional, Commercial, and Industrial[4]	50	48	46	44	42	40
Non-potable outdoor demand in gpcd[5]	30	35	40	45	50	55

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Springs[6]	1,591		dry yr. yield	1,591		0
Subtotal		1,591				
Spring Creek[6]	4,691			4,691		0
Subtotal		4,691				
Groundwater Wells[7]	10,467			10,467		0
Subtotal		10,467				
South Utah Valley Municipal Water Association (SUVMW)[8]						
Share of SUVMWA purchased water from East/South Jordan Canal Company	108.0		108.0		0.0	
Share of SUVMWA CUP M&I	429.3		429.3		0.0	
Subtotal		537		537		0
SVP water[9]						
Highline Canal	219		219		0	
Mapleton Canal	48		48		0	
East Bench Canal	2,016		2,016		0	
Spanish Fork South Canal (20% of 1,045[9])	137		137		0	
Southeast Canal (City will not expand onto this land[9a])	0		0		0	
Westfield (80% of 1,920[9b])	1,001		1,001		0	
Subtotal		3,421		3,421		0
Spanish Fork River water[9]						
Highline Canal	6		0		6	
Mapleton Canal	0		0		0	
East Bench Canal	626		626		0	
Spanish Fork South Canal (20% of 2,268)[10a]	227		144		83	
Southeast Canal (city will not expand onto this land[10a]	0		0		0	
Westfield (80% of 8,390 - see footnote 10a)	3,356		100		3,256	
Subtotal	8,429	4,215		870		3,345
Spring Exchange Water[11]						
Mill Race Exchange	238		238		0	
Malcolm Stream	635		635		0	
Spanish Fork City (SVP water)	0		0			
Subtotal	1,745	873		873		0
Total		25,794		22,450		3,345
Potential Agricultural Conversion Assuming 1 Acre per 9 People Converted	SVP Yield in acre-feet per acre[12]		0.000	Spanish Fork River Yield in acre-feet per acre[13]		
SVP water[14]	0	0	0	0	0	0
Spanish Fork River water[14]	0	533	895	1,111	2,195	3,278

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

Potable demand in acre-feet	4,604	6,049	6,859	7,173	9,750	12,204
Springs	1,591	1,591	1,591	1,591	1,591	1,591
Spring Creek	3,013	4,458	4,691	4,691	4,691	4,691
Groundwater wells	0	0	577	891	3,468	5,922
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Non-potable demand in acre-feet	680	1,086	1,467	1,803	2,851	4,068
Springs	0	0	0	0	0	0
Spring Creek	0	0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
SUVMWA	537	537	537	537	537	537
SVP water	0	0	0	0	6	440
Spanish Fork River water	143	549	930	1,266	1,930	2,218
Local front streams	0	0	0	0	378	873
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
SVP Water	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0
Total New Supplies Developed	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	20,510	18,659	18,045	17,709	16,661	15,444
Unavailable Agricultural Water Within Declaration Boundary	3,345	2,812	2,450	2,234	1,150	67

Year	Projected Amount of Converted Spanish Fork River Water
2010	533 acre-feet
2020	895 acre-feet
2030	1,111 acre-feet
2040	2,195 acre-feet
2050	3,278 acre-feet

4.1.7 Step 6 - Determine the Projected Remaining Agricultural Water on Irrigated Lands not Urbanized

For example, using Spanish Fork South Canal as an example the remaining agricultural water on lands not urbanized on lands with SVP water is the adjusted acreage in Table 3, Column 4 of 656 acres plus the 2,622 acres (Table 3, Column 5) of agricultural lands on which no growth will occur due to zoning restrictions minus the agricultural lands converted in Table 8 at year 2030 of 39 acres times the enlarged Strawberry Reservoir yield of 0.49 acre-feet per acre equals 1,578 acre-feet. Results of the projected remaining agricultural water on lands not urbanized are presented in Table 11.

4.1.8 Step 7 - Determine by Community and Canal Company the Projected Surplus or Deficit in Irrigation Water Supplies on Remaining Agricultural Lands

The assumption as stated previously was that the SVP lands would become supplemental irrigation water for use on other SVP lands while the water from the Spanish Fork River lands would in all likelihood be purchased by developers who were constructing housing in these newly urbanized lands

The projected remaining agricultural water supply is based upon the following:

(1) the enlarged Strawberry Reservoir average annual yield of 61,000 acre-feet reduced by 4% river loss of 2,440 acre-feet and 10,177 acre-feet of SVP M&I for an adjusted average annual yield of 48,363 acre-feet; and
(2) the average annual yield of the Spanish Fork River of 49,000 acre-feet adjusted by the amount that is outside the ideal irrigation diversion requirement to arrive at an annual average of 46,338 acre-feet. This amount was reduced over time by the amount of lands urbanized which were allocated in Step 5, Tables 8 and 9, to the Spanish Fork River.

As a necessary step in determining the capability of these remaining water supplies to meet demands the irrigation diversion requirement in acre-feet per acre was determined.

Step 7 A - Determine the Net Irrigation Requirement in Acre-Feet per Acre for Agricultural Lands

There exists substantial information in south Utah County on the crop consumptive use and other factors such as effective precipitation, groundwater contribution, and irrigation efficiency which

Table 11
SPANISH FORK CITY
Projected Remaining Agricultural Water on Lands Not Urbanized

Lands with SVP water 1/	Remaining SVP Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		313	306	301	278	254
Mapleton Canal		84	82	81	74	68
East Bench Canal		3982	3883	3823	3526	3228
Spanish Fork South Canal		1591	1583	1578	1555	1532
Spanish Fork Southeast Canal		197	197	197	197	197
Spanish Fork Westfield		2239	2211	2195	2112	2030
	Subtotal	***8406***	***8261***	***8175***	***7742***	***7309***

Lands with Spanish Fork River water 2/	Remaining Spanish Fork River Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		66	64	62	55	47
Mapleton Canal		11	11	10	9	8
East Bench Canal		4310	4146	4047	3555	3062
Spanish Fork South Canal		4870	4834	4813	4707	4600
Spanish Fork Southeast Canal		1896	1896	1896	1896	1896
Spanish Fork Westfield		12137	11912	11777	11102	10428
	Subtotal	***23290***	***22862***	***22606***	***21323***	***20041***
	Total (acre-feet)	**31696**	**31124**	**30780**	**29065**	**27350**

when combined correctly determines the net irrigation delivery requirement to meet the crop needs. [2]

Under present conditions there are significant areas of groundwater contribution to the crop consumptive use in the irrigated lands in south Utah County. However there is expected to be less groundwater contribution with time as irrigated lands are urbanized and the cities continue to increase significantly their groundwater pumping to meet future M&I needs. For the analysis of projecting the future irrigation needs and any resulting surplus of deficit in SVP water supplies for irrigation the approach was adopted to show full utilization of groundwater contribution at the present time of 0.26 acre-feet per acre and by the year 2050 the groundwater contribution of the equation for computing net irrigation requirement would be reduced to 0.13 acre-feet per acre at the year 2050. Table 12 contains the net irrigation water requirement for each of the canals.

TABLE 12
VARIATION IN NET IRRIGATION REQUIREMENT OVER TIME
(UNITS: ACRE-FEET PER ACRE)

Canal	2010	2020	2030	2040	2050
Highline Canal	2.90	2.96	2.96	2.99	3.02
Mapleton Canal 1/	3.36	3.36	3.36	3.36	3.36
Salem Canal	2.88	2.93	2.97	3.02	3.06
East Bench Canal 1/	3.31	3.31	3.31	3.31	3.31
Spanish Fork South Canal	2.58	2.71	2.83	2.96	3.08
Spanish Fork Southeast Canal	2.58	2.71	2.83	2.96	3.08
Spanish Fork Westfield	2.58	2.71	2.83	2.96	3.08
Lakeshore Canal	2.58	2.71	2.83	2.96	3.08
Average	2.85	2.93	2.99	3.06	3.13

1/ Mapleton Canal and East Bench Canal do not have a groundwater contribution to the crop consumptive use. Therefore the net irrigation requirement for the crop does not change over time.

Step 7 C - Determine Surplus Water from SVP lands as lands under each canal company are urbanized that can be reapplied to Remaining SVP land which are projected to have irrigation shortages

Table 13 for Spanish Fork City has the purpose of determining for each of the canals the amount of surplus or deficit in SVP water supply. Using as an example the East Bench Canal the amount of surplus SVP water is 186 acre-feet at the year 2030.

Table 14 is an overall summary for Spanish Fork City. For example, it shows a surplus of SVP water of 495 acre-feet at year 2050 that can be used on other SVP agricultural lands.

[2] Source of information on crop consumptive use, effective precipitation, groundwater contribution, and irrigation efficiency are contained in Bonneville Unit Draft Water Supply Appendix, Volume 1 – Text, March 1998.

Table 13
SPANISH FORK CITY
Projected Surplus of Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Highline Canal					
Remaining agricultural Land (acres)	198	185	177	138	99
Water Diversion Requirement in acre-feet acre	2.90	2.93	2.96	2.99	3.02
Water Demand	573	541	523	412	298
Water Supply					
SVP Water from Urbanization	12	19	24	47	71
Local supplies	40	40	40	40	40
Groundwater	61	61	61	61	61
Remaining SVP Agricultal Water	313	306	301	278	254
Remaining Spanish Fork River Agricultural Water	66	64	62	55	47
Surplus of Deficit in Agricultural Water	-81	-51	-35	69	176
Mapleton Canal					
Remaining agricultural Land	40	37	36	28	20
Water Diversion Requirement in acre-feet acre	3.36	3.36	3.36	3.36	3.36
Water Demand	135	126	121	94	67
Water Supply					
SVP Water from Urbanization	3	5	6	13	19
Local supplies	38	38	38	38	38
Groundwater	5	5	5	5	5
Remaining SVP Agricultal Water	84	82	81	74	68
Remaining Spanish Fork River Agricultural Water	11	11	10	9	8
Surplus of Deficit in Agricultural Water	6	15	20	45	71
East Bench Canal					
Remaining agricultural Land	2,892	2,701	2,587	2,014	1,442
Water Diversion Requirement in acre-feet acre	3.31	3.31	3.31	3.31	3.31
Water Demand	9,579	8,946	8,567	6,672	4,777
Water Supply					
SVP Water from Urbanization	147	246	306	603	901
Local supplies	0	0	0	0	0
Groundwater	457	457	457	457	457
Remaining SVP Agricultal Water	3,982	3,883	3,823	3,526	3,228
Remaining Spanish Fork River Agricultural Water	4,310	4,146	4,047	3,555	3,062
Surplus of Deficit in Agricultural Water	-683	-215	66	1,469	2,871

Table 13 (continued)
SPANISH FORK CITY
Projected Surplus of Deficit on Remaining Agricultural Lands

CANALS	2010	2020	2030	2040	2050
Spanish Fork South Canal					
Remaining agricultural Land	5,723	5,684	5,660	5,542	5,424
Water Diversion Requirement in acre-feet acre	2.58	2.71	2.83	2.96	3.08
Water Demand	14,766	15,374	16,018	16,376	16,705
Water Supply					
SVP Water from Urbanization	11	19	24	47	70
Local supplies	0	0	0	0	0
Groundwater	1,258	1,258	1,258	1,258	1,258
Remaining SVP Agricultal Water	2,814	2,806	2,802	2,779	2,756
Remaining Spanish Fork River Agricultural Water	8,629	8,593	8,572	8,465	8,359
Surplus of Deficit in Agricultural Water	-2,054	-2,698	-3,363	-3,827	-4,263
Spanish Fork Southeast Canal					
Remaining agricultural Land	914	914	914	914	914
Water Diversion Requirement in acre-feet acre	2.58	2.71	2.83	2.96	3.08
Water Demand	2,358	2,472	2,587	2,701	2,815
Water Supply					
SVP Water from Urbanization	0	0	0	0	0
Local supplies	0	0	0	0	0
Groundwater	180	180	180	180	180
Remaining SVP Agricultal Water	197	197	197	197	197
Remaining Spanish Fork River Agricultural Water	1,896	1,896	1,896	1,896	1,896
Surplus of Deficit in Agricultural Water	-85	-199	-314	-428	-542
Spanish Fork Westfield Canal					
Remaining agricultural Land	5,087	4,927	4,831	4,351	3,871
Water Diversion Requirement in acre-feet acre	2.58	2.71	2.83	2.96	3.08
Water Demand	13,124	13,326	13,670	12,856	11,922
Water Supply					
SVP Water from Urbanization	40	68	84	167	249
L:ocal supplies	0	0	0	0	0
Groundwater	1,330	1,330	1,330	1,330	1,330
Remaining SVP Agricultal Water	2,239	2,211	2,195	2,112	2,030
Remaining Spanish Fork River Agricultural Water	12,137	11,912	11,777	11,102	10,428
Surplus of Deficit in Agricultural Water	2,622	2,194	1,715	1,855	2,115

Table 14
SPANISH FORK CITY
Summary Table

	2,010	2,020	2,030	2,040	2,050
Remaining Lands in acres with SVP Water in Spanish Fork	14,854	14,448	14,204	12,987	11,769
Water Diversion Requirement in acre-feet acre					
Water Demand	40,401	40,661	41,366	39,017	36,516
Water Supply					
SVP Water from Urbanization	213	358	444	877	1,310
Local supplies	78	78	78	78	78
Groundwater	3,291	3,291	3,291	3,291	3,291
Remaining SVP Agricultal Water	9,629	9,485	9,398	8,966	8,533
Remaining Spanish Fork River Agricultural Water	27,049	26,621	26,364	25,082	23,800
Surplus of Deficit in Agricultural Water	-140	-828	-1,790	-723	495
SVP Water that could be used on other SVP lands	0	0	0	0	495

SOUTHERN UTAH COUNTY SUPPORTING DATA ON AGRICULTURAL CONVERSIONS

GENOLA

Table 1
Distribution of Agricultural Acreage

	Total Acres (see footnote 1)	Genola		Mapleton		Payson		Salem		Spanish Fork		Springville		West Mountain		Other Irrigated Lands 4/
		Percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	
Highline Canal	18,514	27.61%	5,112		0	45.88%	8,494	11.92%	2,207	1.17%	217					2,485
Mapleton Canal	3,673		0	98.81%	3,629		0		0	1.19%	44					0
East Bench Canal	4,169		0	23.87%	995		0		0	76.13%	3,174					0
Salem Canal	1,936		0		0	6.98%	135	74.28%	1,438		0					363
Spanish Fork South Canal	6,437		0		0		0	10.18%	655	50.93%	3,278					2,503
Spanish Fork Southeast Canal	914		0		0		0		0	100.00%	914					0
Westfield Canal	5,323		0		0		0		0	100.00%	5,323					0
Lakeshore	4,207		0		0		0		0					75.00%	3155	1,052
South Shore (see footnote 2)	515		0		0		0		0							515
Totals	**45,688**		**5,112**		**4,624**		**8,629**		**4,300**		**12,950**	Footnote 3				6,917

Footnote 1 - The total acres for the various canal companies is taken from the Bonneville Unit, Draft Water Supply Appendix, Volume 1, Table 3-14, page 3-29, dated March 1998.

Footnote 2 - In the most recent history about 515 acres of land are now irrigated in South Shore area of West Mountain and Utah Lake

Footnote 3 - Historically 4,500 acres has been irrigated in Springville.

Footnote 4 - Of the 6,917 acres of land the analysis in this report considered that 515 acres from South Shore and 4,500 acres in Springville were part of this remaining amount. By subtracting the lands South Shore and Springville would leave 1,902 acres remaining to be considered in accounting for all irrigated lands. This information is used in determining the rate of conversion of agricultural lands. For example, The amount of SVP that has historically been associated with the Springville area is 4,500 acre-feet. Subtracting the existing SVP M&I of 1,051 acre-feet from this historical irrigation water would leave a balance of 3,449 acre-feet for the irrigated lands in Springville. This amount was used in projecting the amount of agricultual water that is available for conversion and future use on other SVP lands.

TABLE 2
GENOLA
(Computation of Reduction in SVP Acres From Present Conversion to M&I)

Yield of	0	equals	9318.9272	divided by	5112	equals	1.82	acre-feet per acre
Corresponding acreage for		0	equals	0	divided t	1.82	equals	0

TABLE 3
GENOLA
Amount of Agricultural Acreage City Expected to Grown Onto

	Acreage Reduction for M&I			Acreage City Expected to Grown Onto			Yield of Water Supply		
	Canal acreage in City Declaration Boundary	Acreageafter reduction for SVP M&I		% of acreage city expected to grow on to	Adjusted acreage	Remaining agriculture lands on which no growth is expected to occur	1961 DryYear Yield	Yield af/ac	Adjusted
Lands with SVP water									1.34
Highline Canal	5,112	5,112		20.00%	1,022	4,090	7,669	1.50	1.50
Mapleton Canal	0	0		0.00%	0	0	0	0.00	0.00
East Bench Canal	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork South Canal (20%)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Southeast Canal (city will not expand onto this)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Westfield (50%)	0	0		0.00%	0	0	0	0.00	0.00
	5112	5,112			1,022	4,090	7,669	1.50	1.50
Lands with Spanish Fork River water									3.15
Highline Canal	5,112	5,112		20.00%	1022	4090	1,650	0.32	0.32
Mapleton Canal	0	0		0.00%	0	0	0	0.00	0.00
East Bench Canal	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork South Canal (20%)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Southeast Canal (city will not expand onto this)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Westfield (50%)	0	0		0.00%	0	0	0	0.00	0.00
	5112	5,112			1022	4090	1,650	0.32	0.32
							9,319		

Table 4
Genola

		2000	2010	2020	2030	2040	2050
Population		965	1,565	2,392	4,744	11,467	18,191
Declaration Boundary Acreage	**10,000**						
Existing Size of City Boundary in Acres	**1,000**						
Historcial Irrigated Acreage in Delcaration Boundary	**5,112**						
Land required for new growth (at 9 people per acre)							
(Assume 20% of growth will be on irrigated agricultural)	**0.51**						
Incremental acreage			34	47	134	382	382
Cumulative acreage			34	81	215	597	978

Table 5

GENOLA

Projected Agricultural Lands Urbanized by Canal Company

(Units in Acres)

(For Analysis Purposes the Growth Was Apportioned

To Be 90% on Lands with SVP Water and 10% to Lands with Spanish Fork River Water

SVP % 0.9 Spanish Fork % 0.1

Lands with SVP water 1/	**Portion of Lands Converted with SVP water (in acres)**					
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		31	73	193	537	881
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	***31***	***73***	***193***	***537***	***881***
Lands with Spanish Fork River water 2/	**Portion of Lands Converted with Spanish Fork River water (in acres)**					
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		3	8	21	60	98
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	***3***	***8***	***21***	***60***	***98***
	Total acres urbanized	**34**	**81**	**215**	**597**	**978**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 6

GENOLA

Projected Amount of Agricultural Water Resulting from Urbanization

(Yield in Acre-Feet Using Unit Yield in Acre-Feet Per Acre During Dry Year (1961))

Lands with SVP water 1/	SVP water (in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		46	109	290	805	1321
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	46	109	290	805	1321
Lands with Spanish Fork River water 2/	**Spanish Fork River water (in acres)**					
		2010	2020	2030	2040	2050
Highline Canal		1	3	7	19	32
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	1	3	7	19	32
	Total (acre-feet)	**47**	**112**	**297**	**825**	**1353**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 7
GENOLA
Remaining Agricultural Water on Lands Not Urbanized

(Remaining Agricultural Water equals the 1961 Dry Year Yield of 19,968 acre-feet minus the 3,417 AF of SVP M&I minus the Agricultural Conversion shown in Table 4)

Lands with SVP water 1/	Remaining SVP Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		7623	7559	7379	6863	6348
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	*7623*	*7559*	*7379*	*6863*	*6348*

Lands with Spanish Fork River water 2/	Remaining Spanish Fork River Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		1649	1648	1643	1631	1619
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	*1649*	*1648*	*1643*	*1631*	*1619*
	Total (acre-feet)	**9272**	**9207**	**9022**	**8494**	**7966**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 8
GENOLA
Surplus of Deficit on Remaining Agricultural Lands

CANALS	2010	2020	2030	2040	2050
Highline Canal					
Remaining agricultural Land (acres)	5,078	5,031	4,897	4,515	4,134
Water Diversion Requirement of 3.33 acre-feet acre	2.90	2.93	2.96	2.99	3.02
Water Demand	14,726	14,741	14,496	13,501	12,483
Water Supply					
SVP Water from Table 4	46	109	290	805	1,321
Remaining SVP Water (from Table 5)	7,623	7,559	7,379	6,863	6,348
Remaining Spanish Fork River (from Table 5)	1,649	1,648	1,643	1,631	1,619
Surplus of Deficit	-5,408	-5,424	-5,184	-4,202	-3,196
Mapleton Canal					
East Bench Canal					

Table 8 (Continued)
GENOLA
Surplus of Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Spanish Fork South Canal					
Spanish Fork Southeast Canal					
Spanish Fork Westfield Canal					

Table 9
Summary Table
GENOLA

	2,010	2,020	2,030	2,040	2,050
Remaining Agricultural Acreage	5,078	5,031	4,897	4,515	4,134
Water Diversion Requirement of 3.33 acre-feet acre	2.90	2.93	2.96	2.99	3.02
Water Demand	14,726	14,741	14,496	13,501	12,483
Water Supply					
SVP Water from Table 4	46	109	290	805	1,321
Remaining SVP Water (from Table 5)	7,623	7,559	7,379	6,863	6,348
Remaining Spanish Fork River (from Table 5)	1,649	1,648	1,643	1,631	1,619
Surplus of Deficit	-5,408	-5,424	-5,184	-4,202	-3,196
SVP Water that could be used on other SVP lands	0	0	0	0	0

MAPLETON

Table 1
Distribution of Agricultural Acreage

	Total Acres (see footnote 1)	Genola		Mapleton		Payson		Salem		Spanish Fork		Springville		West Mountain		Other Irrigated Lands 4/
		Percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	
Highline Canal	18,514	27.61%	5,112		0	45.88%	8,494	11.92%	2,207	1.17%	217					2,485
Mapleton Canal	3,673		0	98.81%	3,629		0		0	1.19%	44					0
East Bench Canal	4,169		0	23.87%	995		0		0	76.13%	3,174					0
Salem Canal	1,936		0		0	6.98%	135	74.28%	1,438		0					363
Spanish Fork South Canal	6,437		0		0		0	10.18%	655	50.93%	3,278					2,503
Spanish Fork Southeast Canal	914		0		0		0		0	100.00%	914					0
Westfield Canal	5,323		0		0		0		0	100.00%	5,323					0
Lakeshore	4,207		0		0		0		0					75.00%	3155	1,052
South Shore (see footnote 2)	515		0		0		0		0							515
Totals	**45,688**		**5,112**		**4,624**		**8,629**		**4,300**		**12,950**	Footnote 3				6,917

Footnote 1 - The total acres for the various canal companies is taken from the Bonneville Unit, Draft Water Supply Appendix, Volume 1, Table 3-14, page 3-29, dated March 1998.

Footnote 2 - In the most recent history about 515 acres of land are now irrigated in South Shore area of West Mountain and Utah Lake

Footnote 3 - Historically 4,500 acres has been irrigated in Springville.

Footnote 4 - Of the 6,917 acres of land the analysis in this report considered that 515 acres from South Shore and 4,500 acres in Springville were part of this remaining amount. By subtracting the lands South Shore and Springville would leave 1,902 acres remaining to be considered in accounting for all irrigated lands. This information is used in determining the rate of conversion of agricultural lands. For example, The amount of SVP that has historically been associated with the Springville area is 4,500 acre-feet. Subtracting the existing SVP M&I of 1,051 acre-feet from this historical irrigation water would leave a balance of 3,449 acre-feet for the irrigated lands in Springville. This amount was used in projecting the amount of agricultual water that is available for conversion and future use on other SVP lands.

TABLE 2
MAPLETON CITY
(Computation of reduction of SVP acres from Present SVP M&I)

Yield of	0	equals	6754.9701 divided by		4624	equal	1.46	acre-feet per acre
Corresponding acreage for		0	equa	0	divide	1.46	equals	0

TABLE 3
MAPLETON CITY
Amount of Agricultural Acreage City Projected to Grow Onto

	Acreage Reduction of SVP M&I			Acreage City Expected to Grown Onto			Yield of Water Supply		
	Canal acreage in City Declaration Boundary	Acreageafter reduction for SVP M&I		% of acreage city expected to grow on to	Adjusted acreage	Remaining agriculture lands on which no growth is expected to occur	Average Year Yield	Yield af/ac	
Lands with SVP water									
Highline Canal	0	0		0.00%	0	0	0	0.00	0.00
Mapleton	3,629	3,629		75.00%	2,722	907	4,010	1.10	1.10
East Bench Canal	995	995		75.00%	746	249	1,294	1.30	1.30
Spanish Fork South Canal (20%)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Southeast Canal (city will not expand onto this)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Westfield (50%)	0	0		0.00%	0	0	0	0.00	0.00
	4624	4,624			3,468	1,156	5304	1.15	1.15
Lands with Spanish Fork River water									
Highline Canal	0	0		75.00%	0	0	0	0.00	0.00
Mapleton	3,629	3,629		75.00%	2722	907	529	0.15	0.15
East Bench Canal	995	995		0.00%	0	995	922	0.93	0.93
Spanish Fork South Canal (20%)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Southeast Canal (city will not expand onto this)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Westfield (50%)	0	0		0.00%	0	0	0	0.00	0.00
	4624	4,624			2722	1902	1451	0.31	0.31
							6755		

TA BLE 4
MAPLETON CITY
(Computation of Rate of Urbanization of Agricultural Lands

		2000	2010	2020	2030	2040	2050
Population		5,809	9,403	14,928	20,990	27,507	34,024
Declaration Boundary Acreage	**7,817**						
Existing Size of City Boundary in Acres	**6,701**						
Historcial Irrigated Acreage in Delcaration Boundary	**4,624**						
Land required for new growth (at 6 people per acre)							
Assume % of future growth on irrigated lands	**0.59**						
Incremental Agricultural acreage			236	363	398	428	428
Cumulative Agricultural acreage			236	599	998	1,426	1,854

TABLE 5

MAPLETON CITY

Projected Agricultural Lands Urbanized Under Canal Company

(Units in Acres)

(For Analysis Purposes the Growth Was Apportioned

To Be 90% on Lands with SVP Water and 10% To Lands with Spanish Fork River Water)

	SVP	0.9		Spanish Fork	0.1	
Lands with SVP water 1/	**Portion of Lands Converted with SVP water (in acres)**					
		2010	2020	2030	2040	2050
Highline Canal		0	0	0	0	0
Mapleton		167	423	705	1,007	1,310
East Bench Canal		46	116	193	276	359
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***213***	***539***	***898***	***1,284***	***1,669***
Lands with Spanish Fork River water 2/	**Portion of Lands Converted with Spanish Fork River water (in acres)**					
		2010	2020	2030	2040	2050
Highline Canal		0	0	0	0	0
Mapleton Canal		19	47	78	112	146
East Bench Canal		0	7	6	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***19***	***54***	***85***	***112***	***146***
	Total agricultural acres urbanized	**231**	**593**	**983**	**1,395**	**1,815**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase

the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

TABLE 6

MAPLETON CITY

Amount of Agricultural Water Resulting from Urbanization

(Yield in Acre-Feet Using Unit Yield in Acre-Feet Per Acre During Dry Year (1961))

Lands with SVP water 1/	SVP water (in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		0	0	0	0	0
Mapleton Canal		184	468	779	1113	1447
East Bench Canal		60	151	251	359	467
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	244	619	1030	1472	1914
Lands with Spanish Fork River water 2/	**Spanish Fork River water (in acres)**					
		2010	2020	2030	2040	2050
Highline Canal		0	0	0	0	0
Mapleton Canal		3	7	11	16	21
East Bench Canal		0	6	6	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	3	13	17	16	21
	Total (acre-feet)	**247**	**632**	**1047**	**1489**	**1936**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 7
Mapleton
Projected Remaining Agricultural Water on Lands Not Urbanized

(Remaining Agricultural Water equals the 1961 Dry Year Yield of 19,968 acre-feet minus the 3,417 AF of SVP M&I minus the Agricultural Conversion shown in Table 4)

Lands with SVP water 1/	Remaining SVP Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		0	0	0	0	0
Mapleton Canal		3825	3542	3231	2897	2562
East Bench Canal		1235	1143	1043	935	827
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***5060***	***4685***	***4274***	***3832***	***3390***

Lands with Spanish Fork River water 2/	Remaining Spanish Fork River Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		0	0	0	0	0
Mapleton Canal		526	522	518	513	508
East Bench Canal		922	916	916	922	922
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***1448***	***1438***	***1434***	***1435***	***0***
						1430
	Total (acre-feet)	**6508**	**6123**	**5708**	**5266**	**3390**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

TABLE 8
MAPLETON CITY
Projected Surplus or Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Highline Canal					
Mapleton Canal					
Remaining agricultural Land	3,444	2,251	1,939	1,603	1,266
Water Diversion Requirement of 3.33 acre-feet acre	3.26	3.26	3.26	3.26	3.26
Water Demand	11,226	7,339	6,320	5,224	4,128
Water Supply					
SVP Water from Table 4	184	468	779	1,113	1,447
Local supplies	3,132	3,132	3,132	3,132	3,132
Groundwater	435	435	435	435	435
Remaining SVP Water (from Table 5)	3,825	3,542	3,231	2,897	2,562
Remaining Spanish Fork River (from Table 5)	526	522	518	513	508
Surplus of Deficit	-3,124	759	1,774	2,865	3,956
East Bench Canal					
Remaining agricultural Land	949	872	795	719	636
Water Diversion Requirement of 3.33 acre-feet acre	3.31	3.31	3.31	3.31	3.31
Water Demand	3,142	2,887	2,633	2,379	2,105
Water Supply					
SVP Water from Table 4	60	151	251	359	467
Remaining SVP Water (from Table 5)	1,235	1,143	1,043	935	827
Remaining Spanish Fork River (from Table 5)	922	916	916	922	922
Surplus of Deficit	-926	-677	-422	-163	112

TABLE 8 (Continued)
MAPLETON CITY

Projected Surplus or Deficit on Remaining Agricultural Lands

CANALS	2010	2020	2030	2040	2050
Spanish Fork South Canal					
Spanish Fork Southeast Canal					
Spanish Fork Westfield Canal					

TABLE 9
SUMMARY TABLE
MAPLETON CITY

	2,010	2,020	2,030	2,040	2,050
Remaining Agricultural Acreage	4,393	3,124	2,734	2,321	1,902
Water Diversion Requirement of 3.33 acre-feet acre	0.00	0.00	0.00	0.00	0.00
Water Demand	14,368	10,226	8,953	7,603	6,233
Water Supply					
SVP Water from Table 4	244	619	1,030	1,472	1,914
Remaining SVP Water (from Table 5)	5,060	4,685	4,274	3,832	3,390
Remaining Spanish Fork River (from Table 5)	1,448	1,438	1,434	1,435	1,430
Local water supply	3,132	3,132	3,132	3,132	3,132
Groundwater	435	435	435	435	435
Surplus of Deficit	-4,484	-352	917	2,267	3,633
Amount of SVP that can be applied on other lands	**0**	**0**	**917**	**1,472**	**1,914**

PAYSON

Table 1
Distribution of Agricultural Acreage

	Total Acres (see footnote 1)	Genola		Mapleton		Payson		Salem		Spanish Fork		Springville		West Mountain		Other Irrigated Lands 4/
		Percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	
Highline Canal	18,514	27.61%	5,112		0	45.88%	8,494	11.92%	2,207	1.17%	217					2,485
Mapleton Canal	3,673		0	98.81%	3,629		0		0	1.19%	44					0
East Bench Canal	4,169		0	23.87%	995		0		0	76.13%	3,174					0
Salem Canal	1,936		0		0	6.98%	135	74.28%	1,438		0					363
Spanish Fork South Canal	6,437		0		0		0	10.18%	655	50.93%	3,278					2,503
Spanish Fork Southeast Canal	914		0		0		0		0	100.00%	914					0
Westfield Canal	5,323		0		0		0		0	100.00%	5,323					0
Lakeshore	4,207		0		0		0		0					75.00%	3155	1,052
South Shore (see footnote 2)	515		0		0		0		0							515
Totals	**45,688**		**5,112**		**4,624**		**8,629**		**4,300**		**12,950**	Footnote 3				6,917

Footnote 1 - The total acres for the various canal companies is taken from the Bonneville Unti, Draft Water Supply Appendix, Volume 1, Table 3-14, page 3-29, dated March 1998.

Footnote 2 - In the most recent history about 515 acres of land are now irrigated in South Shore area of West Mountain and Utah Lake

Footnote 3 - Historically 4,500 acres has been irrigated in Springville.

Footnote 4 - Of the 6,917 acres of land the analysis in this report considered that 515 acres from South Shore and 4,500 acres in Springville were part of this remaining amount. By subtracting the lands South Shore and Springville would leave 1,902 acres remaining to be considered in accounting for all irrigated lands. This information is used in determining the rate of conversion of agricultural lands. For example, The amount of SVP that has historically been associated with the Springville area is 4,500 acre-feet. Subtracting the existing SVP M&I of 1,051 acre-feet from this historical irrigation water would leave a balance of 3,449 acre-feet for the irrigated lands in Springville. This amount was used in projecting the amount of agricultual water that is available for conversion and future use on other SVP lands.

TABLE 2
PAYSON CITY
(computation of reduction in SVP acres from present M&I)

Yield of	0	equals	20482.5536	divided by		8629	equal	2.37	acre-feet per acre
Corresponding acreage for		0	equa	0		divide	2.37	equals	0

TABLE 3
PAYSON CITY
Amount of Agricultural Acreage City Projected to Grow Onto

	Acreage Reduction for M&I			Acreage City Expected to Grow Onto			Yield of Water Supply		
	Canal acreage in City Declaration Boundary	Acreageafter reduction for SVP M&I		% of acreage city expected to grow on to	Adjusted acreage	Remaining agriculture lands on which no growth is expected to occur	1961 DryYear Yield	Yield af/ac	
Lands with SVP water									
Highline Canal	8,494	8,494		30.00%	2,548	5,946	16,471	1.94	1.94
Salelm Canal	135	135		30.00%	41	95	100	0.74	0.74
East Bench Canal	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork South Canal (20%)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Southeast Canal (city will not expand onto this)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Westfield (50%)	0	0		0.00%	0	0	0	0.00	0.00
	8629	8,629			2,589	6,040	16,571	1.92	1.92
Lands with Spanish Fork River water									
Highline Canal	8,494	8,494		30.00%	2548	5946	3,544	0.42	0.42
Salem Canal	135	135		30.00%	41	95	368	2.72	2.72
East Bench Canal	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork South Canal (20%)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Southeast Canal (city will not expand onto this)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Westfield (50%)	0	0		0.00%	0	0	0	0.00	0.00
	8629	8,629			2589	6040	3,912	0.45	0.45
							20,483		

TABLE 4
PAYSON CITY
(Computation of Rate of Urbanization of Agricultural Lands

		2000	2010	2020	2030	2040	2050
Population		12,716	20,606	27,750	30,583	55,673	80,763
Declaration Boundary Acreage	**24,721**						
Existing Size of City Boundary in Acres	**4,233**						
Historcial Irrigated Acreage in Delcaration Boundary	**8,629**						
Land required for new growth (at 9 people per acre)							
Percentage of future growth on irrigated lands	**0.35**						
Incremental Agricultural acreage			306	277	110	973	973
Cumulative Agricultural acreage			306	583	693	1,666	2,639

Table 5

PAYSON CITY

Projected Agricultural Lands Urbanized by Canal Company

(Units in Acres)

(For Analysis Purposes the 30% Growth on Agriculture Was Apportioned To Be 90% on Lands with SVP Water and 10% To Lands with Spanish Fork River Water)

SVP 0.9 Spanish Fork 0.1

Lands with SVP water 1/	**Portion of Lands Converted with SVP water (in acres)**					
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		271	517	614	1,476	2,338
Salelm Canal		4	8	10	23	37
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***275***	***525***	***624***	***1,499***	***2,375***
Lands with Spanish Fork River water 2/	**Portion of Lands Converted with Spanish Fork River water (in acres)**					
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		30	57	68	164	260
Salelm Canal		0	1	1	3	4
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***31***	***58***	***69***	***167***	***264***
	Total agricultural acres urbanized	**306**	**583**	**693**	**1,666**	**2,639**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 6

PAYSON CITY

Projected Amount of Agricultural Water Resulting from Urbanization

(Yield in Acre-Feet Using Unit Yield in Acre-Feet per Acre for Enlarge Strawberry Reservoir and Average Annual Yield of Spanish Fork)

Lands with SVP water 1/	SVP water (in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		526	1002	1190	2862	4534
Salelm Canal		3	6	7	17	28
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	**529**	**1008**	**1198**	**2879**	**4561**
Lands with Spanish Fork River water 2/	**Spanish Fork River water (in acres)**					
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		13	24	28	68	108
Salelm Canal		1	2	3	7	11
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	**14**	**26**	**31**	**76**	**120**
	Total (acre-feet)	**543**	**1034**	**1229**	**2955**	**4681**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 7
PAYSON CITY
Remaining Agricultural Water on Lands Not Urbanized

(Remaining Agricultural Water equals the 1961 Dry Year Yield of 19,968 acre-feet minus the 3,417 AF of SVP M&I minus the Agricultural Conversion shown in Table 4)

Lands with SVP water 1/	Remaining SVP Agricultural Water (Units in acre-feet)				
	2010	2020	2030	2040	2050
Highline Canal	15945	15469	15280	13609	11937
Salelm Canal	97	94	93	83	73
East Bench Canal	0	0	0	0	0
Spanish Fork South Canal (20%)	0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)	0	0	0	0	0
Spanish Fork Westfield (50%)	0	0	0	0	0
Subtotal	***16042***	***15563***	***15373***	***13691***	***12009***

Lands with Spanish Fork River water 2/	Remaining Spanish Fork River Agricultural Water (Units in acre-feet)				
	2010	2020	2030	2040	2050
Highline Canal	3532	3520	3516	3476	3436
Salelm Canal	366	365	365	360	356
East Bench Canal	0	0	0	0	0
Spanish Fork South Canal (20%)	0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)	0	0	0	0	0
Spanish Fork Westfield (50%)	0	0	0	0	0
Subtotal	***3898***	***3885***	***3881***	***3836***	***3792***
Total (acre-feet)	**19940**	**19448**	**19254**	**17528**	**15802**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 8
PAYSON CITY
Projected Surplus or Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Highline Canal					
Remaining agricultural Land	10,677	10,405	10,296	9,339	8,381
Water Diversion Requirement in acre-feet acre	2.90	2.93	2.96	2.99	3.02
Water Demand	30,964	30,486	30,478	27,922	25,310
Water Supply					
SVP Water from Urbanization from Table 5-14	526	1,002	1,190	2,862	4,534
Local supplies	1,583	1,583	1,583	1,583	1,583
Groundwater	2,390	2,390	2,390	2,390	2,390
Remaining SVP Agricultal Water from Table 5-15	19,672	19,196	19,008	17,336	15,664
Remaining Spanish Fork River Agricultural Water from Table 5-15	3,532	3,520	3,516	3,476	3,436
Surplus of Deficit in Agricultural Water	-3,261	-2,794	-2,790	-275	2,297
Salelm Canal					
Remaining agricultural Land	130	126	124	109	94
Water Diversion Requirement in acre-feet acre	2.88	2.93	2.97	3.02	3.06
Water Demand	375	368	369	328	287
Water Supply					
SVP Water from Urbanization from Table 5-14	3	6	7	17	28
Local Supplies	0	0	0	0	0
Groundwater	63	63	63	63	63
Remaining SVP Agricultal Water from Table 5-15	97	94	93	83	73
Remaining Spanish Fork River Agricultural Water from Table 5-15	366	365	365	360	356
Surplus of Deficit in Agricultural Water	91	97	96	132	170
East Bench Canal					

Table 8 (Continued)
PAYSON CITY
Projected Surplus or Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Spanish Fork South Canal					
Spanish Fork Southeast Canal					
Spanish Fork Westfield Canal					

Table 9
PAYSON CITY
Summary Table

	2,010	2,020	2,030	2,040	2,050
Remaining Agricultural Acreage (acres)	10,808	10,531	10,421	9,448	8,474
Water Diversion Requirement of 3.33 acre-feet acre					
Water Demand	30,964	30,486	30,478	27,922	25,310
Water Supply					
SVP Water from Table 4	529	1,008	1,198	2,879	4,561
Remaining SVP Water (from Table 5)	19,769	19,290	19,100	17,419	15,737
Remaining Spanish Fork River (from Table 5)	3,898	3,885	3,881	3,836	3,792
Local Supplies	1,583	1,583	1,583	1,583	1,583
Groundwater	2,453	2,453	2,453	2,453	2,453
Surplus of Deficit	-2,732	-2,266	-2,263	248	2,817
Amount of SVP that can be applied to other lands	0	0	0	248	2,817

SALEM

Table 1
Distribution of Agricultural Acreage

	Total Acres (see footnote 1)	Genola		Mapleton		Payson		Salem		Spanish Fork		Springville		West Mountain		Other Irrigated Lands 4/
		Percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	
Highline Canal	18,514	27.61%	5,112		0	45.88%	8,494	11.92%	2,207	1.17%	217					2,485
Mapleton Canal	3,673		0	98.81%	3,629		0		0	1.19%	44					0
East Bench Canal	4,169		0	23.87%	995		0		0	76.13%	3,174					0
Salem Canal	1,936		0		0	6.98%	135	74.28%	1,438		0					363
Spanish Fork South Canal	6,437		0		0		0	10.18%	655	50.93%	3,278					2,503
Spanish Fork Southeast Canal	914		0		0		0		0	100.00%	914					0
Westfield Canal	5,323		0		0		0		0	100.00%	5,323					0
Lakeshore	4,207		0		0		0		0					75.00%	3155	1,052
South Shore (see footnote 2)	515		0		0		0		0							515
Totals	**45,688**		**5,112**		**4,624**		**8,629**		**4,300**		**12,950**	Footnote 3				6,917

Footnote 1 - The total acres for the various canal companies is taken from the Bonneville Unti, Draft Water Supply Appendix, Volume 1, Table 3-14, page 3-29, dated March 1998.

Footnote 2 - In the most recent history about 515 acres of land are now irrigated in South Shore area of West Mountain and Utah Lake

Footnote 3 - Historically 4,500 acres has been irrigated in Springville.

Footnote 4 - Of the 6,917 acres of land the analysis in this report considered that 515 acres from South Shore and 4,500 acres in Springville were part of this remaining amount. By subtracting the lands South Shore and Springville would leave 1,902 acres remaining to be considered in accounting for all irrigated lands. This information is used in determining the rate of conversion of agricultural lands. For example, The amount of SVP that has historically been associated with the Springville area is 4,500 acre-feet. Subtracting the existing SVP M&I of 1,051 acre-feet from this historical irrigation water would leave a balance of 3,449 acre-feet for the irrigated lands in Springivlle. This amount was used in projecting the amount of agricultual water that is available for conversion and future use on other SVP lands.

TABLE 2
SALEM CITY
(Computation of Reduction in SVP Acres from Present SVP M&I

Yield of	0	equals	10298.73	divided by	4300	equals	2.40	acre-feet per acre	
Corresponding acreage for		0	equals	0	divided b	2.40	equals	0	

TABLE 3
SALEM CITY
Amount of Agricultural Acreage City is Projected to Grow Onto

	Acreage Reduction for SVP M&I			Acreage City Expected to Grow Onto			Yield of Water Supply		
	Canal acreage in City Declaration Boundary	Acreageafter reduction for SVP M&I		% of acreage city expected to grow on to	Adjusted acreage	Remaining agriculture lands on which no growth is expected to occur	Average Annual Yield	Yield af/ac	
Lands with SVP water									
Highline Canal	2,207	2,207		40.00%	883	1,324	3,311	1.50	1.50
Salem Canal	1,438	1,438		40.00%	575	863	73	0.05	0.05
East Bench Canal	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork South Canal (20%)	655	655		40.00%	262	393	320	0.49	0.49
Spanish Fork Southeast Canal (city will not expand onto this)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Westfield (50%)	0	0		0.00%	0	0	0	0.00	0.00
	4300	4,300			1,720	2,580	3,704	0.86	0.86
Lands with Spanish Fork River water									
Highline Canal	2,207	2,207		40.00%	883	1324	712	0.32	0.32
Salem Canal	1,438	1,438		40.00%	575	863	4,898	3.41	3.41
East Bench Canal	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork South Canal (20%)	655	655		40.00%	262	393	984	1.50	1.50
Spanish Fork Southeast Canal (city will not expand onto this)	0	0		0.00%	0	0	0	0.00	0.00
Spanish Fork Westfield (50%)	0	0		0.00%	0	0	0	0.00	0.00
	4300	4,300			1720	2580	6595	1.53	1.53
									0.00
							10299		0.00

TABLE 4
SALEM CITY
(Computation of Rate of Urbanization of Agricultural Lands)

		2000	2010	2020	2030	2040	2050
Population		4,372	7,351	12,101	17,016	24,212	31,409
Declaration Boundary Acreage	**7,500**						
Existing Size of City Boundary in Acres	**3,167**						
Historclal irrigated Acreage in Delcaration Boundary	**4,300**						
Total Amount of Land Required for Growth			331	859	1405	2204	3004
Agricultural Land required for new growth							
(Assumed Percentage of growth on irrigated agricultural)	**0.4**						
Incremental acreage			132	211	218	320	320
Cumulative acreage			132	344	562	882	1,202

Table 5

SALEM CITY

Projected Agricultural Lands Urbanized by Canal Company

(Units in Acres)

(For Analysis Purposes the Growth Was Apportioned

To Be 40% on Lands with SVP Water and 60% To Lands with Spanish Fork River Water)

	SVP	0.4		Spanish Fork	0.6	
Lands with SVP water 1/	**Portion of Lands Converted with SVP water (in acres)**					
		2010	2020	2030	2040	2050
Highline Canal		27	71	115	181	247
Salem Canal		18	46	75	118	161
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		8	21	34	54	73
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***53***	***137***	***225***	***353***	***481***
Lands with Spanish Fork River water 2/	**Portion of Lands Converted with Spanish Fork River water (in acres)**					
		2010	2020	2030	2040	2050
Highline Canal		41	106	173	272	370
Salem Canal		27	69	113	177	241
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		12	31	51	81	110
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***66***	***172***	***281***	***441***	***601***
	Total acres urbanized	**119**	**309**	**506**	**794**	**1,081**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 6

SALEM CITY

Projected Amount of Agricultural Water Resulting from Urbanization

(Yield in Acre-Feet Using Enlarged Strawberry Yield and Average Annual Yield of Spanish Fork River)

Lands with SVP water 1/	SVP water (in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		41	106	173	272	370
Salem Canal		1	2	4	6	8
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		4	10	17	26	36
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	46	118	194	304	414
Lands with Spanish Fork River water 2/	**Spanish Fork River water (In acres)**					
		2010	2020	2030	2040	2050
Highline Canal		13	34	56	88	119
Salem Canal		90	235	384	603	821
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		18	47	77	121	165
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	122	316	517	811	1106
	Total (acre-feet)	**167**	**434**	**711**	**1115**	**1520**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 7
SALEM CITY
Remaining Agricultural Water on Lands Not Urbanized

Lands with SVP water 1/	Remaining SVP Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		3270	3205	3138	3039	2941
Salem Canal		72	71	69	67	65
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		316	310	304	294	284
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***3658***	***3586***	***3510***	***3400***	***3290***

Lands with Spanish Fork River water 2/	Remaining Spanish Fork River Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		699	678	657	625	593
Salem Canal		4808	4664	4514	4296	4077
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		966	937	907	863	819
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***6473***	***6279***	***6078***	***5783***	***5489***
	Total (acre-feet)	**10131**	**9864**	**9588**	**9183**	**8779**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

TABLE 8
SALEM CITY
Projected Surplus or Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Highline Canal					
Remaining agricultural Land (acres)	2,139	2,031	1,919	1,754	1,590
Water Diversion Requirement of 3.33 acre-feet acre	2.90	2.93	2.96	2.99	3.02
Water Demand	6,203	5,950	5,679	5,246	4,803
Water Supply					
SVP Water from Table 4	41	106	173	272	370
Local supplies	411	411	411	411	411
Groundwater	621	621	621	621	621
Remaining SVP Water (from Table 5)	3,270	3,205	3,138	3,039	2,941
Remaining Spanish Fork River (from Table 5)	699	678	657	625	593
Surplus of Deficit	-1,161	-929	-679	-278	133
Salem Canal					
Remaining agricultural Land	1,757	1,686	1,613	1,506	1,399
Water Diversion Requirement of 3.33 acre-feet acre	2.880	2.925	2.970	3.015	3.060
Water Demand	5,059	4,931	4,790	4,540	4,281
Water Supply					
SVP Water from Table 4	1	2	4	6	8
Local supplies	0	0	0	0	0
Groundwater	669	669	669	669	669
Remaining SVP Water (from Table 5)	145	143	142	140	138
Remaining Spanish Fork River (from Table 5)	5,795	5,650	5,501	5,283	5,064
Surplus of Deficit	1,550	1,533	1,525	1,557	1,597
East Bench Canal					
Remaining agricultural Land	0	0	0	0	0
Water Diversion Requirement of 3.33 acre-feet acre	3.312	3.312	3.312	3.312	3.312
Water Demand	0	0	0	0	0
Water Supply					
SVP Water from Table 4	0	0	0	0	0
Remaining SVP Water (from Table 5)	0	0	0	0	0
Remaining Spanish Fork River (from Table 5)	0	0	0	0	0
Surplus of Deficit	0	0	0	0	0

TABLE 8 (Continued)
SALEM CITY
Projected Surplus or Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Spanish Fork South Canal					
Remaining agricultural Land	635	603	569	521	472
Water Diversion Requirement of 3.33 acre-feet acre	2.58	2.71	2.83	2.96	3.08
Water Demand	1,638	1,630	1,611	1,539	1,454
Water Supply					
SVP Water from Table 4	4	10	17	26	36
Lcoal supplies	0	0	0	0	0
Groundwater	251	251	251	251	251
Remaining SVP Water (from Table 5)	316	310	304	294	284
Remaining Spanish Fork River (from Table 5)	966	937	907	863	819
Surplus of Deficit	-100	-122	-133	-104	-63
Spanish Fork Southeast Canal					
Remaining agricultural Land	0	0	0	0	0
Water Diversion Requirement of 3.33 acre-feet acre	0	0	0	0	0
Water Demand	0	0	0	0	0
Water Supply					
SVP Water from Table 4	0	0	0	0	0
Remaining SVP Water (from Table 5)	0	0	0	0	0
Remaining Spanish Fork River (from Table 5)	0	0	0	0	0
Surplus of Deficit	0	0	0	0	0
Spanish Fork Westfield Canal					
Remaining agricultural Land	0	0	0	0	0
Water Diversion Requirement of 3.33 acre-feet acre	0	0	0	0	0
Water Demand	0	0	0	0	0
Water Supply					
SVP Water from Table 4	0	0	0	0	0
Remaining SVP Water (from Table 5)	0	0	0	0	0
Remaining Spanish Fork River (from Table 5)	0	0	0	0	0
Surplus of Deficit	0	0	0	0	0

TABLE 9
SALEM CITY
Summary Table

	2,010	2,020	2,030	2,040	2,050
Remaining Lands Agricultural Acreage in Spanish Fork	4,530	4,319	4,101	3,781	3,461
Water Diversion Requirement of 3.33 acre-feet acre					
Water Demand	7,841	7,580	7,290	6,784	6,256
Water Supply					
SVP Water from Table 4	46	118	194	304	414
Local supplies	411	411	411	411	411
Groundwater	1,541	1,541	1,541	1,541	1,541
Remaining SVP Water (from Table 5)	3,731	3,658	3,583	3,473	3,363
Remaining Spanish Fork River (from Table 5)	7,460	7,266	7,065	6,770	6,476
Surplus of Deficit	5,348	5,414	5,503	5,715	5,949
SVP Water that could be used on other lands	**46**	**118**	**194**	**304**	**414**

SPANISH FORK

Table 1
Distribution of Agricultural Acreage

	Total Acres (see footnote 1)	Genola		Mapleton		Payson		Salem		Spanish Fork		Springville		West Mountain		Other Irrigated Lands 4/
		Percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	
Highline Canal	18,514	27.61%	5,112		0	45.88%	8,494	11.92%	2,207	1.17%	217					2,485
Mapleton Canal	3,673		0	98.81%	3,629		0		0	1.19%	44					0
East Bench Canal	4,169		0	23.87%	995		0		0	76.13%	3,174					0
Salem Canal	1,936		0		0	6.98%	135	74.28%	1,438		0					363
Spanish Fork South Canal	6,437		0		0		0	10.18%	655	50.93%	3,278					2,503
Spanish Fork Southeast Canal	914		0		0		0		0	100.00%	914					0
Westfield Canal	5,323		0		0		0		0	100.00%	5,323					0
Lakeshore	4,207		0		0		0		0					75.00%	3155	1,052
South Shore (see footnote 2)	515		0		0		0		0							515
Totals	**45,688**		**5,112**		**4,624**		**8,629**		**4,300**		**12,950**	Footnote 3				6,917

Footnote 1 - The total acres for the various canal companies is taken from the Bonneville Unti, Draft Water Supply Appendix, Volume 1, Table 3-14, page 3-29, dated March 1998.

Footnote 2 - In the most recent history about 515 acres of land are now irrigated in South Shore area of West Mountain and Utah Lake

Footnote 3 - Historically 4,500 acres has been irrigated in Springville.

Footnote 4 - Of the 6,917 acres of land the analysis in this report considered that 515 acres from South Shore and 4,500 acres in Springville were part of this remaining amount. By subtracting the lands South Shore and Springville would leave 1,902 acres remaining to be considered in accounting for all irrigated lands. This information is used in determining the rate of conversion of agricultural lands. For example, The amount of SVP that has historically been associated with the Springville area is 4,500 acre-feet. Subtracting the existing SVP M&I of 1,051 acre-feet from this historical irrigation water would leave a balance of 3,449 acre-feet for the irrigated lands in Springville. This amount was used in projecting the amount of agricultual water that is available for conversion and future use on other SVP lands.

TABLE
SPANISH FORK CITY
(computation of reduction in SVP acres from present M&I)

M&I of	0	equals	32540.4681	divided by	12950	equals	2.51	acre-feet per acre	
Corresponding acreage for		0	equals	0	divided by	2.51	equals	0	acres

Note: The 1,703 acre-feet is from Table 5- 8 and represents the amount of existing SVP M&I water in Spanish Fork City, The 19,968 acre-feet is the historical dry year yield of the Strawberry Valley Project of 13,95 acre-feet plus the Spanish Fork River of 6,873 acre-feet in Spanish Fork City's Declaration boundary. This 19,968 acre-feet is divided by the total histoical acreage of 12,950 acres to arrive at the yield of 1.54 acre-feet per acre. The M&I water of 1,703 acre-feet divided by the factor of 1.54 provides an estimate of the amount of SVP acreage that is no longer in irrigated agriculture. The historical irrigated acreage of 12,950 acre-feet is then reduced by 1,104 acres as shown in Table 5-13.

TABLE

SPANISH FORK CITY

Amount of Agricultural Acreage City Could Potentially Grow Onto

	Acreage Reduction for M&I		Acreage City Could Potentially Grow Onto			Yield of Water Supply		
	Step 2A & Step 2 B		Step 2 C			Step 2 D		
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
	Canal acreage In City Declaration Boundary	Acreageafter reduction for SVP M&I	% of acreage city could potentially grow on to (information from Spanish Fork City's engineer)	Adjusted acreage	Remaining agriculture lands on which no growth is expected to occur	AverageYear Yield	Historical Year (af/ac)	Projected Future Yield in af/ac
Lands with SVP water								
								Adjusted for Enlarged Strawberry (see footnote 1)
Highline Canal	217	217	100.00%	217	0	325	1.50	1.50
Mapleton Canal	44	44	100.00%	44	0	87	1.98	1.98
East Bench Canal	3,174	3,174	100.00%	3,174	0	4,129	1.30	1.30
Spanish Fork South Canal	3,278	3,278	20.00%	656	2,622	1,602	0.49	0.49
Spanish Fork Southeast Canal	914	914	0.00%	0	914	197	0.22	0.22
Spanish Fork Westfield	5,323	5,323	50.00%	2,662	2,662	2,279	0.43	0.43
	12950	12,950		6,752	6,198	8619	0.67	0.67
Lands with Spanish Fork River water								
								Adjusted for Spanish Fork Average Flow of 46,338 AF (see footnote 2)
Highline Canal	217	217	100.00%	217	0	70	0.32	0.32
Mapleton Canal	44	44	100.00%	44	0	12	0.26	0.26
East Bench Canal	3,174	3,174	100.00%	3174	0	4,553	1.43	1.43
Spanish Fork South Canal	3,278	3,278	20.00%	656	2622	4,922	1.50	1.50
Spanish Fork Southeast Canal	914	914	0.00%	0	914	1,896	2.07	2.07
Spanish Fork Westfield	5,323	5,323	50.00%	2662	2662	12,469	2.34	2.34
	12950	12,950		6752	6198	23921	1.85	1.85
						32540		

(1) Enlarged Strawberry Yield was adjusted by taking the yield of 61,000 acre-feet and subtracting the 10,177 to get a net yield of 50,803 acre-feet projected to be available in the future for irrigation. This was then divided by the Also there needs to be an accounting for the losses in stream channels prior to diversions. The losses total about 4% of diversion which is 4% times 61,000 or 2,440 acre-feet. This would result in 48,363 acre-feet This was divided by the historical yield of 37,913 to get a factor of 1.276. This factor was then applied to the historical dry year yield to get the projected yield in acre-feet per acre for the future. For example, 0.05 times 1.34 equals 0.06 acre-feet per acre.

SVP Factor

(2) The yield of the Spanish Fork River was adjusted to account for average conditions. The average yield of 45,000 acre-feet was divided by the 1961 dry year yield of 15,542 acre-feet for all canals in South Utah County to get a factor of 3.15 which was then multipled by the historical yield in af/ac to get the expected annual average future yield. For example, 1.35 times 3.15 equals 4.26 acre-feet per acre

Spanish Fork River Factor

TABLE
SPANISH FORK CITY
(Computation of rate of urbanization of agricultural lands)

		2000	2010	2020	2030	2040	2050
Population		20,246	27,693	32,745	35,771	50,900	66,028
Declaration Boundary Acreage	17,881						
Existing Size of City Boundary in Acres	8,102						
Historcial Irrigated Acreage in Delcaration Boundary	12,950						
Total Land Area Required for Growth			827	1389	1725	3406	5087
Land required for new growth (at 9 people per acre)							
(Percentage of growth)	0.72						
Incremental acreage			599	407	244	1,217	1,217
Cumulative acreage			599	1,006	1,249	2,467	3,684

Table

SPANISH FORK CITY

Projected Urbanization of Agricultural Lands by Canal Company

(Units in Acres)

(For Analysis Purposes the Growth Was Apportioned To Be 40% on Lands with SVP Water and 60% To Lands with Spanish Fork River Water)

SVP % 0.40 Spanish Fork 0.60

Lands with SVP water 1/	Portion of Lands Converted with SVP water (in acres)					
		2010	2020	2030	2040	2050
Highline Canal		8	13	16	32	47
Mapleton Canal		2	3	3	6	10
East Bench Canal		113	189	235	464	693
Spanish Fork South Canal		23	39	49	96	143
Spanish Fork Southeast Canal		0	0	0	0	0
Spanish Fork Westfield		94	159	197	389	581
	Subtotal	*240*	*402*	*500*	*987*	*1,474*
Lands with Spanish Fork River water 2/	**Portion of Lands Converted with Spanish Fork River water (in acres)**					
		2010	2020	2030	2040	2050
Highline Canal		12	19	24	48	71
Mapleton Canal		2	4	5	10	14
East Bench Canal		169	284	352	696	1,039
Spanish Fork South Canal		35	59	73	144	215
Spanish Fork Southeast Canal		0	0	0	0	0
Spanish Fork Westfield		142	238	295	583	871
	Subtotal	*300*	*503*	*750*	*1,480*	*2,210*
	Total acres urbanized	**539**	**905**	**1,249**	**2,467**	**3,684**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table

SPANISH FORK CITY

Projected Amount of Agricultural Water Resulting from Urbanization

Lands with SVP water 1/	SVP water (in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		12	19	24	47	71
Mapleton Canal		3	5	6	13	19
East Bench Canal		147	246	306	603	901
Spanish Fork South Canal		11	19	24	47	70
Spanish Fork Southeast Canal		0	0	0	0	0
Spanish Fork Westfield		40	68	84	167	249
	Subtotal	**213**	**358**	**444**	**877**	**1310**
Lands with Spanish Fork River water 2/	**Spanish Fork River water (in acres)**					
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		4	6	8	15	23
Mapleton Canal		1	1	1	3	4
East Bench Canal		242	407	505	998	1490
Spanish Fork South Canal		52	88	109	216	322
Spanish Fork Southeast Canal		0	0	0	0	0
Spanish Fork Westfield		332	557	692	1367	2041
	Subtotal	**631**	**1059**	**1316**	**2598**	**3880**
	Total (acre-feet)	**844**	**1417**	**1760**	**3475**	**5190**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table
SPANISH FORK CITY
Projected Remaining Agricultural Water on Lands Not Urbanized

Lands with SVP water 1/	Remaining SVP Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		313	306	301	278	254
Mapleton Canal		84	82	81	74	68
East Bench Canal		3982	3883	3823	3526	3228
Spanish Fork South Canal		1591	1583	1578	1555	1532
Spanish Fork Southeast Canal		197	197	197	197	197
Spanish Fork Westfield		2239	2211	2195	2112	2030
	Subtotal	***8406***	***8261***	***8175***	***7742***	***7309***

Lands with Spanish Fork River water 2/	Remaining Spanish Fork River Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		66	64	62	55	47
Mapleton Canal		11	11	10	9	8
East Bench Canal		4310	4146	4047	3555	3062
Spanish Fork South Canal		4870	4834	4813	4707	4600
Spanish Fork Southeast Canal		1896	1896	1896	1896	1896
Spanish Fork Westfield		12137	11912	11777	11102	10428
	Subtotal	***23290***	***22862***	***22606***	***21323***	***20041***
	Total (acre-feet)	**31696**	**31124**	**30780**	**29065**	**27350**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table
SPANISH FORK CITY
Projected Surplus of Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Highline Canal					
Remaining agricultural Land (acres)	198	185	177	138	99
Water Diversion Requirement in acre-feet acre	2.90	2.93	2.96	2.99	3.02
Water Demand	573	541	523	412	298
Water Supply					
SVP Water from Urbanization from Table 5-14	12	19	24	47	71
Local supplies	40	40	40	40	40
Groundwater	61	61	61	61	61
Remaining SVP Agricultal Water from Table 5-15	313	306	301	278	254
Remaining Spanish Fork River Agricultural Water from Table 5-15	66	64	62	55	47
Surplus of Deficit in Agricultural Water	-81	-51	-35	69	176
Mapleton Canal					
Remaining agricultural Land	40	37	36	28	20
Water Diversion Requirement in acre-feet acre	3.36	3.36	3.36	3.36	3.36
Water Demand	135	126	121	94	67
Water Supply					
SVP Water from Urbanization from Table 5-14	3	5	6	13	19
Local supplies	38	38	38	38	38
Groundwater	5	5	5	5	5
Remaining SVP Agricultal Water from Table 5-15	84	82	81	74	68
Remaining Spanish Fork River Agricultural Water from Table 5-15	11	11	10	9	8
Surplus of Deficit in Agricultural Water	6	15	20	45	71
East Bench Canal					
Remaining agricultural Land	2,892	2,701	2,587	2,014	1,442
Water Diversion Requirement in acre-feet acre	3.31	3.31	3.31	3.31	3.31
Water Demand	9,579	8,946	8,567	6,672	4,777
Water Supply					
SVP Water from Urbanization from Table 5-14	147	246	306	603	901
Local supplies	0	0	0	0	0
Groundwater	457	457	457	457	457
Remaining SVP Agricultal Water from Table 5-15	3,982	3,883	3,823	3,526	3,228
Remaining Spanish Fork River Agricultural Water from Table 5-15	4,310	4,146	4,047	3,555	3,062
Surplus of Deficit in Agricultural Water	-683	-215	66	1,469	2,871

Table
SPANISH FORK CITY
Projected Surplus of Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Spanish Fork South Canal					
Remaining agricultural Land	5,723	5,684	5,660	5,542	5,424
Water Diversion Requirement in acre-feet acre	2.58	2.71	2.83	2.96	3.08
Water Demand	14,766	15,374	16,018	16,376	16,705
Water Supply					
SVP Water from Urbanization from Table 5-14	11	19	24	47	70
Local supplies	0	0	0	0	0
Groundwater	1,258	1,258	1,258	1,258	1,258
Remaining SVP Agricultal Water from Table 5-15	2,814	2,806	2,802	2,779	2,756
Remaining Spanish Fork River Agricultural Water from Table 5-15	8,629	8,593	8,572	8,465	8,359
Surplus of Deficit in Agricultural Water	-2,054	-2,698	-3,363	-3,827	-4,263
Spanish Fork Southeast Canal					
Remaining agricultural Land	914	914	914	914	914
Water Diversion Requirement in acre-feet acre	2.58	2.71	2.83	2.96	3.08
Water Demand	2,358	2,472	2,587	2,701	2,815
Water Supply					
SVP Water from Urbanization from Table 5-14	0	0	0	0	0
Local supplies	0	0	0	0	0
Groundwater	180	180	180	180	180
Remaining SVP Agricultal Water from Table 5-15	197	197	197	197	197
Remaining Spanish Fork River Agricultural Water from Table 5-15	1,896	1,896	1,896	1,896	1,896
Surplus of Deficit in Agricultural Water	-85	-199	-314	-428	-542
Spanish Fork Westfield Canal					
Remaining agricultural Land	5,087	4,927	4,831	4,351	3,871
Water Diversion Requirement in acre-feet acre	2.58	2.71	2.83	2.96	3.08
Water Demand	13,124	13,326	13,670	12,856	11,922
Water Supply					
SVP Water from Urbanization from Table 5-14	40	68	84	167	249
L:ocal supplies	0	0	0	0	0
Groundwater	1,330	1,330	1,330	1,330	1,330
Remaining SVP Agricultal Water from Table 5-15	2,239	2,211	2,195	2,112	2,030
Remaining Spanish Fork River Agricultural Water from Table 5-15	12,137	11,912	11,777	11,102	10,428
Surplus of Deficit in Agricultural Water	2,622	2,194	1,715	1,855	2,115

Table
SPANISH FORK CITY
Summary Table

	2,010	2,020	2,030	2,040	2,050
Remaining Lands in acres with SVP Water in Spanish Fork	14,854	14,448	14,204	12,987	11,769
Water Diversion Requirement in acre-feet acre					
Water Demand	40,401	40,661	41,366	39,017	36,516
Water Supply					
SVP Water from Urbanization from Table 5-14	213	358	444	877	1,310
Local supplies	78	78	78	78	78
Groundwater	3,291	3,291	3,291	3,291	3,291
Remaining SVP Agricultal Water from Table 5-15	9,629	9,485	9,398	8,966	8,533
Remaining Spanish Fork River Agricultural Water from Table 5-15	27,049	26,621	26,364	25,082	23,800
Surplus of Deficit in Agricultural Water	-140	-828	-1,790	-723	495
SVP Water that could be used on other SVP lands	0	0	0	0	495

SPRINGVILLE

Table 1
Distribution of Agricultural Acreage

	Total Acres (see footnote 1)	Genola		Mapleton		Payson		Salem		Spanish Fork		Springville		West Mountain		Other Irrigated Lands 4/
		Percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	
Highline Canal	18,514	27.61%	5,112		0	45.88%	8,494	11.92%	2,207	1.17%	217					2,485
Mapleton Canal	3,673		0	98.81%	3,629		0		0	1.19%	44					0
East Bench Canal	4,169		0	23.87%	995		0		0	76.13%	3,174					0
Salem Canal	1,936		0		0	6.98%	135	74.28%	1,438		0					363
Spanish Fork South Canal	6,437		0		0		0	10.18%	655	50.93%	3,278					2,503
Spanish Fork Southeast Canal	914		0		0		0		0	100.00%	914					0
Westfield Canal	5,323		0		0		0		0	100.00%	5,323					0
Lakeshore	4,207		0		0		0		0					75.00%	3155	1,052
South Shore (see footnote 2)	515		0		0		0		0							515
Totals	**45,688**		**5,112**		**4,624**		**8,629**		**4,300**		**12,950**		Footnote 3			6,917

Footnote 1 - The total acres for the various canal companies is taken from the Bonneville Unti, Draft Water Supply Appendix, Volume 1, Table 3-14, page 3-29, dated March 1998.

Footnote 2 - In the most recent history about 515 acres of land are now irrigated in South Shore area of West Mountain and Utah Lake

Footnote 3 - Historically 4,500 acres has been irrigated in Springville.

Footnote 4 - Of the 6,917 acres of land the analysis in this report considered that 515 acres from South Shore and 4,500 acres in Springville were part of this remaining amount. By subtracting the lands South Shore and Springville would leave 1,902 acres remaining to be considered in accounting for all irrigated lands. This information is used in determining the rate of conversion of agricultural lands. For example, The amount of SVP that has historically been associated with the Springville area is 4,500 acre-feet. Subtracting the existing SVP M&I of 1,051 acre-feet from this historical irrigation water would leave a balance of 3,449 acre-feet for the irrigated lands in Springville. This amount was used in projecting the amount of agricultual water that is available for conversion and future use on other SVP lands.

TABLE 2
SPRINGVILLE CITY
(Computation of reduction of SVP acres from Present SVP M&I)

Yield of	0	equals	10386.749	divided by		4100	equal	2.53	acre-feet per acre
Corresponding acreage for		0	equa	0		divide	2.53	equals	0

TABLE 3
SPRINGVILLE CITY
Amount of Agricultural Acreage City Projected to Grow Onto

	Acreage Reduction of SVP M&I			Acreage City Expected to Grown Onto			Yield of Water Supply	
	Canal acreage In City Declaration Boundary	Acreageafter reduction for SVP M&I		% of acreage city expected to grow on to	Adjusted acreage	Remaining agriculture lands on which no growth is expected to occur	1961 DryYear Yield	Yield af/ac
Lands with SVP water								
Highline Canal	0	0		0.00%	0	0	0	0.00
Mapleton	4,100	4,100		85.00%	3,485	615	3,194	0.78
East Bench Canal	0	0		0.00%	0	0	0	0.00
Spanish Fork South Canal (20%)	0	0		0.00%	0	0	0	0.00
Spanish Fork Southeast Canal (city will not expand onto this)	0	0		0.00%	0	0	0	0.00
Spanish Fork Westfield (50%)	0	0		0.00%	0	0	0	0.00
	4100	4,100			3,485	615	3194	0.78
Lands with Hobble Creek water								
Highline Canal	0	0		0.00%	0	0	0	0.00
Mapleton	4,100	4,100		85.00%	3485	615	7,193	1.75
East Bench Canal	0	0		0.00%	0	0	0	0.00
Spanish Fork South Canal (20%)	0	0		0.00%	0	0	0	
Spanish Fork Southeast Canal (city will not expand onto this)	0	0		0.00%	0	0	0	
Spanish Fork Westfield (50%)	0	0		0.00%	0	0	0	
	4100	4,100			3485	615	7193	1.75
							10387	

TA BLE 4
SPRINGVILLE CITY
(Computation of Rate of Urbanization of Agricultural Lands

		2000	2010	2020	2030	2040	2050
Population		20,424	28,866	34,132	37,266	59,658	59,658
Declaration Boundary Acreage	**11,185**						
Existing Size of City Boundary in Acres	**6,405**						
Historcial Irrigated Acreage in Delcaration Boundary	**4,100**						
Land required for new growth (at 6 people per acre)							
Assume % of future growth on irrigated lands	**0.37**						
Incremental Agricultural acreage			521	325	193	1381	0
Cumulative Agricultural acreage			521	845	1039	2419	2419

SPRINVILLE CITY

Agricultural Lands Urbanized by Canal

(Units in Acres)

(For Analysis Purposes the Growth Was Apportioned

To Be 40% on Lands with SVP Water and 60% To Lands with Hobble Creek Water)

	SVP	0.4	Spanish Fork	0.6		
Lands with SVP water 1/	**Portion of Lands Converted with SVP water (in acres)**					
		2010	2020	2030	2040	2050
Highline Canal		0	0	0	0	0
Mapleton		208	338	415	968	968
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***208***	***338***	***415***	***968***	***968***
Lands with Hobble Creek water 2/	**Portion of Lands Converted with Spanish Fork River water (in acres)**					
		2010	2020	2030	2040	2050
Highline Canal		0	0	0	0	0
Mapleton		312	507	623	1,452	1,452
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***312***	***507***	***623***	***1,452***	***1,452***
	Total agricultural acres urbanized	**521**	**845**	**1,039**	**2,419**	**2,419**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 6

SPRINGVILLE CITY

Amount of Agricultural Water Resulting from Urbanization

(Yield in Acre-Feet Using Unit Yield in Acre-Feet Per Acre During Dry Year (1961))

Lands with SVP water 1/	**SVP water (in acre-feet)**					
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		0	0	0	0	0
Salelm Canal		162	263	324	754	754
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	**162**	**263**	**324**	**754**	**754**
Lands with Hobble Creek water 2/	**Spanish Fork River water (in acres)**					
		2010	**2020**	**2030**	**2040**	**2050**
Highline Canal		0	0	0	0	0
Salelm Canal		548	890	1093	2547	2547
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	**548**	**890**	**1093**	**2547**	**2547**
	Total (acre-feet)	**710**	**1153**	**1417**	**3301**	**3301**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase

the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 7
SPRINGVILLE CITY
Remaining Agricultural Water on Lands Not Urbanized

(Remaining Agricultural Water equals the 1961 Dry Year Yield of 19,968 acre-feet minus the 3,417 AF of SVP M&I minus the Agricultural Conversion shown in Table 4)

Lands with SVP water 1/	Remaining SVP Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		0	0	0	0	0
Salelm Canal		3032	2930	2870	2440	2440
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***3032***	***2930***	***2870***	***2440***	***2440***

Lands with Hobble Creek water 2/	Remaining Spanish Fork River Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Highline Canal		0	0	0	0	0
Salelm Canal		6645	6303	6100	4646	4646
East Bench Canal		0	0	0	0	0
Spanish Fork South Canal (20%)		0	0	0	0	0
Spanish Fork Southeast Canal (city will not expand onto this)		0	0	0	0	0
Spanish Fork Westfield (50%)		0	0	0	0	0
	Subtotal	***6645***	***6303***	***6100***	***4646***	***4646***
	Total (acre-feet)	**9677**	**9234**	**8970**	**7086**	**7086**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

TABLE 8
SPRINGVILLE CITY
Surplus or Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Highline Canal					
Remaining agricultural Land (acres)	0	0	0	0	0
Water Diversion Requirement of 3.33 acre-feet acre	3.16	3.16	3.16	3.16	3.16
Water Demand	0	0	0	0	0
Water Supply					
SVP Water from Table 4	0	0	0	0	0
Remaining SVP Water (from Table 5)	0	0	0	0	0
Remaining Spanish Fork River (from Table 5)	0	0	0	0	0
Surplus of Deficit	0	0	0	0	0
Mapleton Canal					
Remaining agricultural Land	3,579	2,640	2,446	1,066	1,066
Water Diversion Requirement of 3.33 acre-feet acre	3.26	3.26	3.26	3.26	3.26
Water Demand	11,669	8,605	7,975	3,474	3,474
Water Supply					
SVP Water from Table 4	162	263	324	754	754
Remaining SVP Water (from Table 5)	3,032	2,930	2,870	2,440	2,440
Remaining Hobble Creek Water (from Table 5)	6,645	6,303	6,100	4,646	4,646
Supplies from Hobble Creek					
Surplus of Deficit	-1,830	892	1,318	4,366	4,366
East Bench Canal					
Remaining agricultural Land	0	0	0	0	0
Water Diversion Requirement of 3.33 acre-feet acre	3.31	3.31	3.31	3.31	3.31
Water Demand	0	0	0	0	0
Water Supply					
SVP Water from Table 4	0	0	0	0	0
Remaining SVP Water (from Table 5)	0	0	0	0	0
Remaining Spanish Fork River (from Table 5)	0	0	0	0	0
Surplus of Deficit	0	0	0	0	0

TABLE 8 (Continued)
SPRINGVILLE CITY

Surplus or Deficit on Remaining Agricultural Lands

CANALS	2010	2020	2030	2040	2050
Spanish Fork South Canal					
Remaining agricultural Land	0	0	0	0	0
Water Diversion Requirement of 3.33 acre-feet acre	0	0	0	0	0
Water Demand	0	0	0	0	0
Water Supply					
SVP Water from Table 4	0	0	0	0	0
Remaining SVP Water (from Table 5)	0	0	0	0	0
Remaining Spanish Fork River (from Table 5)	0	0	0	0	0
Surplus of Deficit	0	0	0	0	0
Spanish Fork Southeast Canal					
Remaining agricultural Land	0	0	0	0	0
Water Diversion Requirement of 3.33 acre-feet acre	0	0	0	0	0
Water Demand	0	0	0	0	0
Water Supply					
SVP Water from Table 4	0	0	0	0	0
Remaining SVP Water (from Table 5)	0	0	0	0	0
Remaining Spanish Fork River (from Table 5)	0	0	0	0	0
Surplus of Deficit	0	0	0	0	0
Spanish Fork Westfield Canal					
Remaining agricultural Land	0	0	0	0	0
Water Diversion Requirement of 3.33 acre-feet acre	0	0	0	0	0
Water Demand	0	0	0	0	0
Water Supply					
SVP Water from Table 4	0	0	0	0	0
Remaining SVP Water (from Table 5)	0	0	0	0	0
Remaining Spanish Fork River (from Table 5)	0	0	0	0	0
Surplus of Deficit	0	0	0	0	0

TABLE 9
SUMMARY TABLE
SPRINGVILLE CITY

	2,010	2,020	2,030	2,040	2,050
Remaining Agricultural Acreage	4,194	3,255	3,061	1,681	1,681
Water Diversion Requirement of 3.33 acre-feet acre	3.16	3.16	3.16	3.16	3.16
Water Demand	13,254	10,285	9,674	5,311	5,311
Water Supply					
SVP Water from Table 4	162	263	324	754	754
Remaining SVP Water (from Table 5)	3,032	2,930	2,870	2,440	2,440
Remaining Hobble Creek Water (from Table 5)	6,645	6,303	6,100	4,646	4,646
Surplus of Deficit	-3,416	-788	-381	2,529	2,529
Amount of SVP that can be applied on other lands	0	0	0	754	754

WEST MOUNTAIN

Table 1
Distribution of Agricultural Acreage

	Total Acres (see footnote 1)	Genola		Mapleton		Payson		Salem		Spanish Fork		Springville		West Mountain		Other Irrigated Lands 4/
		Percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	percent	acres	
Highline Canal	18,514	27.61%	5,112		0	45.88%	8,494	11.92%	2,207	1.17%	217					2,485
Mapleton Canal	3,673		0	98.81%	3,629		0		0	1.19%	44					0
East Bench Canal	4,169		0	23.87%	995		0		0	76.13%	3,174					0
Salem Canal	1,936		0		0	6.98%	135	74.28%	1,438		0					363
Spanish Fork South Canal	6,437		0		0		0	10.18%	655	50.93%	3,278					2,503
Spanish Fork Southeast Canal	914		0		0		0		0	100.00%	914					0
Westfield Canal	5,323		0		0		0		0	100.00%	5,323					0
Lakeshore	4,207		0		0		0		0					75.00%	3,156	1,052
South Shore (see footnote 2)	515		0		0		0		0							515
Totals	**45,888**		**5,112**		**4,624**		**8,629**		**4,300**		**12,950**		Footnote 3			6,917

Footnote 1 - The total acres for the various canal companies is taken from the Bonneville Unit, Draft Water Supply Appendix, Volume 1, Table 3-14, page 3-29, dated March 1998.

Footnote 2 - In the most recent history about 515 acres of land are now irrigated in South Shore area of West Mountain and Utah Lake

Footnote 3 - Historically 4,500 acres has been irrigated in Springville.

Footnote 4 - Of the 6,917 acres of land the analysis in this report considered that 515 acres from South Shore and 4,500 acres in Springville were part of this remaining amount. By subtracting the lands South Shore and Springville would leave 1,902 acres remaining to be considered in accounting for all irrigated lands. This information is used in determining the rate of conversion of agricultural lands. For example, The amount of SVP that has historically been associated with the Springville area is 4,500 acre-feet. Subtracting the existing SVP M&I of 1,051 acre-feet from this historical irrigation water would leave a balance of 3,449 acre-feet for the irrigated lands in Springville. This amount was used in projecting the amount of agricultual water that is available for conversion and future use on other SVP lands.

TABLE 2
WEST MOUNTAIN
Amount of Agricultural Acreage City is Projected to Grow Onto

	Acreage Reduction for SVP M&I			Acreage City Expected to Grow Onto			Yield of Water Supply		
	Canal acreage in City Declaration Boundary	Acreageafter reduction for SVP M&I		% of acreage city expected to grow on to	Adjusted acreage	Remaining agriculture lands on which no growth is expected to occur	Average Year Yield	Yield af/ac	
Lands with SVP water									1,276
Lakeshore Canal	3,155	3,155		80.00%	2,524	631	1,802	0.57	0.57
	3155	3,155			2,524	631	1802	0.57	
Lands with Spanish Fork River water									2,895
Lakeshore Canal	3,155	3,155		80.00%	2524	631	4,112	1.30	1.30
	3155.25	3,155			2524	631	4112	1.30	
							5914		

TABLE 3
WEST MOUNTAIN
(Computation of Reduction in SVP Acres from Present SVP M&I

Yield of	0	equals	5914	divided by	3155.25	equals	1.87	acre-feet per acre	
Corresponding acreage for		0	equals	0	divided b	1.87	equals	0	

TABLE 4
WEST MOUNTAIN
(Computation of Rate of Urbanization of Agricultural Lands)

		2000	2010	2020	2030	2040	2050
Population		4,372	7,351	12,101	17,016	24,212	31,409
Declaration Boundary Acreage	7,500						
Existing Size of City Boundary In Acres	3,167						
Historcial Irrigated Acreage in Delcaration Boundary	3,155						
Land required for new growth (at 6 people per acre)							
	0.42						
Incremental acreage			139	222	230	336	336
Cumulative acreage			139	361	591	927	1,264

Table 5

WEST MOUNTAIN

Agricultural Lands Urbanized by Canal

(Units in Acres)

(For Analysis Purposes the Growth Was Apportioned To Be 40% on Lands with SVP Water and 60% To Lands with Spanish Fork River Water)

	SVP	0.40		Spanish Fork	0.60	
Lands with SVP water 1/	**Portion of Lands Converted with SVP water (in acres)**					
		2010	2020	2030	2040	2050
Lakeshore Canal		56	145	236	371	505
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	***56***	***145***	***236***	***371***	***505***
Lands with Spanish Fork River water 2/	**Portion of Lands Converted with Spanish Fork River water (in acres)**					
		2010	2020	2030	2040	2050
Lakeshore Canal		84	217	355	556	758
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	***70***	***181***	***295***	***464***	***632***
	Total acres urbanized	**125**	**325**	**532**	**835**	**1,137**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 6

WEST MOUNTAIN

Amount of Agricultural Water Resulting from Urbanization

(Yield in Acre-Feet Using Unit Yield in Acre-Feet Per Acre During Dry Year (1961))

Lands with SVP water 1/	**SVP water (in acre-feet)**					
		2010	**2020**	**2030**	**2040**	**2050**
Lakeshore Canal		32	83	135	212	289
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	**32**	**83**	**135**	**212**	**289**
Lands with Spanish Fork River water 2/	**Spanish Fork River water (in acres)**					
		2010	**2020**	**2030**	**2040**	**2050**
Lakeshore Canal		109	282	462	725	988
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	**109**	**282**	**462**	**725**	**988**
	Total (acre-feet)	**141**	**365**	**597**	**937**	**1277**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

Table 7
WEST MOUNTAIN
Remaining Agricultural Water on Lands Not Urbanized

(Remaining Agricultural Water equals the 1961 Dry Year Yield of 19,968 acre-feet minus the 3,417 AF of SVP M&I minus the Agricultural Conversion shown in Table 4)

Lands with SVP water 1/	Remaining SVP Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Lakeshore Canal		1770	1719	1667	1590	1513
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	***1770***	***1719***	***1667***	***1590***	***1513***

Lands with Spanish Fork River water 2/	Remaining Spanish Fork River Agricultural Water (Units in acre-feet)					
		2010	2020	2030	2040	2050
Lakeshore Canal		4003	3830	3650	3387	3124
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	Subtotal	***4003***	***3830***	***3650***	***3387***	***3124***
	Total (acre-feet)	**5773**	**5549**	**5317**	**4977**	**4637**

1/ SVP water that becomes available through urbanization reverts back to the Strawberry Water Users Association. This water can then be applied to other agricultural lands under the Strawberry Valley Project to progress towards a firm irrigation water supply.

2/ The most likely scenario for lands that are urbanized which have Spanish Fork River Water is that the city would require developers to purchase the water supply for the canal company for use in outdoor watering of the new subdivisions. Therefore this water would not revert back to other irrigated lands.

TABLE 8
WEST MOUNTAIN
Projected Surplus or Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Lakeshore Canal					
Remaining agricultural Land (acres)	4,068	3,846	3,616	3,280	2,943
Water Diversion Requirement of 3.33 acre-feet acre	2.58	2.71	2.83	2.96	3.08
Water Demand	10,495	10,403	10,233	9,691	9,065
Water Supply					
SVP Water from Table 4	32	83	135	212	289
Groundwater	2,550	2,550	2,550	2,550	2,550
Remaining SVP Water (from Table 5)	1,770	1,719	1,667	1,590	1,513
Remaining Spanish Fork River (from Table 5)	4,003	3,830	3,650	3,387	3,124
Surplus of Deficit	-2,140	-2,221	-2,231	-1,953	-1,589
Salem Canal					
Remaining agricultural Land	0	0	0	0	0
Water Diversion Requirement of 3.33 acre-feet acre	0	0	0	0	0
Water Demand	0	0	0	0	0
Water Supply					
SVP Water from Table 4	0	0	0	0	0
Remaining SVP Water (from Table 5)	0	0	0	0	0
Remaining Spanish Fork River (from Table 5)	0	0	0	0	0
Surplus of Deficit	0	0	0	0	0
East Bench Canal					

TABLE 8 (Continued)
WEST MOUNTAIN
Projected Surplus or Deficit on Remaining Agricultural Lands

	2010	2020	2030	2040	2050
CANALS					
Spanish Fork South Canal					
Spanish Fork Southeast Canal					
Spanish Fork Westfield Canal					

TABLE 9
WEST MOUNTAIN
Summary Table

	2,010	2,020	2,030	2,040	2,050
Remaining Lands in acres with SVP Water in West Mountain	4,068	3,846	3,616	3,280	2,943
Water Diversion Requirement of 3.33 acre-feet acre	2.58	2.71	2.83	2.96	3.08
Water Demand	10,495	10,403	10,233	9,691	9,065
Water Supply					
SVP Water from Table 4	32	83	135	212	289
Remaining SVP Water (from Table 5)	1,770	1,719	1,667	1,590	1,513
Remaining Spanish Fork River (from Table 5)	4,003	3,830	3,650	3,387	3,124
Surplus of Deficit	-4,690	-4,771	-4,781	-4,503	-4,139
SVP Water that could be used on other lands	0	0	0	0	0

Central Utah Project Completion Program

Attachment D

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Attachment D

Table D-1

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
Mona
1/30/2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Area of City Boundaries = 776 acres from Brown and Caldwell Report, September 1999, "2070 Water Demand and Supply Analysis for South Utah County and East Juab County, Utah (Note: see footnote 1 for amount of irrigated acreage)						
Population Projections (State of Utah - Office of Planning and Budget)	850	1,386	1,790	2,139	2,716	3,293
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year (footnote 2)	0.291	0.273	0.255	0.242	0.230	0.218
Acre-feet/year (footnote 3)	247	378	456	519	626	719
Potable Demand (gpcd) (footnote 4)	260	244	227	216	206	195
Residential Indoor (footnote 5)	80	80	80	80	80	80
Residential Outdoor (footnote 6)	124	100	80	60	40	20
Commerical, industrial, and institutional (footnote 7)	34	34	34	34	34	34
Non-potable outdoor demand (gpcd) (footnote 8)	22	30	33	42	52	61

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS						
Source of Water	**Gross Amount of Water Available within Declaration Boundary**		**Portion of Gross Water Supply Presently Developed for M&I**		**Portion of Gross Water Supply Presently Not Developed or Unavailable for M&I**	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Groundwater Wells (footnote 9)		11		11		0
Springs (footnote 10)		339		339		0
Groundwater Irrigation (footnote 11)						
Historical Average Pumping	5600		0		5600	
North, Pole, Bear Canyon and Willow Creeks	1,000		0		1,000	
Subtotal		1,000		0		1,000
Total		6,950		350		6,600
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**Ag. Irrig. Yield in acre-feet per acre**		1.4	**See footnote 13 on how 1.4 acre-feet acre is computed**		
Agricultural Irrigation Water (footnote 14)	0	126	221	303	439	575
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Culinary indoor demand in acre-feet	227	332	390	418	468	494
Springs	227	332	339	339	339	339
Groundwater wells	0	0	11	11	11	11
Remaining Demand for Culinary Supplies	0	0	40	68	118	144
Secondary (outdoor) demand in acre-feet	21	47	66	101	158	225
Springs	21	7	0	0	0	0
Groundwater wells	0	11	0	0	11	11
Groundwater Irrigation	0	0	0	0	0	0
Local front streams	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	29	66	101	147	214
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Agricultural Irrigation water	0	29	106	169	265	358
Requirements for New Supplies	0	29	106	169	265	358
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	102	98	115	134	163	206
Unavailable Agricultural Water Within Declaration Boundary	6,600	6,474	6,379	6,297	6,161	6,025

FOOTNOTES:

(1) Irrigated acreage equals 4,675 acres, from Table 3-28, page 3-53, SFN System Water Supply Appendix, Volume I, March 1998.
(2) acre-feet per capita computed from line 6. For example, 260 gpcd divided by a factor of 892.7 converts gpcd to 0.291 acre-feet per capita
(3) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.291 acre-feet per capita times 850 = 247 acre-feet
(4) 260 gpcd is the sum of (80 + 124 + 34 + 22)
(5) Residential indoor of 80 gpcd is computed from Table 2, page 27, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources. For example 78.9 acre-feet per year divided by population of 880 (from same table) equals 0.0897 acre-feet per capita. This figure is multiplied by a conversion factor of 892.7 to get 80 gpcd.
(6) Table 2, page 27 from report cited in footnote (5). For example, 122.4 divided by population of 880 times conversion factor of 892.7 eqauls 124 gpcd
(7) Table 2, page 27 from report cited in footnote (5). For example, (33.1 + 0.2 + 0.3) divided by population of 880 times factor of 892.7 eqauls 34 gpcd
(8) Table 3, page 28 from report cited in footnote (5). For example, 21.6 divided by population of 880 times factor of 892.7 equals 22 gpcd
(9) From Utah Division of Water Rights database, October 2001
(10) From Table 1, page 26 of report cited in footnote (5)
(11) Groundwater pumping of 5,600 acre-feet is from Table3-31, page 3-55, SFN System Water Supply Appendix, volume I, March 1998.
(12) Dry year yield in 1961 from Table 24, page 56, SFN System Water Supply Appendix, Volume. II, March 1998.
(13) Dry year yield of 1.4 is computed by dividing the sum of the groundwater yield (5,600 AF) and surface streams (1,000 AF) by irrigated acreage of 4,675 acres.
(14) Amount of agricultural conversion is computed by taking the incremental difference in population and divided by 6 people per acre. This value is then multiplied times the dry year yield of the agricultural water. For example, (1,386 minus 850) divided by 6 times 2.0 equals 179 acre-feet

(NOTE: All units in acre-feet unless otherwise noted)

Table D-2

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
Nephi

1/30/2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Area of City Boundaries = 2,490 acres from Brown and Caldwell Report, September 1999, "2070 Water Demand and Supply Analysis for South Utah County and East Juab County, Utah (see footnote 1 for amount of irrigated acreage)						
Population Projections (State of Utah - Office of Planning and Budget)	4,733	6,506	7,870	9,052	11,002	12,952
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year (footnote 2)	0.300	0.281	0.263	0.250	0.238	0.225
Acre-feet/year (footnote 3)	1,420	1,830	2,066	2,263	2,613	2,914
Potable Demand (gpcd) (footnote 4)	266	251	234	223	212	201
Residential Indoor (footnote 5)	80	80	80	80	80	80
Residential Outdoor (footnote 6)	37	32	26	23	19	15
Commerical, industrial, and institutional (footnote 7)	87	82	76	73	69	65
Non-potable outdoor demand (gpcd) (footnote 8)	62	57	52	47	44	41

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS			
Source of Water	**Gross Amount of Water Available within Declaration Boundary**	**Portion of Gross Water Supply Presently Developed for M&I**	**Portion of Gross Water Supply Presently Not Developed or Unavailable for M&I**
Dry Year Yield	**(acre-feet)**	**(acre-feet)**	**(acre-feet)**
Groundwater Wells (footnote 9)	5,000	5,000	0
Springs (footnote 10)	2,752	2,752	0
Groundwater Irrigation (footnote 11)			
Salt Creek wells, Nephi Irrigation Company	3,400	0	3,400
Other Irrigation Companies	6,000	0	6,000
Subtotal	9,400	0	9,400
Local streams (footnote 12)			
Irrigation season Salt Creek (dry year yield)	3,800	0	3,800
Non - irrigation season Salt Creek (dry year yield)	2,300	0	2,300
Subtotal	6,100	0	6,100
Total	23,252	7,752	15,500

Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**Ag. Irrig. Yield in acre-feet per acre**		1.68	**See footnote 13 on how 1.68 acre-feet acre is computed**		
Agricultural Irrigation Water (footnote 14)	0	496	878	1,209	1,755	2,301
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Culinary indoor demand in acre-feet	1,082	1,414	1,612	1,779	2,071	2,330
Springs	1,082	1,414	1,612	1,779	2,071	2,330
Groundwater wells	0	0	0	0	0	0
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Secondary (outdoor) demand in acre-feet	338	416	454	484	542	584
Springs	0	0	0	0	0	0
Groundwater wells	338	416	454	484	542	584
Groundwater Irrigation	0	0	0	0	0	0
Local front streams	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Agricultural Irrigation water	0	0	0	0	0	0
Requirements for New Supplies	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	8,632	8,718	8,864	8,998	9,195	9,440
Unavailable Agricultural Water Within Declaration Boundary	13,200	12,704	12,322	11,991	11,445	10,899

FOOTNOTES:

(1) Irrigated acreage equals 7,850 acres, from Table 3-28, page 3-53, SFN System Water Supply Appendix, Volume I, March 1998.

(2) acre-feet per capita computed from line 6. For example, 266 gpcd divided by a factor of 892.7 converts gpcd to 0.300 acre-feet per capita

(3) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.291 acre-feet per capita times 850 = 247 acre-feet

(4) 266 gpcd is the sum of (80 + 37 + 87 + 62)

(5) Residential indoor of 80 gpcd is computed from Table 2, page 27, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources. For example 443.6 acre-feet (from Table 2) per year divided by population of 4,950 (from same table) equals 0.0896 acre-feet per capita. This figure is multiplied by a conversion factor of 892.7 to get 80 gpcd.

(6) Table 2, page 27 from report cited in footnote (5). For example, 207.2 divided by population of 4,950 times conversion factor of 892.7 equals 37 gpcd

(7) Table 2, page 27 from report cited in footnote (5). For example, (224.7 + 123.0 + 136.2) divided by population of 4,950 times factor of 892.7 equals 87 gpcd

(8) Table 3, page 28 from report cited in footnote (5). For example, 344.0 divided by population of 4,950 times factor of 892.7 equals 62 gpcd

(9) Note: Groundwater rights for Nephi City total 10,281 acre-feet from Table 1, page 26 of report cited in footnote (5). For this analysis it was assumed that a reasonalbe safe yield of groundwater in a dry year would be 20,000 acre-feet for both irrigation and M&I. Subtracting the 15,000 acre-feet for irrigation would leave 5,000 AF for M&I.

(10) From Table 1, page 26 of report cited in footnote (5)

(11) Groundwater pumping of 3,430 acre-feet is from page 5-6, SFN System Water Supply Appendix, volume I, March 1998. The amount of other groundwater pumping of 6,000 acre-feet is computed by subtracting both Mona (5,600 AF) and Salt Creek (3,400 AF) from the average historical groundwater pumping of 15,000 AF. The 15,000 AF is referred to on page 5-6 of the SFN System Water Supply Appendix, Volume I, March 1998 and in Table 4-4, page 4-11 of the same report.

(12) Dry year yield in 1961 from page B-9, SFN System Water Supply Appendix, Volume. III - "Flows At Selected Points",March 1998.

(13) Dry year yield of 1.68 is computed by dividing the sum of the groundwater yield (9,400 AF) and surface streams (3,800 AF) by irrigated acreage of 7,850 acres.

(14) Amount of agricultural conversion is computed by taking the incremental difference in population and divided by 6 people per acre. This value is then multiplied times the dry year yield of the agricultural water. For example, (6,506 minus 4,733) divided by 6 times 1.68 equals 496 acre-feet

(NOTE: All units in acre-feet unless otherwise noted)

Table D-3

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
Rocky Ridge

January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Population Projections (State of Utah - Office of Planning and Budget)	403	465	505	540	595	649
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year (footnote 1)	0.080	0.080	0.080	0.080	0.080	0.080
Acre-feet/year (footnote 2)	32	37	40	43	48	52
Potable Demand (gpcd) (footnote 3)	70	70	70	70	70	70
Residential Indoor (footnote 4)	55	55	55	55	55	55
Residential Outdoor (footnote 5)	12	12	12	12	12	12
Commerical, industrial, and institutional (footnote 6)	3	3	3	3	3	3
Non-potable outdoor demand (gpcd) (footnote 7)	0	0	0	0	0	0
CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS						
Source of Water	**Gross Amount of Water Available within Declaration Boundary**		**Portion of Gross Water Supply Presently Developed for M&I**		**Portion of Gross Water Supply Presently Not Developed or Unavailable for M&I**	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Groundwater Wells (footnote 8)	115		115		0	
Springs (footnote 8)	0		0		0	
Total	115		115		0	
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**Ag. Irrig. Yield in acre-feet per acre**		0.0			
Agricultural Irrigation water	0	0	0	0	0	0
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Culinary indoor demand in acre-feet	30	35	38	41	46	50
Springs	0	0	0	0	0	0
Groundwater wells	30	35	38	41	46	50
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Secondary (outdoor) demand in acre-feet	2	2	2	2	2	2
Springs	0	0	0	0	0	0
Groundwater wells	2	2	2	2	2	2
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Requirements for New Supplies	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	83	78	75	72	67	63
Unavailable Agricultural Water Within Declaration Boundary	negligible	negligible	negligible	negligible	negligible	negligible

FOOTNOTES:

(1) acre-feet per capita computed from line 6. For example, 70 gpcd divided by a factor of 892.7 converts gpcd to 0.080 acre-feet per capita

(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.08 acre-feet per capita times 403 = 32 acre-feet

(3) 70 gpcd is the sum of (55 + 12 + 3)

(4) Residential indoor of 55 gpcd is computed from Table 2, page 27, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources. For example 16.2 acre-feet (from Table 2) per year divided by population of 261 (from same table) equals 0.062 acre-feet per capita. This figure is multiplied by a conversion factor of 892.7 to get 55 gpcd.

(5) Table 2, page 27 from report cited in footnote (5). For example, 3.5 divided by population of 261 times conversion factor of 892.7 equals 12 gpcd

(6) Table 2, page 27 from report cited in footnote (5). For example, (0.6 + 0.0 + 0.4) divided by population of 261 times factor of 892.7 equals 3 gpcd

(7) Table 3, page 28 from report cited in footnote (5). Secondary outdoor use equals 0.0 for Rocky Ridge

(NOTE: All units in acre-feet unless otherwise noted)

Table D-4
Elk Ridge

Utah Lake Drainage Basin Water Delivery System

Summary of Available Water Supplies and Demand through Year 2050

March 15, 2004

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 2,057 acres (from Table 2, Brown and Caldwell Report, September 1999) **Irrigated acres = 0 acres** (from JUB Report, Table 10, March 1996)						
Population Projections (State of Utah - Office of Planning and Budget)	1,838	3,093	4,391	5,024	5,512	6,000
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.287	0.274	0.269	0.263	0.258	0.246
Acre-feet/year[2]	527	849	1,181	1,323	1,420	1,479
Total Water Use Gallons per capita per day[3]	256	245	240	235	230	220
Potable Demand (gpcd)	256	245	240	235	230	220
Indoor demand[4]	111	106	103	101	98	93
Outdoor demand[4]	132	127	124	122	119	114
Institutional, Commercial, and Industrial[4]	13	13	13	13	13	13
Non-potable outdoor demand in gpcd	0	0	0	0	0	0

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS						
Source of Water	**Gross Amount of Water Available within Declaration Boundary**		**Portion of Gross Water Supply Presently Developed**		**Portion of Gross Water Supply Presently Not Developed or Unavailable**	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Groundwater Well Rights[6]	643			643		0
Springs[7]	0			0		0
Subtotal		643		0		0
South Utah Valley Municipal Water Association (SUVMWA)[8]						0
Share of SUVMWA purchased water from East/South Jordan Canal Company	8.4		8.4		0.0	
Share of SUVMWA CUP M&I	33.4		33.4		0.0	
Subtotal		42		42		0
SVP water[9]						
Highline Canal	0		0		0	
Salem Canal	0		0		0	
Subtotal		0		0		0
Spanish Fork River water[9]						
Highline Canal	0		0		0	
Salem Canal	0		0		0	
Subtotal		0		0		0
Local streams[9]						
(none)	0		0		0	
(none)	0		0		0	
Subtotal		0		0		0
Total		685		685		0
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre**		0.000	**Spanish Fork River Yield in acre-feet per acre**		0.000
SVP water	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	527	849	1,181	1,323	1,420	1,479
Springs	0	0	0	0	0	0
Groundwater wells	485	643	643	643	643	643
SUVMWA	42	42	42	42	42	42
Remaining Demand for Culinary Supplies	0	164	496	638	735	794
Non-potable (outdoor) demand in acre-feet	0	0	0	0	0	0
Springs		0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
SUVMWA	0	0	0	0	0	0
SVP water	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0
Local front streams	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
FUTURE SUPPLIES TO BE DEVELOPED TO MEET NEEDS						
Additional Groundwater Wells	0	0	0	0	0	0
SVP Water	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0
Total New Supplies Developed	0	0	0	0	0	0
Remaining Demand Not Met	0	164	496	638	735	794
Total Remaining Available Supplies	158	0	0	0	0	0
Unavailable Agricultural Water Within Declaration Boundary	0	0	0	0	0	0

FOOTNOTES:

(1) Total water use (256 gpcd) divided by a factor of 892.7 converts gpcd to 0.287 acre-feet per capita

(2) Acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.287 acre-feet per capita times population of 1,838 equals 527 acre-feet.

(3) Gallons per capita per day is the sum of Total potable use plus Non-potable use.

(4) Gallons per capita per day (gpcd) for 1998 was obtained from the report "Municipal and Industrial Water Supply and Uses in Utah and East Juab Counties area", July 2000, by Hansen, Allen, and Luce for the Utah Division of Water Resources. GPCD was computed by multiplying acre-feet per capita from Table 6, page 32 by a conversion factor of 892.7

(5) Gpcd for 1998 non-potable use was obtained from report cited in footnote 4 by multiplying acre-feet per capita from Table 7, page 34 (secondary use) by a factor of 892.7

(6) From the following reports -

A. Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"

B. Hansen, Allen, and Luce, July 2000, for Utah Division of Water Resources, "Municipal and Industrial Water Supply and Uses in the Utah and East Juab Counties Area"

C. JUB Engineers, March 1996, "Water Rights Analysis, Future Demands and Needs Inventory" for South Utah Valley Municipal Water Association

(7) Table 5, page 31 from report cited in footnote (4)

(8) From report by Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"

(9) There is no water from these sources available to Elk Ridge

Table D-5

Genola

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 9,011 acres Irrigated acres = 5,692 acres (both acreages are from JUB Report, Table 15, March 1996)						
Population Projections (State of Utah - Office of Planning and Budget)	965	1,565	2,392	4,744	11,467	18,191
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050 but limited to 190 gpcd						
Acre-feet/capita/year[1]	0.262	0.259	0.255	0.252	0.249	0.246
Acre-feet/year[2]	253	405	611	1,196	2,852	4,483
Total Water Use Gallons per capita per day[3]	234	231	228	225	222	220
Potable Demand (gpcd)	147	144	141	138	136	134
Indoor demand[4]	80	78	77	75	74	73
Outdoor demand[4]	43	42	41	40	40	39
Institutional, Commercial, and Industrial[4]	24	24	23	23	22	22
Non-potable outdoor demand in gpcd[5]	87	87	87	87	86	86

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS						
Source of Water	**Gross Amount of Water Available within Declaration Boundary**		**Portion of Gross Water Supply Presently Developed**		**Portion of Gross Water Supply Presently Not Developed or Unavailable**	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Springs[6]	2,915			240		2,675
Subtotal		2,915				
Groundwater Wells[7]	161	0		161		0
Subtotal		161				
South Utah Valley Municipal Water Association (SUVMWA)[8]						0
Share of SUVMWA purchased water from East/South Jordan Canal Company	6.0		6.0		0.0	
Share of SUVMWA CUP M&I	23.9		23.9		0.0	
Subtotal		30		30		0
SVP water[9]						
(none)	0		0		0	
(none)	0		0		0	
Subtotal		0		0		0
Spanish Fork River Water[10]						
Highline Canal	219		0		219	
Salem Canal	0		0		0	
Subtotal		219		0		219
Local streams[11]						
(none)	0		0		0	
(none)	0		0		0	
Subtotal		0		0		0
Total		**3,324**		**431**		**2,894**
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre**		0.00	**Spanish Fork River Yield in acre-feet per acre(footnote 12)**		0.02
SVP water[9]	0	0	0	0	0	0
Spanish Fork River water[13]	0	2	6	15	42	70
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	159	253	378	735	1,742	2,722
Springs	159	161	161	161	161	161
Groundwater wells	0	92	217	240	240	240
Remaining Demand for Culinary Supplies	0	0	0	334	1,341	2,321
Non-potable (outdoor) demand in acre-feet	94	152	233	460	1,110	1,761
Springs	2	0	0	0	0	0
Groundwater wells	92	122	23	0	0	0
SUVMWA	0	30	30	30	30	30
SVP water (existing)	0	0	0	0	0	0
Spanish Fork River water	0	0	6	15	42	70
Local front streams	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	174	415	1,038	1,661
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	168	735	2,337	2,605
SVP water (Culinary grade requirements)	0	0	0	0	0	0
SVP Water (secondary grade requirements)	0	0	0	0	0	0
Spanish Fork River water	0	0	6	15	42	70
Total New Supplies Developed	0	0	174	750	2379	2675
Remaining Demand Not Met	0	0	0	0	0	1,307
Total Remaining Available Supplies	3,071	2,919	2,713	2,128	472	148
Unavailable Agricultural Water Within Declaration Boundary	219	216	213	203	176	149

FOOTNOTES:

(1) Total water use (234 gpcd) divided by a factor of 892.7 converts gpcd to acre-feet per capita
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.263 acre-feet per capita times population of 965 equals 253 acre-feet.
(3) gallons per capita per day is the sum of Total potable use plus Non-potable use.
(4) gallons per capita per day (gpcd) for 1998 was obtained from the report "Municipal and Industrial Water Supply and Uses in Utah and East Juab Counties area", July 2000, by Hansen, Allen, and Luce for the Utah Division of Water Resources. GPCD was computed by multiplying acre-feet per capita from Table 6, page 32 by a conversion factor of 892.7
(5) gpcd for 1998 non-potable use was obtained from report cited in footnote 4 by multiplying acre-feet per capita from Table 7, page 34 (secondary use) by a factor of 892.7
(6) from the following reports -
A. Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
B. Hansen, Allen, and Luce, July 2000, for Utah Division of Water Resources, "Municipal and Industrial Water Supply and Uses in the Utah and East Juab Counties Area"
C. JUB Engineers, March 1996, "Water Rights Analysis, Future Demands and Needs Inventory" for South Utah Valley Municipal Water Association
(7) Table 5, page 31 from report cited in footnote (4)
(8) from report by Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
(9) No SVP water available for Elk Ridge
(10) ~~from Spanish Fork River Commissioner Report,~~ dry ~~year yield for 1961.~~ The amount obtained from this report was reduced by half under the assumption that only half the river water would become available for M&I use.
(11) not applicable
(12) computed by dividing 219 acre-feet of Spanish Fork River water in declaration bloundary acreage (9,011acres) to obtain a yield of 0.02 acre-feet per acre.
(13)Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied by the dry year yield of the agricultural water. Developable SVP supplies are calculated the same way except using the dry year yield of SVP water. Same procedure is completed for each successive 10 year increments with the amount of conversion being accumulated.

Table D-6

Goshen

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 485 acres Irrigated acres = 282 acres (both acreages are from the JUB Report, Table 17, March 1996)						
Population Projections (State of Utah - Office of Planning and Budget)	874	1,249	1,682	1,970	2,611	3,251
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.463	0.426	0.381	0.337	0.291	0.246
Acre-feet/year[2]	404	532	640	663	760	800
Total Water Use Gallons per capita per day[3]	413	380	340	300	260	220
Potable Demand (gpcd)	268	236	209	181	154	117
Indoor demand[4]	80	78	77	75	74	72
Outdoor demand[4]	139	110	85	60	35	0
Institutional, Commercial, and Industrial[4]	49	48	47	46	45	44
Non-potable outdoor demand in gpcd[5]	145	144	131	119	106	103

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Springs[6]	1,086			1,086		0
Subtotal		1,086				
Groundwater Wells[7]	188			188		0
Subtotal		188				
South Utah Valley Municipal Water Association (SUVMWA)[8]						0
Share of SUVMWA purchased water from East/South Jordan Canal Company	4.4		4.4		0.0	
Share of SUVMWA CUP M&I	17.5		17.5		0.0	
Subtotal		22		22		0
SVP water[9]						
(none)	0		0		0	
(none)	0		0		0	
Subtotal		0		0		0
Currant Creek water[10]						
Goshen Irrigation Canal	392		0		392	
(none)	0		0		0	
Subtotal		392		0		392
Local streams[11]						
(none)	0		0		0	
(none)	0		0		0	
Subtotal		0		0		0
Total		1,687		1,296		392
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre[12]**		0.00	**Goshen Irrigation Canal (yield in acre-feet per acre)[13]**		0.81
SVP water[14]	0	0	0	0	0	0
Goshen Irrigation water[14]	0	0	58	97	392	392
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	262	331	394	400	450	425
Springs	262	331	394	400	450	425
Groundwater wells	0	0	0	0	0	0
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Non-potable demand in acre-feet	142	201	247	263	310	375
Springs	142	179	225	241	288	353
Groundwater wells	0	0	0	0	0	0
SUVMWA	0	22	22	22	22	22
SVP water	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0
Local front streams	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies To Be Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
SVP Water	0	0	0	0	0	0
Goshen Irrigation Canal	0	0	0	0	0	0
Total New Supplies Developed	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	1,284	1,155	1,046	1,025	928	887
Unavailable Agricultural Water Within Declaration Boundary	392	392	333	294	-1	-1

FOOTNOTES:

(1) Total water use (413 gpcd) divided by a factor of 892.7 converts gpcd to acre-feet per capita
(2) Acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.463 acre-feet per capita times population of 874 equals 404 acre-feet.
(3) Gallons per capita per day is the sum of Total potable use plus Non-potable use.
(4) Gallons per capita per day (gpcd) for 1998 was obtained from the report "Municipal and Industrial Water Supply and Uses in Utah and East Juab Counties area", July 2000, by Hansen, Allen, and Luce for the Utah Division of Water Resources. GPCD was computed by multiplying acre-feet per capita from Table 6, page 32 by a conversion factor of 892.7
(5) Gpcd for 1998 non-potable use was obtained from report cited in footnote 4 by multiplying acre-feet per capita from Table 7, page 34 (secondary use) by a factor of 892.7
(6) Table 5, page 31 from report cited in footnote (4)
(7) From the following reports -
  A. Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
  B. Hansen, Allen, and Luce, July 2000, for Utah Division of Water Resources, "Municipal and Industrial Water Supply and Uses in the Utah and East Juab Counties Area"
  C. JUB Engineers, March 1996, "Water Rights Analysis, Future Demands and Needs Inventory" for South Utah Valley Municipal Water Association
(8) From report by Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
(9) From Spanish Fork River Commissioner Report, dry year yield for 1961
(10) ~~From Spanish Fork River Commissioner Report, dry year yield for 1961~~. The amounts obtained from this report were reduced by half under the assumption tht only 1/2 the river water would become available for M&I use.
(11) From water supply records using 1961 dry year yield
(12) No SVP water available for future development
(13) Computed by dividing 392 acre-feet of Goshen Canal irrigation water in declaration bloundary acreage (485 acres) to obtain a yield of 0.81 acre-feet per acre.
(14) Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied by the dry year yield of the agricultural water. Developable SVP supplies are calculated the same way except using the dry year yield of SVP water. Same procedure is completed for each successive 10 year increments with the amount of conversion being accumulated.

Table D-7

Mapleton

Utah Lake Drainage Basin Water Delivery System

Summary of Available Water Supplies and Demand through Year 2050

January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 7,817 acres (from Brown & Caldwell Report, Table 2, September 1999) **Irrigated acres = 4,662 acres** (from JUB Report, Table 1, March 1996)						
Population Projections (State of Utah - Office of Planning and Budget)	5,809	9,403	14,928	20,990	27,507	34,024
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.600	0.502	0.416	0.326	0.291	0.246
Acre-feet/year[2]	3,488	4,718	6,203	6,842	8,014	8,381
Total Water Use Gallons per capita per day[3]	536	448	371	291	260	220
Potable Demand (gpcd)	263	200	148	96	94	92
Indoor demand[4]	80	78	77	75	74	72
Outdoor demand[4]	161	100	50	0	0	0
Institutional, Commercial, and Industrial[4]	22	22	21	21	20	20
Non-potable outdoor demand in gpcd[5]	273	248	223	195	166	128

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Springs[6]	1,904			1,904		0
Subtotal		1,904				
Groundwater Wells[7] (water rights equals 7,097 acre-feet)	7,097			5,323		1,774
Subtotal		7097				
South Utah Valley Municipal Water Association (SUVMWA)[8]						0
Share of SUVMWA purchased water from East/South Jordan Canal Company	28.8		28.8		0.0	
Share of SUVMWA CUP M&I	114.5		114.5		0.0	
Subtotal		143		143		0
SVP water[9]						
Mapleton Irrigation Co.	1,613		0		1,613	
East Bench Canal	214		0		214	
Subtotal		1,827		0		1,827
Spanish Fork River water[10]						
Mapleton Irrigation Co.	0		0		0	
East Bench Canal	196		90		106	
Subtotal		196		90		106
Local streams[11]						
Hobble Creek	500		500		0	
Maple Creek	1		1		0	
Subtotal		501		501		0
Total		**11,668**		**7,961**		**3,707**
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre[12]**		0.234	**Spanish Fork River Yield in acre-feet per acre[13]**		0.014
SVP water[14]	0	140	355	591	1,827	1,827
Spanish Fork River water[14]	0	8	21	34	106	106
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	1,711	2,106	2,474	2,257	2,899	3,502
Springs	1,711	1,904	1,904	1,904	1,904	1,904
Groundwater wells	0	202	570	353	995	1,598
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Non-potable (outdoor) demand in acre-feet	1,776	2,612	3,729	4,585	5,115	4,879
Springs	193	0	0	0	0	0
Groundwater wells	992	1,714	2,551	2,551	2,448	2,212
SUVMWA	0	143	143	143	143	143
SVP water	0	155	420	1,255	1,827	1,827
Spanish Fork River water	90	99	114	135	196	196
Local front streams	501	501	501	501	501	501
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
SVP Water (Converted to culinary)	0	0	0	0	0	0
SVP Water for outdoor use	0		0	0	0	0
Spanish Fork River water	0	0	0	0	0	0
Total New Supplies Developed	0	0	0	0	0	0
Remaining Demand Not Met	1	0	0	0	0	0
Total Remaining Available Supplies	8,181	6,950	5,465	4,826	3,654	3,287
Unavailable Agricultural Water Within Declaration Boundary	1,933	1,785	1,557	1,307	0	0

FOOTNOTES:

(1) Total water use (536 gpcd) divided by a factor of 892.7 converts gpcd to acre-feet per capita

(2) Acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.600 acre-feet per capita times population of 5,809 equals 3,488 acre-feet.

(3) Gallons per capita per day is the sum of Total potable use plus Non-potable use.

(4) Gallons per capita per day (gpcd) for 1998 was obtained from the report "Municipal and Industrial Water Supply and Uses in Utah and East Juab Counties area", July 2000, by Hansen, Allen, and Luce for the Utah Division of Water Resources. GPCD was computed by multiplying acre-feet per capita from Table 6, page 32 by a conversion factor of 892.7

(5) gpcd for 1998 non-potable use was obtained from report cited in footnote 4 by multiplying acre-feet per capita from Table 7, page 34 (secondary use) by a factor of 892.7

(6) Table 5, page 31 from report cited in footnote (4)

(7) From the following reports -

A. Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"

B. Hansen, Allen, and Luce, July 2000, for Utah Division of Water Resources, "Municipal and Industrial Water Supply and Uses in the Utah and East Juab Counties Area"

C. JUB Engineers, March 1996, "Water Rights Analysis, Future Demands and Needs Inventory" for South Utah Valley Municipal Water Association

(8) From report by Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"

(9) From Spanish Fork River Commissioner Report, dry year yield for 1961.The amount obtained From this report was amended on Aug 21, 2002, in accordance with the 2000 Federal Notice of Environmental Assessment issued by the Dept. of Interior, which limited SVP to 10,177 ac-ft across the ten cities.

(10) From Spanish Fork River Commissioner Report, dry year yield for 1961. The amounts obtained from this report were reduced by half under the assumption tht only 1/2 the river water

(11) From ~~Spanish Fork River Commissioner Report, dry year yield for 1961~~. The amounts obtained from this report were reduced by half under the assumption tht only 1/2 the river water

(12) Computed by dividing 1827 acre-feet of SVP water declaration boundary acreage(7817 acres) to obtain a yield of .234 acre-feet per acre

(13) Computed by dividing 196 acre-feet of Spanish Fork River water declaration boundary acreage (7817 acres) to obtain a yield of 0.014 acre-feet per acre.

(14)Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied by the dry year yield of the agricultural water. Developable SVP supplies are calculated the same way except using the dry year yield of SVP water. Same procedure is completed for each successive 10 year increments with the amount of conversion being accumulated.

Table D-8

Payson

Utah Lake Drainage Basin Water Delivery System

Summary of Available Water Supplies and Demand through Year 2050

January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 24,721 acres (from Brown & Caldwell Report, Table 2, September 1999) Irrigated acres = 10,616 acres (from JUB Report, Table 13, March 1996).						
Population Projections (State of Utah - Office of Planning and Budget)	12,716	20,606	27,750	30,583	55,673	80,763
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050) Capped at 220 gpcd						
Acre-feet/capita/year[1]	0.308	0.297	0.287	0.277	0.256	0.246
Acre-feet/year[2]	3,921	6,124	7,970	8,480	14,263	19,899
Total Water Use Gallons per capita per day[3]	275	265	256	248	229	220
Potable Demand (gpcd)	150	147	144	142	139	136
Indoor demand[4]	79	78	76	75	73	72
Outdoor demand[4]	1	1	1	1	1	1
Institutional, Commercial, and Industrial[4]	70	69	67	66	65	63
Non-potable outdoor demand in gpcd[5]	125	118	112	106	90	84

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Springs[6]		1,448		1,448		0
Groundwater Wells[7]		7,057		3,300		3,757
South Utah Valley Municipal Water Association (SUVMWA)[8]						
Share of SUVMWA purchased water from East/South Jordan Canal Company	80		80		0	
Share of SUVMWA CUP M&I	316		316		0	
Subtotal		396		396		0
SVP water[9]						
Highline Canal	3,758		3,758		0	
Salem Canal	0		0		0	
Subtotal		3,758		3,758		0
Spanish Fork River water[10]						
Highline Canal	0		0		0	
Salem Canal	110		0		110	
Subtotal		110		0		110
Local streams[11]						
Payson (Peteeteneet) Creek	1,440		1,440		0	
Spring Lake	1,400		1,400		0	
Subtotal		2,840		2,840		0
Total		15,609		11,742		3,867

Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre[12]**		0.000	**Spanish Fork River Yield in acre-feet per acre[13]**		0.004
Year	**YR 2000**	**YR 2010**	**YR 2020**	**YR 2030**	**YR 2040**	**YR 2050**
SVP water[14]	0	0	0	0	0	0
Spanish Fork River water[14]	0	6	11	13	32	50

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Potable demand in acre-feet	2,141	3,400	4,488	4,848	8,651	12,300
Springs	1,448	1,448	1,448	1,448	1,448	1,448
Groundwater wells	693	1,952	3,040	3,300	3,300	3,300
Spring Lake	0	0	0	100	1,400	1,400
Unmet Demand for Culinary Supplies	0	0	0	0	2,503	6,152
Non-potable demand in acre-feet	1,781	2,724	3,482	3,631	5,613	7,600
Springs	0	0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
SUVMWA	0	396	396	396	396	396
SVP water (existing)	1,781	1,840	1,840	1,840	3,758	3,758
Spanish Fork River water	0	0	0	0	19	50
Payson (Peteetenet) Creek	0	488	1,246	1,395	1,440	1,440
Unmet Demand for Secondary Supplies	0	0	0	0	0	1,956
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells (culinary use)	0	0	0	0	2,471	3,757
SVP Water (culinary requirements from agricultural conversions)	0	0	0	0	0	0
SVP Water (agriculture conversion)	0	0	0	0	0	0
Spanish Fork River water (agriculture conversion)	0	0	0	0	31	0
Total New Supplies Developed	0	0	0	0	2502	3757
Remaining Demand Not Met	0	0	0	0	0	4,350
Total Remaining Available Supplies	11,687	9,485	7,639	7,130	1,346	60
Unavailable Agricultural Water Within Declaration Boundary	110	104	99	97	78	60

FOOTNOTES:

(1) Total water use (275 gpcd) divided by a factor of 892.7 converts gpcd to acre-feet per capita

(2) Acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.372 acre-feet per capita times population of 12,716 equals 3,921 acre-feet.

(3) Gallons per capita per day is the sum of Total potable use plus Non-potable use.

(4) Gallons per capita per day (gpcd) for 1998 was obtained from the report "Municipal and Industrial Water Supply and Uses in Utah and East Juab Counties area", July 2000, by Hansen, Allen, and Luce for the Utah Division of Water Resources. GPCD was computed by multiplying acre-feet per capita from Table 6, page 32 by a conversion factor of 892.7

(5) Gpcd for 1998 non-potable use was obtained from report cited in footnote 4 by multiplying acre-feet per capita from Table 7, page 34 (secondary use) by a factor of 892.7

(6) Table 5, page 31 from report cited in footnote (4)

(7) From the following reports -

A. Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"

B. Hansen, Allen, and Luce, July 2000, for Utah Division of Water Resources, "Municipal and Industrial Water Supply and Uses in the Utah and East Juab Counties Area"

C. JUB Engineers, March 1996, "Water Rights Analysis, Future Demands and Needs Inventory" for South Utah Valley Municipal Water Association

(8) From report by Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"

(9) ~~From Spanish Fork River Commissioner Report, dry year yield for 1961.~~ The amount obtained from this report was amended on Aug 21, 2002, in accordance with the 2000 Federal Notice of Environmental Assessment issued by the Dept. of Interior, which limited SVP to 10,177 ac-ft across the ten cities.

(10) ~~From Spanish Fork River Commissioner Report, dry year yield for 1961.~~ The amounts obtained from this report were reduced by half under the assumption that only 1/2 the river water would become available for M&I use.

(11) ~~From Spanish Fork River Commissioner Report, dry year yield for 1961.~~ The amounts obtained from this report were reduced by half under the assumption that only 1/2 the irrigation water would become available for M&I use.

(12) All SVP water is currently available within the city. No developable future supplies exist.

(13) Computed by dividing 110 acre-feet of Spanish Fork River water declaration boundary acreage (27721 acres) to obtain a yield of 0.004 acre-feet per acre.

(14) Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied by the dry year yield of the agricultural water. Developable SVP supplies are calculated the same way except using the dry year yield of SVP water. Same procedure is completed for each successive 10 year increments with the amount of conversion being accumulated.

Table D-9

Salem

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
January 30, 2003

Declaration boundary = 7,500 acres (from Brown & Caldwell Report, Table 2, September 1999) **Irrigated acres = 5,865 acres** (from JUB Report, Table 7, March 1996).

Population Projections (State of Utah - Office of Planning and Budget)	4,372	7,351	12,101	17,016	24,212	31,409
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050) limited to 220 gpcd minimum						
Acre-feet/capita/year[1]	0.258	0.255	0.254	0.252	0.250	0.246
Acre-feet/year[2]	1,126	1,877	3,074	4,288	6,053	7,727
Total Water Use Gallons per capita per day[3]	230	228	226	224	222	220
Potable Demand (gpcd)	230	178	99	97	95	93
Indoor demand[4]	80	78	77	75	74	72
Outdoor demand[4]	127	77	0	0	0	0
Institutional, Commercial, and Industrial[4]	23	23	22	22	21	21
Non-potable outdoor demand in gpcd[4]	0	50	127	127	127	127

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Springs[5]		200		200		0
Groundwater Wells[7]		3,592		3,344		248
South Utah Valley Municipal Water Association (SUVMWA)[8]						
Share of SUVMWA purchased water from East/South Jordan Canal Company	21.6		21.6		0.0	
Share of SUVMWA CUP M&I	85.7		85.7		0.0	
Subtotal		107		107		0
SVP water[9]						
Highline Canal	20		20		0	
Spanish Fork South	5		5		0	
Salem Canal	100		100		0	
Subtotal		125		125		0
Spanish Fork River water[10]						
Highline Canal	0		0		0	
Spanish Fork South	197		137		60	
Salem Canal	227		0		227	
Subtotal		423		137		286
Local streams[11]						
Salem Pond		86	86		0	
Subtotal		0		86		0
Total		4,533		3,999		534
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre[12]**		0.000	**Spanish Fork River Yield In acre-feet per acre[13]**		0.038
SVP water[14]	0	0	0	0	0	0
Spanish Fork River water[14]	0	13	33	54	84	115

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

Potable demand in acre-feet	1,126	1,465	1,341	1,848	2,577	3,276
Springs	200	200	200	200	200	200
Groundwater wells	926	1,265	1,141	1,648	2,377	3,076
SUVMWA	0	0	0	0	0	0
Unmet Demand for Culinary Supplies	0	0	0	0	0	0
Non-potable demand in acre-feet	0	412	1,733	2,440	3,476	4,451
Springs	0	0	0	0	0	0
Groundwater wells	0	64	1,332	1,696	967	268
SUVMWA	0	107	107	107	107	107
SVP water	0	5	38	125	125	125
Spanish Fork River water	0	150	170	191	221	252
Local front streams	0	86	86	86	86	86
Unmet Demand for Secondary Supplies	0	0	0	235	1,970	3,613
FUTURE SUPPLIES TO BE DEVELOPED TO MEET M&I NEEDS						
Additional Groundwater Wells	0	0	0	235	248	248
SVP water (culinary grade)	0	0	0	0	0	0
SVP Water (non-potable outdoor use)	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0
Total New Supplies Developed	0	0	0	235	248	248
Remaining Demand Not Met	0	0	0	0	1,722	3,365
Total Remaining Available Supplies	3,121	2,383	1,206	13	0	0
Unavailable Agricultural Water Within Declaration Boundary	286	273	253	232	202	171

FOOTNOTES:

(1) Total water use (230 gpcd) divided by a factor of 892.7 converts gpcd to acre-feet per capita
(2) Acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.258 acre-feet per capita times population of 4,372 equals 1,126 acre-feet.
(3) Gallons per capita per day is the sum of Total potable use plus Non-potable use.
(4) Gallons per capita per day (gpcd) for 1998 was obtained from the report "Municipal and Industrial Water Supply and Uses in Utah and East Juab Counties area", July 2000, by Hansen, Allen, and Luce for the Utah Division of Water Resources. GPCD was computed by multiplying acre-feet per capita from Table 6, page 32 by a conversion factor of 892.7
(5) Gpcd for 1998 non-potable use was obtained from report cited in footnote 4 by multiplying acre-feet per capita from Table 7, page 34 (secondary use) by a factor of 892.7
(6) Table 5, page 31 from report cited in footnote (4). The amount obtained in this report was amended as a result of an ionterview with the City on Aug. 7, 2002
(7) From the following reports -
A. Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
B. Hansen, Allen, and Luce, July 2000, for Utah Division of Water Resources, "Municipal and Industrial Water Supply and Uses in the Utah and East Juab Counties Area"
C. JUB Engineers, March 1996, "Water Rights Analysis, Future Demands and Needs Inventory" for South Utah Valley Municipal Water Association
The amount of ground water obtained form the reports above was amended on Aug. 20, 2002 from 5,642 to 3,592 ac-ft as a result of an interview with the City on August 14,
(8) From report by Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
(9) ~~From Spanish Fork River Commissioner Report, dry year yield for 1961.~~ The amount obtained from this report was amended on Aug 21, 2002, in accordance with the 2000 Federal Notice of Environmental Assessment issued by the Dept. of Interior, which limited SVP to 10,177 ac-ft across the ten cities.
(10) ~~From Spanish Fork River Commissioner Report, dry year yield for 1961.~~ The amounts obtained from this report were reduced by half under the assumption that only 1/2 the river
(11) ~~From Spanish Fork River Commissioner Report, dry year yield for 1961.~~ The amounts obtained from this report were reduced by half under the assumption that only 1/2 the irrigation water would become available for M&I use.
(12) All SVP water is currently available within the city. No developable future supplies exist.
(13) Computed by dividing 125 acre-feet of Spanish Fork River water declaration boundary acreage (7500 acres) to obtain a yield of 0.038 acre-feet per acre.
(14) Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied by the dry year yield of the agricultural water. Developable SVP supplies are calculated the same way except using the dry year yield of SVP water. Same procedure is completed for each successive 10 year increments with the amount of conversion being accumulated.

Table D-10

Santaquin

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 7,953 acres (from Brown & Caldwell Report, Table 2, September 1999) **Irrigated acres = 1,600 acres***						
Population Projections (State of Utah - Office of Planning and Budget)	4,834	9,822	16,865	24,263	43,442	62,621
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050) but limited to 220 gpcd						
Acre-feet/capita/year[1]	0.385	0.357	0.329	0.301	0.273	0.246
Acre-feet/year[2]	1,863	3,510	5,554	7,311	11,874	15,433
Total Water Use Gallons per capita per day[3]	344	319	294	269	244	220
Potable Demand (gpcd)	154	144	134	124	114	105
Indoor demand[4]	87	76	75	74	73	72
Outdoor demand[4]	58	59	50	41	32	24
Institutional, Commercial, and Industrial[4]	9	9	9	9	9	9
Non-potable outdoor demand in gpcd[5]	190	175	160	145	130	115

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Springs[6] (Note: 100 gpm goes to Genola or about 17 acre-feet per year)		1,158		1,158		0
Springs[6] (Note: 100 gpm goes to Genola or about 17 acre-feet per year)		3,844		414		3,430
Recent Purchase of East/South Jordan Canal Water[8a]		807		807		0
South Utah Valley Municipal Water Association (SUVMWA)[8]						
Share of SUVMWA purchased water from East/South Jordan Canal Company	21.2		21.2		0.0	
Share of SUVMWA CUP M&I	84.3		84.3		0.0	
Subtotal		106		106		0
SVP water[9]						
Highline Canal	0		0		0	
Salem Canal	0		0		0	
Subtotal		0		0		0
Local Irrigation Companies[10]						
Summit Creek Irrigation Company Well	1,450			0	1,450	
Summit Creek Irrigation Company	1,412		760		652	
East Santaquin Irrigation Company (Well)	385		0		385	
Subtotal		3,247		760		2,487
Total		**9,161**		**3,245**		**5,917**

Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre**		0	**Summit Creek IrrigationYield in acre-feet per acre**[13]		0.313
SVP water[14]	0	0	0	0	0	0
Local Irrigation Companies	0	260	627	1,012	2,012	2,487

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

Potable demand in acre-feet	834	1,584	2,532	3,370	5,548	7,366
Springs	422	1,158	1,158	1,158	1,158	1,158
Groundwater wells	414	414	414	414	414	414
Remaining Demand for Culinary Supplies	0	0	960	1,798	3,976	5,794
Non-potable demand in acre-feet	1,029	1,925	3,023	3,941	6,326	8,067
Springs	1,029	0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
SUVMWA	0	106	106	106	106	106
Recent purchase of East/South Jordan Canal Water	0	807	807	807	807	807
SVP Water	0	0	0	0	0	0
Local Irrigation Companies	0	760	760	760	760	760
Remaining Demand for Secondary Supplies	0	252	1,350	2,268	4,653	6,394
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	1,682	3,054	3,430	3,430
SVP Water	0	0	0	0	0	0
Local Irrigation Companies	0	252	627	1,012	2,012	2,487
Total New Supplies Developed	0	252	2,309	4,066	5,442	5,917
Remaining Demand Not Met	0	0	0	0	3,187	6,271
Total Remaining Available Supplies	4,810	3,437	1,747	376	-1	-1
Unavailable Agricultural Water Within Declaration Boundary	2,487	2,227	1,860	1,474	475	-1

FOOTNOTES:
*Irrigated acres from SFN Plan formulation report.
(1) Total water use (344 gpcd) divided by a factor of 892.7 converts gpcd to acre-feet per capita
(2) Present water use was obtained from City Engineer for Sanataquin on October 2, 2001
(3) Gallons per capita per day is the sum of Total potable use plus Non-potable use.
(4) Gallons per capita per day (gpcd) for 1998 was obtained from the report "Municipal and Industrial Water Supply and Uses in Utah and East Juab Counties area", July 2000, by Hansen, Allen, and Luce for the Utah Division of Water Resources. GPCD was computed by multiplying acre-feet per capita from Table 6, page 32 by a conversion factor of 892.7
(5) Gpcd for 1998 non-potable use was obtained from report cited in footnote 4 by multiplying acre-feet per capita from Table 7, page 34 (secondary use) by a factor of 892.7
(6) Table 5, page 31 from report cited in footnote (4). The amount obtained in this report was amended as a result of an interview with the City on Aug. 7, 2002
(7) From the following reports -
A. Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
B. Hansen, Allen, and Luce, July 2000, for Utah Division of Water Resources, "Municipal and Industrial Water Supply and Uses in the Utah and East Juab Counties Area"
C. JUB Engineers, March 1996, "Water Rights Analysis, Future Demands and Needs Inventory" for South Utah Valley Municipal Water Association
(8) From report by Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
(8a) Information obtained from Santaquin City Engineer on August 7, 2002
(9) No SVP water available for Santaquin
(10) No Spanish Fork River water available for Santaquin. Irrigation Company supply was reduced by 1/2 under the assumption that only half of the irrigation water would become available for M&I use.
(13) Computed by dividing 2487 acre-feet of Summit Creek Irrigation water by declaration boundary acreage of 7953 acres to obtain a yield of 0.313 acre-feet per acre.
(14) Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied by the dry year yield of the agricultural water. Developable SVP supplies are calculated the same way except using the dry year yield of SVP water. Same procedure is completed for each successive 10 year increments with the amount of conversion being accumulated.

Table D-11

Spanish Fork
Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 17,881 acres (from Brown & Caldwell Report, Table 2, September 1999) **Irrigated acres = 14,226acres** (from JUB Report, Table 4, March 1996)						
Population Projections (State of Utah - Office of Planning and Budget)	20,246	27,693	32,745	35,771	50,900	66,028
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050) but limited to 190 gpcd						
Acre-feet/capita/year[1]	0.261	0.258	0.254	0.251	0.248	0.246
Acre-feet/year[2]	5,284	7,135	8,327	8,976	12,601	16,272
Total Water Use Gallons per capita per day[3]	233	230	227	224	221	220
Potable Demand (gpcd)	203	195	187	179	171	165
Indoor demand[4]	78	77	76	75	74	73
Outdoor demand[4]	75	70	65	60	55	52
Institutional, Commercial, and Industrial[4]	50	48	46	44	42	40
Non-potable outdoor demand in gpcd[5]	30	35	40	45	50	55

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Springs[6]	1,591		dry yr. yield	1,591		0
Subtotal		1,591				
Spring Creek[6]	4,691			4,691		0
Subtotal		4,691				
Groundwater Wells[7]	10,467			10,467		0
Subtotal		10,467				
South Utah Valley Municipal Water Association (SUVMW)[8]						
Share of SUVMWA purchased water from East/South Jordan Canal Company	108.0		108.0		0.0	
Share of SUVMWA CUP M&I	429.3		429.3		0.0	
Subtotal		537		537		0
SVP water[9]						
Highline Canal	219		219		0	
Mapleton Canal	48		48		0	
East Bench Canal	2,016		2,016		0	
Spanish Fork South Canal (20% of 1,045[9a])	137		137		0	
Southeast Canal (City will not expand onto this land[9a])	0		0		0	
Westfield (80% of 1,920[9a])	1,001		1,001		0	
Subtotal		3,421		3,421		0
Spanish Fork River water[10]						
Highline Canal	6		0		6	
Mapleton Canal	0		0		0	
East Bench Canal	626		626		0	
Spanish Fork South Canal (20% of 2,268)[10a]	227		144		83	
Southeast Canal (city will not expand onto this land[10a]	0		0		0	
Westfield (80% of 8,390 - see footnote 10a)	3,356		100		3,256	
Subtotal	8,429	4,215		870		3,345
Spring Exchange Water[11]						
Mill Race Exchange	238		238		0	
Malcolm Stream	635		635		0	
Spanish Fork City (SVP water)	0		0			
Subtotal	1,745	873		873		0
Total		**25,794**		**22,450**		**3,345**
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre[12]**		0.000	**Spanish Fork River Yield in acre-feet per acre[13]**		0.187
SVP water[14]	0	0	0	0	0	0
Spanish Fork River water[14]	0	232	390	484	955	1,427

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

Potable demand in acre-feet	4,604	6,049	6,859	7,173	9,750	12,204
Springs	1,591	1,591	1,591	1,591	1,591	1,591
Spring Creek	3,013	4,458	4,691	4,691	4,691	4,691
Groundwater wells	0	0	577	891	3,468	5,922
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Non-potable demand in acre-feet	680	1,086	1,467	1,803	2,851	4,068
Springs	0	0	0	0	0	0
Spring Creek	0	0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
SUVMWA	537	537	537	537	537	537
SVP water	0	0	0	0	6	440
Spanish Fork River water	143	549	930	1,266	1,930	2,218
Local front streams	0	0	0	0	378	873
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
SVP Water	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0
Total New Supplies Developed	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	20,510	18,659	18,045	17,709	16,661	15,444
Unavailable Agricultural Water Within Declaration Boundary	3,345	3,112	2,955	2,861	2,389	1,918

FOOTNOTES:

(1) Total water use (233 gpcd) divided by a factor of 892.7 converts gpcd to acre-feet per capita
(2) Acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.261 acre-feet per capita times population of 20,246 equals 5,284 acre-feet.
(3) Gallons per capita per day is the sum of Total potable use plus Non-potable use.
(4) Gallons per capita per day (gpcd) for 1998 was obtained from the report "Municipal and Industrial Water Supply and Uses in Utah and East Juab Counties area", July 2000, by Hansen, Allen, and Luce for the Utah Division of Water Resources. GPCD was computed by multiplying acre-feet per capita from Table 6, page 32 by a conversion factor of 892.7
(5) Gpcd for 1998 non-potable use was obtained from report cited in footnote 4 by multiplying acre-feet per capita from Table 7, page 34 (secondary use) by a factor of 892.7
(6) Table 5, page 31 from report cited in footnote (4). The amount obtained in this report was amended as a result of an interview with the City on Aug. 7, 2002
(7) From the following reports -
A. Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
B. Hansen, Allen, and Luce, July 2000, for Utah Division of Water Resources, "Municipal and Industrial Water Supply and Uses in the Utah and East Juab Counties Area"
C. JUB Engineers, March 1996, "Water Rights Analysis, Future Demands and Needs Inventory" for South Utah Valley Municipal Water Association
The amount of ground water obtained form the reports above was amended on Aug. 20, 2002 from 5,642 to 3,592 ac-ft as a result of an interview with the City on August 14,
(8) From report by Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
(9) ~~From Spanish Fork River Commissioner Report, dry year yield for 1961~~ The amount obtained from this report was amended on Aug 21, 2002, in accordance with the 2000 Federal Notice of Environmental Assessment issued by the Dept. of Interior, which limited SVP to 10,177 ac-ft across the ten cities.
(10) ~~From Spanish Fork River Commissioner Report, dry year yield for 1961.~~ The amounts obtained from this report were reduced by half under the assumption that only 1/2 the river water would become available for M&I use.
(10a) Percentages were obtained from Richard Heap, Spanish Fork City Engineer on August 7, 2002
(11) From report cited in Footnote 7 c and as amended with discussions with Spanish Fork City.
(12) All SVP water is currently available within the city. No developable future supplies exist.
(13) Computed by dividing the Spanish Fork River water available for future development (3,345 ac-ft) by declaration boundary acreage of 17,881 acres .
(14) Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied by the dry year yield of the agricultural water. Developable SVP supplies are calculated the same way except using the dry year yield of SVP water. Same procedure is completed for each successive 10 year increments with the amount of conversion being accumulated.

Table D-12

Springville

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 11,185 acres (from Brown & Caldwell Report, Table 2, September 1999) **Irrigated acres = 4,780 acres**						
Population Projections (State of Utah - Office of Planning and Budget)	20,424	28,866	34,132	37,286	59,658	59,658
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.348	0.336	0.314	0.291	0.269	0.246
Acre-feet/year[2]	7,115	9,701	10,706	10,860	16,039	14,702
Total Water Use Gallons per capita per day[3]	311	300	280	260	240	220
Potable Demand (gpcd)	290	268	186	164	142	120
Indoor demand[4]	80	78	76	74	72	70
Outdoor demand[4]	73	70	0	0	0	0
Institutional, Commercial, and Industrial[4]	137	120	110	90	70	50
Non-potable outdoor demand in gpcd[5]	21	32	94	96	98	100

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Springs[6]	8,000					0
		8,000		8,000		
Groundwater Wells[7]	10,816					2,570
Subtotal		10,816		8246		
South Utah Valley Municipal Water Association (SUVMWA)[8]						
Share of SUVMWA purchased water from East/South Jordan Canal Company	116.4		116.4		0.0	
Share of SUVMWA CUP M&I	462.7		462.7		0.0	
Subtotal		579		579		0
SVP water[9]						
Springville Irrigation Co. (Mapleton Lateral)	1,051		1,051		0	
(none)	0		0		0	
Subtotal		1,051		1,051		0
Spanish Fork River water[10]						
Spanish Fork River water Mapleton Lateral	0		0		0	
(none)		0		0		0
Subtotal		0		0		0
Local streams[11]						
Hobble Creek	2,104		2,104		0	
(none)	0		0		0	
Subtotal		2,104		2,104		0
Total		**22,550**		**19,980**		**2,570**

Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield (acre feet per acre)** (footnote 12)		0.000	**Hobble Creek Yield (acre-feet per acre)** (footnote 13)		0.000
SVP water (footnote 14)	0	0	0	0	0	0
Hobble Creek water (footnote 14)	0	0	0	0	0	0

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Potable demand in acre-feet	6635	8666	7112	6850	9490	8019
Springs	6635	8000	7112	6850	8000	8000
Groundwater wells	0	666	0	0	1490	19
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Non-potable demand in acre-feet	480	1035	3594	4010	6549	6683
Springs	0	0	0	276	0	0
Groundwater wells	0	0	0	0	2815	2949
SUVMWA	0	579	579	579	579	579
SVP water	0	0	911	1051	1051	1051
Hobble Creek water	480	456	2104	2104	2104	2104
Local front streams	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
SVP Water	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0
Total New Supplies Developed	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	15,434	12,849	11,844	11,690	6,511	7,847
Unavailable Agricultural Water Within Declaration Boundary	0	0	0	0	0	0

FOOTNOTES:

(1) acre-feet per capita computed by 311 gpcd divided by a factor of 892.7 converts gpcd to 0.348 acre-feet per capita)
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.348 acre-feet per capita times population of 20,424 equals 7,115 acre-feet.
(3) gallons per capita per day is the sum of Total potable use plus Non-potable use.
(4) gallons per capita per day (gpcd) for 1998 was obtained from the report "Municipal and Industrial Water Supply and Uses in Utah and East Juab Counties area", July 2000, by Hansen, Allen, and Luce for the Utah Division of Water Resources. GPCD was computed by multiplying acre-feet per capita from Table 6, page 32 by a conversion factor of 892.7
(5) gpcd for 1998 non-potable use was obtained from report cited in footnote 4 by multiplying acre-feet per capita from Table 7, page 34 (secondary use) by a factor of 892.7
(6) Table 5, page 31 from report cited in footnote (4)
(7) from the following reports -
A. Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
B. Hansen, Allen, and Luce, July 2000, for Utah Division of Water Resources, "Municipal and Industrial Water Supply and Uses in the Utah and East Juab Counties Area"
C. JUB Engineers, March 1996, "Water Rights Analysis, Future Demands and Needs Inventory" for South Utah Valley Municipal Water Association
(8) from report by Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
(9) ~~A value of 4,490 acre-feet for ultimate potential for SVP water was obtained from Carpenter (1996) - report cited in footnote (6)~~ A. The amount obtained from this report was amended on Aug 21, 2002, in accordance with the 2000 Federal Notice of Environmental Assessment issued by the Dept. of Interior, which limited SVP to 10,177 ac-ft across the ten cities.
(10) not applicable
(11) ~~from Carpenter (1996) - report cited in footnote (6) A. The 3,439 includes (Springville Irrigation Company - 3,296 AF, plus Matson Spring Irrigation Company - 10 AF, Wood Spring Irrigation Company - 80 AF, Big Hollow Irrigation Company - 24 AF, Mill Pond Irrigation Company - 29 AF)~~ The amounts obtained from this report were reduced by half under the assumption tht only 1/2 the irrigation water would become available for M&I use.
(12) All SVP water is currently available within the city. No developable future supplies exist.
(13) All Hobble Creek water has already been developed. No developable future supplies exist.
(14)Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied by the dry year yield of the agricultural water. Developable SVP supplies are calculated the same way except using the dry year yield of SVP water. Same procedure is completed for each successive 10 year increments with the amount of conversion being accumulated.

Table D-13

Woodland Hills

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 2,051 acres (from Brown & Caldwell Report, Table 2, September 1999) **Irrigated acres = 0 acres** (from JUB Report, Table 9, March 1996)						
Population Projections (State of Utah - Office of Planning and Budget)	941	1,891	3,247	4,014	4,793	4,793
Future Demand With Conservation (not applicable because gpcd is significantly below 190 gpcd)						
Acre-feet/capita/year[1]	0.169	0.198	0.203	0.208	0.213	0.213
Acre-feet/year[2]	159	375	658	836	1,020	1,020
Total Water Use Gallons per capita per day[3]	151	177	181	186	190	190
Potable Demand (gpcd)	151	177	181	186	190	190
Indoor demand[4]	80	80	78	76	74	72
Outdoor demand[4]	71	67	63	60	58	55
Institutional, Commercial, and Industrial[4]	0	30	40	50	58	63
Non-potable outdoor demand in gpcd[5]	0	0	0	0	0	0

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Springs (footnote 6)		0		0		0
Subtotal		0				
Groundwater Wells (footnote 7)		456		456		0
South Utah Valley Municipal Water Association (SUVMWA) (footnote 8)						0
Share of SUVMWA purchased water from East/South Jordan Canal Company	5.6		5.6		0.0	
Share of SUVMWA CUP M&I	22.3		22.3		0.0	
Subtotal		28		28		0
SVP water						
Highline Canal	0		0		0	
Salem Canal	0		0		0	
Subtotal		0		0		0
Spanish Fork River water						
Highline Canal	0		0		0	
Salem Canal	0		0		0	
Subtotal		0		0		0
Local streams						
(none)	0		0		0	
(none)	0		0		0	
Subtotal		0		0		0
Total		**484**		**484**		**0**
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted		0.000				0.000
SVP water	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

Potable demand in acre-feet	159	375	658	836	1,020	1,020
Springs	0	0	0	0	0	0
Groundwater wells	159	347	456	456	456	456
SUVMWA		28	28	28	28	28
Remaining Demand for Culinary Supplies	0	0	174	352	536	536
Non-potable demand in acre-feet	0	0	0	0	0	0
Springs	0	0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
SUVMWA	0	0	0	0	0	0
SVP water	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0
Local front streams	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
SVP Water	0	0	0	0	0	0
Spanish Fork River water	0	0	0	0	0	0
Total New Supplies Developed	0	0	0	0	0	0
Remaining Demand Not Met	0	0	174	352	536	536
Total Remaining Available Supplies	325	109	0	0	0	0
Unavailable Agricultural Water Within Declaration Boundary	0	0	0	0	0	0

FOOTNOTES:

(1) acre-feet per capita computed by 151 gpcd divided by a factor of 892.7 converts gpcd to 0.169 acre-feet per capita
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.169 acre-feet per capita times population of 941 equals 159 acre-feet.
(3) gallons per capita per day is the sum of Total potable use plus Non-potable use.
(4) gallons per capita per day (gpcd) for 1998 was obtained from the report "Municipal and Industrial Water Supply and Uses in Utah and East Juab Counties area", July 2000, by Hansen, Allen, and Luce for the Utah Division of Water Resources. GPCD was computed by multiplying acre-feet per capita from Table 6, page 32 by a conversion factor of 892.7
(5) gpcd for 1998 non-potable use was obtained from report cited in footnote 4 by multiplying acre-feet per capita from Table 7, page 34 (secondary use) by a factor of 892.7
(6) Table 5, page 31 from report cited in footnote (4)
(7) from the following reports -
A. Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"
B. Hansen, Allen, and Luce, July 2000, for Utah Division of Water Resources, "Municipal and Industrial Water Supply and Uses in the Utah and East Juab Counties Area"
C. JUB Engineers, March 1996, "Water Rights Analysis, Future Demands and Needs Inventory" for South Utah Valley Municipal Water Association
The amount obtained from these reports was amended on Aug 21, 2002 from a memo dated Jul 16, 2002 by Tony Fuller, Water rights specialist for the City of Salem
(8) from report by Carl Carpenter, June 1996, "Water Supply Planning Report for South Utah Valley Municipal Water Association"

Table D-14

Goshen Valley

Utah Lake Drainage Basin Water Delivery System

Summary of Available Water Supplies and Demand through Year 2050

January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Approximate Size of Boundary is 20,000 acres Irrigated acres =						
Population Projections (State of Utah - Office of Planning and Budget)	415	1,172	1,731	2,415	25,264	48,114
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.246	0.246	0.246	0.246	0.246	0.246
Acre-feet/year[2]	102	289	426	595	6,226	11,857
Total Water Use Gallons per capita per day[3]	220	220	220	220	220	220
Potable Demand (gpcd)	180	150	130	110	110	110
Indoor demand[4]	90	90	90	90	90	90
Outdoor demand[4]	70	40	20	0	0	0
Institutional, Commercial, and Industrial[4]	20	20	20	20	20	20
Non-potable outdoor demand in gpcd[4]	40	70	90	110	110	110

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Springs	0			0		0
Subtotal		0				
Groundwater Wells	0			0		0
Subtotal		0				
South Utah Valley Municipal Water Association (SUVMWA)						0
Subtotal		0		0		0
SVP water	0					
Subtotal		0		0		0
Irrigation water	0					
Current Creek Irrigation Company (private lands)	1,248		0		1,248	
Subtotal		1,248		0		1,248
Local streams	0					
Subtotal		0		0		0
Total		1,248		0		1,248
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre**		0.00	**Goshen Irrigation Canal (yield in acre-feet per acre)**		0.42
SVP water	0	0	0	0	0	0
Irrigation water	0	52	91	139	1,248	1,248
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	84	197	251	298	3,113	5,929
Springs						
Groundwater wells						
Remaining Demand for Culinary Supplies	84	197	251	298	3,113	5,929
Non-potable demand in acre-feet	19	92	175	298	3,113	5,929
Springs						
Groundwater wells						
SUVMWA						
SVP water						
Spanish Fork River water						
Local front streams						
Remaining Demand for Secondary Supplies	19	92	175	298	3,113	5,929
Future Supplies To Be Developed to Meet Population Growth						
Additional Groundwater Wells						
SVP Water						
Current Creek Irrigation Canal (private ownership of agricultural lands)		52	91	139	1,248	1,248
Total New Supplies Developed		52	91	139	1,248	1,248
Remaining Demand Not Met	102	237	335	456	4,978	10,609
Total Remaining Available Supplies	1,248	1,196	1,157	1,109	0	0
Unavailable Agricultural Water Within Declaration Boundary	1,248	1,196	1,157	1,109	0	0

FOOTNOTES:

(1) Total water use of 220 gpcd has been established for all new area in South Utah County and does not reflect actual usage.

(2) Acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.246 acre-feet per capita times population of 415 equals 102 acre-feet.

(3) Gallons per capita per day is the sum of Total potable use plus Non-potable use.

(4) An assumed value that was considered to be representative of future use.

Table D-15

West Mountain Area

Utah Lake Drainage Basin Water Delivery System

Summary of Available Water Supplies and Demand through Year 2050

January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = acres Irrigated acres = 4,274						
Population Projections (State of Utah - Office of Planning and Budget)	2,026	5,722	8,452	11,789	13,157	14,525
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.246	0.246	0.246	0.246	0.246	0.246
Acre-feet/year[2]	499	1,410	2,079	2,905	3,242	3,580
Total Water Use Gallons per capita per day[3]	220	220	220	220	220	220
Potable Demand (gpcd)	180	150	130	110	110	110
Indoor demand[4]	90	90	90	90	90	90
Outdoor demand[4]	70	40	20	0	0	0
Institutional, Commercial, and Industrial[4]	20	20	20	20	20	20
Non-potable outdoor demand in gpcd[4]	40	70	90	110	110	110

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Springs	0			0		
Subtotal		0				0
Groundwater Wells (assume present demands met by existing wells)	500			500		
Subtotal		500				0
South Utah Valley Municipal Water Association (SUVMWA)	0			0		
Subtotal		0				0
SVP water	0					
Subtotal		0		0		0
Irrigation Company Water	3,086					
Lakeshore Irrigation Company (1961 yield of approx. 3,086 AF) see footnote 5						
Subtotal		3,086		3,086		0
Local streams	0					
Subtotal		0		0		0
Total		3,586		3,586		0
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre**		0.00	**Irrigation Water yield (acre-feet per acre)**		0.72
SVP water	0	0	0	0	0	0
Irrigation water (see footnote 6 - assume 80% of growth will be on ag. lands)	0	356	619	940	1,072	1,203
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	409	961	1,227	1,453	1,621	1,790
Springs	0	0	0	0	0	0
Groundwater wells	409	500	500	500	500	500
Remaining Demand for Culinary Supplies	0	461	727	953	1,121	1,290
Non-potable demand in acre-feet	91	449	852	1,453	1,621	1,790
Springs						
Groundwater wells	91					
SUVMWA						
SVP water	0	0	0	0	0	0
Local front streams						
Remaining Demand for Secondary Supplies	0	449	852	1,453	1,621	1,790
Future Supplies To Be Developed to Meet Population Growth						
Additional Groundwater Wells						
SVP Water	0	0	0	0	0	0
Conversion of Lakeshore Irrigation Company	0	356	619	940	1,072	1,203
Total New Supplies Developed	0	356	619	940	1,072	1,203
Remaining Demand Not Met	(1)	554	960	1,465	1,670	1,877
Total Remaining Available Supplies	1	0	0	0	0	0
Unavailable Agricultural Water Within Declaration Boundary	3,086	2,730	2,467	2,146	2,014	1,883

FOOTNOTES:

(1) Total water use of 220 gpcd has been established for all new area in South Utah County and does not reflect actual usage.

(2) Acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.246 acre-feet per capita times population of 2026 equals 499 acre-feet.

(3) Gallons per capita per day is the sum of Total potable use plus Non-potable use.

(4) An assumed value that was considered to be representative of future use.

(5) Yield of 3,086 acre-feet is the 1961 dry year yield. Information obtained by the Draft Water Supply Appendix, March 1998, Volume 2, Bonneville Unit

Table D-16

West Shore Area (Mosida Area)
Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Approximate Area = 15,000 acres Irrigated acres = 0						
Population Projections (State of Utah - Office of Planning and Budget)	44	124	184	256	6,659	13,061
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.246	0.246	0.246	0.246	0.246	0.246
Acre-feet/year[2]	11	31	45	63	1,641	3,219
Total Water Use Gallons per capita per day[3]	220	220	220	220	220	220
Potable Demand (gpcd)	180	150	130	110	110	110
Indoor demand[4]	90	90	90	90	90	90
Outdoor demand[4]	70	40	20	0	0	0
Institutional, Commercial, and Industrial[4]	20	20	20	20	20	20
Non-potable outdoor demand in gpcd[4]	40	70	90	110	110	110
CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS						
Source of Water	**Gross Amount of Water Available within Declaration Boundary**		**Portion of Gross Water Supply Presently Developed**		**Portion of Gross Water Supply Presently Not Developed or Unavailable**	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Springs	0			0		0
Subtotal		0				
Groundwater Wells (assume 300 acre-feet of privately owned)	300			0		300
Subtotal		300				
South Utah Valley Municipal Water Association (SUVMWA)	0			0		0
Subtotal		0				
SVP water	0					0
Subtotal		0		0		
Irrigation Company Water	0					0
Subtotal		0		0		
Local streams	0					0
Subtotal		0		0		
Total		**300**		0		**300**
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre**		0.00	**Irrigation Water yield (acre-feet per acre)**		0.00
SVP water	0	0	0	0	0	0
Irrigation water	0	0	0	0	0	0
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	9	21	27	32	821	1,609
Springs						
Groundwater wells						
Remaining Demand for Culinary Supplies	9	21	27	32	821	1,609
Non-potable demand in acre-feet	2	10	19	32	821	1,609
Springs						
Groundwater wells						
SUVMWA						
SVP water						
Spanish Fork River water						
Local front streams						
Remaining Demand for Secondary Supplies	2	10	19	32	821	1,609
Future Supplies To Be Developed to Meet Population Growth						
Additional Groundwater Wells						
SVP Water						
Potential purchase of existing groundwater wells	11	31	45	63	300	300
Total New Supplies Developed	11	31	45	63	300	300
Remaining Demand Not Met	0	0	0	0	1,341	2,919
Total Remaining Available Supplies	289	269	255	237	0	0
Unavailable Agricultural Water Within Declaration Boundary	0	0	0	0	0	0

FOOTNOTES:
(1) Total water use of 220 gpcd has been established for all new area in South Utah County and does not reflect actual usage.
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.246 acre-feet per capita times population of 44 equals 11 acre-feet.
(3) Gallons per capita per day is the sum of Total potable use plus Non-potable use.
(4) An assumed value that was considered to be representative of future use.

Table D-17

Other Unincorporated Area

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = acres Irrigated acres =						
Population Projections (State of Utah - Office of Planning and Budget)	8,169	6,944	4,861	1,944	1,878	1,811
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.246	0.246	0.246	0.246	0.246	0.246
Acre-feet/year[2]	2,013	1,711	1,196	479	463	446
Total Water Use Gallons per capita per day[3]	220	220	220	220	220	220
Potable Demand (gpcd)	180	150	130	110	110	110
Indoor demand[4]	90	90	90	90	90	90
Outdoor demand[4]	70	40	20	0	0	0
Institutional, Commercial, and Industrial[4]	20	20	20	20	20	20
Non-potable outdoor demand in gpcd[4]	40	70	90	110	110	110

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS						
Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Springs	0			0		0
Subtotal		0				
Groundwater Wells	0			0		0
Subtotal		0				
South Utah Valley Municipal Water Association (SUVMWA)	0			0		0
Subtotal		0				
SVP water	0					0
Subtotal		0		0		
Irrigation Company Water	0					0
Subtotal		0		0		
Local streams	0					0
Subtotal		0		0		
Total		0		0		0
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	SVP Yield in acre-feet per acre		0.00	Rename this (yield in acre-feet per acre)		0.00
SVP water	0	0	0	0	0	0
Irrigation water	0	0	0	0	0	0

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	1,647	1,167	706	240	231	223
Springs						
Groundwater wells						
Remaining Demand for Culinary Supplies	(1,647)	(1,167)	(706)	(240)	(231)	(223)
Non-potable demand in acre-feet	366	545	490	240	231	223
Springs						
Groundwater wells						
SUVMWA						
SVP water						
Spanish Fork River water						
Local front streams						
Remaining Demand for Secondary Supplies	(366)	(545)	(490)	(240)	(231)	(223)
Future Supplies To Be Developed to Meet Population Growth						
Additional Groundwater Wells						
SVP Water						
Goshen Irrigation Canal						
Total New Supplies Developed	0	0	0	0	0	0
Remaining Demand Not Met	(2,013)	(1,711)	(1,196)	(479)	(463)	(446)
Total Remaining Available Supplies	0	0	0	0	0	0
Unavailable Agricultural Water Within Declaration Boundary	0	0	0	0	0	0

Table D-18

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
Alpine
February 1, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 4,597acres (acreage is from Appendix C-4, page 13, draft report, "North Utah County Water Needs", June 14, 2001						
Population Projections (State of Utah - Office of Planning and Budget)	7,146	9,874	11,752	15,675	18,900	18,900
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.361	0.338	0.316	0.301	0.286	0.271
Acre-feet/year[2]	2,580	3,181	3,722	4,305	4,999	5,596
Total Water Use Gallons per capita per day[3]	322	302	282	269	255	242
Potable Demand (gpcd) (equals the sum of line 8, line 9, and line 10)	121	111	101	91	81	71
Indoor demand[4]	51	51	51	51	51	51
Outdoor demand[4]	50	40	30	20	10	0
Institutional, Commercial, and Industrial[4]	20	20	20	20	20	20
Non-potable outdoor demand in gpcd[4]	201	191	181	178	174	171

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Groundwater Wells[5]		4,716		4,716		0
Springs[6]		292		292		0
Local Streams (Surface Water)[7]						
Dry Creek (Alpine Irrigation Co.)	1,073		0		1,073	
Fort Creek (Alpine Irrigation Co.)	2,000		0		2,000	
Subtotal		3,073		0		3,073
Canals/Storage Water[7]						
Alpine District (Direct Flow)	70		70		0	
Alpine District (Storage)	51		51		0	
CUP	688		688		0	
Subtotal		809		809		0
Total		**8,890**		**5,817**		**3,073**
Potential Agricultural Conversion Assuming 1 Acre per 9 People Converted	**Small urban irrigation lots yield (acre-feet per acre)**		1.53	**(see footnote 8 for explanation of how 1.53 was derived**		
Alpine Irrigation Company Conversion (footnote 9)	0	464	783	1,450	1,998	1,998

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

Potable demand in acre-feet	969	1,228	1,330	1,598	1,715	1,503
Springs	292	292	292	292	292	292
Groundwater Wells (footnote 10)	677	936	1,038	1,306	1,423	1,211
Remaining Demand for Potable Supplies	0	0	0	0	0	0
Non-Potable Secondary demand in acre-feet	1,611	1,954	2,392	2,707	3,284	4,093
Springs	0	0	0	0	0	0
Groundwater wells (footnote 10)	1,611	1,650	1,879	1,898	2,475	3,284
Local Streams (Surface Water)	0	0	0	0	0	0
Canals/Storage Water (includes CUP - 688 AF)	0	304	513	809	809	809
.	0	0	0	0	0	0
.	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies To Be Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Alpine Irrigation Company Conversion	0	0	0	0	0	0
.	0	0	0	0	0	0
Total Requirement for New Supplies	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	3,237	3,099	2,878	2,962	2,816	2,219
Unavailable Agricultural Water Within Declaration Boundary	3,073	2,609	2,290	1,623	1,075	1,075

FOOTNOTES:

(1) calculated by dividing total water use by a factor of 892.7
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.361 acre-feet per capita times 7,146 = 2,580 acre-feet
(3) Gallons per capita per day (gpcd) are obtained from Table 6, page 32, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources (UDWR)
(4) 201 gpcd is a computed value by first dividing year 1999 groundwater pumping 2,525 by year 1999 population of 7,000 which computes to 0.361 acre-feet per capita. By multiplying by 892.7 this converts to 322 gpcd. The second step is to subtract the potable water of 121 gpcd. (322 minus 121 = 201 gpcd)
(5) Table 5, page 10, draft report "North Utah County Water Needs Study", June 14, 2001, by Parsons for the CUWCD and north Utah County cities.
(6)From Table 5, page 31, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area," July 2000 by Hansen, Allen and Luce for UDWR.
(7) From Appendix C-7, page 16, draft report, "North Utah County Water Needs Study", June 14, 2001 by Parsons for the CUWCD and north Utah County cities multiplied times the dry year yield of the agricultural water. For example, (9,400 minus 7,146) divided by 6 times 1.611 equals 605 acre-feet
(8) 1.53 acre-feet per acre is derived by dividing the water supply in line 26 of 3,073 acre-feet by 2,008 acres. The 2,008 acres was derived by assuming that the lot sizes of 40,000 square feet (1 acre) and 217,800 square feet (5) acres which total to 2,008 acres would more nearly represent irrigated agriculture than city lots(from Appendix C-4, draft report, June 14, 2001, "North Utah County Water Needs Study", by Parsons for the CUWCD and north Utah County cities
(9)Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied times the dry year yield of the agricultural water. For example, (9,400 minus 7,146) divided by 6 times 1.611 equals 605 acre-feet
(10) Historical groundwater pumping equals 2,525 ac-ft. The combination of groundwater wells 677 plus 1,848 equals 2,525 acre-feet.

(NOTE: All units in acre-feet unless otherwise noted

Table D-19

American Fork
Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
February 1, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 8,665 acres Irrigated acres = 3,987acres (from draft report, "North Utah County Report, June 14, 2001)						
Population Projections (State of Utah - Office of Planning and Budget)	21,941	27,787	32,573	35,583	46,008	56,433
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.297	0.278	0.260	0.248	0.235	0.223
Acre-feet/year[2]	6,516	8,246	9,447	10,670	12,390	13,872
Total Water Use Gallons per capita per day[3]	265	249	232	221	210	199
Potable Demand (gpcd) (equals the sum of line 8, line 9, and line 10)	260	240	215	190	165	140
Indoor demand[4]	75	75	75	75	75	75
Outdoor demand[4]	102	90	70	50	30	10
Institutional, Commercial, and Industrial[4]	88	75	70	65	60	55
Non-potable outdoor demand in gpcd[4]	5	9	17	31	45	59

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Groundwater Wells[5]		15,559		15,559		0
Springs[6]		0		0		0
Local Streams (Surface Water)[7]						
American Fork River (irrigation water)	12,653		0		12,653	
Subtotal		12,653		0		12,653
Canals/Storage Water[7]						
Alpine District (Direct Flow)	290		290		0	
Alpine District (Storage)	206		206		0	
CUP	1,990		1,990		0	
Provo River Project (Deer Creek Reservoir)	500		500		0	
Subtotal		2,986		2,986		0
Total		31,198		18,545		12,653
Potential Agricultural Conversion Assuming 1 Acre per 9 People Converted	**Irrigation Conversion Yield in ac-ft per acre**		2.00	**An assumed conservative yield of 2.0 acre-feet acre was used for agriculture conversion**		
Irrigation Conversion[8]	0	1,299	2,363	3,032	5,348	7,665
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	6,390	7,470	7,845	7,573	8,504	8,850
Springs	0	0	0	0	0	0
Groundwater wells[9]	6,390	7,470	7,845	7,573	8,504	8,850
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Non-Potable Secondary demand in acre-feet	126	775	1,602	3,096	3,886	5,022
Springs	0	0	0	0	0	0
Groundwater wells[9]	126	775	1,602	3,096	3,886	5,022
Local Streams (Surface Water)	0	0	0	0	0	0
Canals/Storage Water	0	0	0	0	0	0
.	0	0	0	0	0	0
.	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
.	0	0	0	0	0	0
.	0	0	0	0	0	0
Total Requirement for New Supplies	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	12,029	11,599	11,461	10,907	11,503	12,338
Unavailable Agricultural Water Within Declaration Boundary	12,653	11,354	10,290	9,621	7,305	4,988

FOOTNOTES:
(1) calculated by dividing total water use by a factor of 892.7
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.297 acre-feet per capita times 21,941 = 6,516 acre-feet
(3) Gallons per capita per day (gpcd) are obtained from Table 6, page 32, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources(UDWR) (Note: acre-feet divided by population times 892.7 equals gpcd).
(4) Iincludes outddoor potable (Table 6, page 32) and secondary (Table 7, page 34) Hansen, Allen, Luce, June 2000, report for UDWR
(5) Table 5, page 10, draft report, "North Utah County Water Needs Study", June 14, 2001, by Parsons for CUWCD and north Utah County cities.
(6) Table 5, page 31, from reported noted in footnote (3)
(7) Appendix L, page 86, from reported noted in footnote (5)
(8)Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied times the dry year yield of the agricultural water. For example, (29,615 minus 21,941) divided by 6 times 2.0 equals 2,558 acre-feet
(9) Historical groundwater pumping equals 6,188 acre-feet. The combination of groundwater wells 1,843 plus 4,345 equals 6,188 acre-feet.

(NOTE: All units in acre-feet unless otherwise noted

Table D-20

Cedar Fort
Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
February 1, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Population Projections (State of Utah - Office of Planning and Budget)	341	500	632	738	932	1,127
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050) but limited to 220 gpcd						
Acre-feet/capita/year[1]	0.251	0.235	0.220	0.213	0.213	0.213
Acre-feet/year[2]	86	192	294	454	734	1,181
Total Water Use Gallons per capita per day[3]	224	210	196	190	190	190
Potable Demand (gpcd) (equals the sum of line 8, line 9, and line 10)	164	157	150	147	147	147
Indoor demand[4]	69	69	69	69	69	69
Outdoor demand[4]	60	60	60	60	60	60
Institutional, Commercial, and Industrial[4]	35	35	35	35	35	35
Non-potable outdoor demand in gpcd[4]	60	53	46	43	43	43

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Groundwater Wells[5]		0		0		0
Springs[6]		62		62		0
Local Streams (Surface Water)[7]						
(none)	0		0		0	
Subtotal		0		0		0
Canals/Storage Water[7]	0		0		0	
Un-named irrigation source	2,268		2,268		0	
Subtotal		2,268		2,268		0
Total		**2,330**		**2,330**		**0**
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**From north Utah County Report Cedar Fort has rights to 2,268 acre-feet of irrigation water**					
from un-named irrigation sources	0	0	0	0	0	0

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Potable demand in acre-feet	63	88	106	122	153	186
Springs	62	62	62	62	62	62
Groundwater Wells	0	0	0	0	0	0
Remaining Demand for Culinary Supplies	1	26	44	60	91	124
Non-Potable Secondary demand in acre-feet	23	104	187	332	580	995
Springs	0	0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
Local Streams (Surface Water)	0	0	0	0	0	0
Canals/Storage Water (presently converted agriculture)	23	26	26	26	26	26
.	0	0	0	0	0	0
.	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	78	161	306	554	969
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells for indoor use (exchange with irrigation conversions)	1	26	44	60	91	124
Irrigation conversions to meet outdoor use	0	78	161	306	554	969
.	0	0	0	0	0	0
Total Requirement for New Supplies	1	104	206	366	646	1,093
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	2,244	2,138	2,036	1,876	1,596	1,149
Unavailable Agricultural Water Within Declaration Boundary	0	0	0	0	0	0

FOOTNOTES:
(1) calculated by dividing total water use by a factor of 892.7
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.184 acre-feet per capita times 341 = 63 acre-feet
(3) Gallons per capita per day (gpcd) are obtained from Table 5, page 31, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources
(4)Includes potable outdoor use (Table 5, page 31) and Secondary use (Table 7, page 34), "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area," July 2000 by Hansen, Allen and Luce for UDWR.
(5) From Table 5, page 31, (same reported as in footnotes (3) and (4)
(6) From Appendix F-5, page 39, draft report , "North Utah County Water Needs Study", June 2001, by Parsons for the CUWCD and north Utah County cities.
(7) Unpublished data provided by consultant for study in footnote (6)

(NOTE: All units in acre-feet unless otherwise noted

Table D-21

Cedar Hills

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
February 1, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Population Projections (State of Utah - Office of Planning and Budget)	3,094	6,807	9,663	10,132	12,300	12,300
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050) but limited to 220 gpcd						
Acre-feet/capita/year[1]	0.260	0.244	0.228	0.217	0.213	0.213
Acre-feet/year[2]	804	1,659	2,198	2,195	2,617	2,617
Total Water Use Gallons per capita per day[3]	232	218	203	193	190	190
Potable Demand (gpcd) (equals the sum of line 8, line 9, and line 10)	232	218	203	193	190	190
Indoor demand[4]	117	110	103	98	96	96
Outdoor demand[4]	105	98	91	86	84	84
Institutional, Commercial, and Industrial[4]	10	10	10	10	10	10
Non-potable outdoor demand in gpcd[4]	0	0	0	0	0	0

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Groundwater Wells[5]		2,328		2,328		0
Springs[6]		0		0		0
Local Streams (Surface Water)[7]						
American Fork River	0		0		0	
Battle Creek	0		0		0	
Dry Creek (Alpine Irrigation Co.)	0		0		0	
Fort Creek (Alpine Irrigation Co.)	0		0		0	
Grove Creek	0		0		0	
Subtotal		0		0		0
Canals/Storage Water[7]						
Alpine District (Direct Flow -)	0		0		0	
Alpine District (Storage)	0		0		0	
CUP	675		675		0	
Pleasant Grove Irrigation Stock	608		608		0	
(None)	0		0		0	
(None)	0		0		0	
Subtotal		1,283		1,283		0
Total		3,611		3,611		0
Potential Agricultural Conversion Assuming 1 Acre per 9 People Converted	**Irrigation Conversion Yield in ac-ft per acre**		N/A			
(None)	0	0	0	0	0	0

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Potable demand in acre-feet	804	1,659	2,198	2,195	2,617	2,617
Springs	0	0	0	0	0	0
Groundwater wells (footnote 8)	804	1,659	2,198	2,195	2,328	2,328
Remaining Demand for Culinary Supplies	0	0	0	0	289	289
Non-Potable Secondary demand in acre-feet	0	0	0	0	0	0
Springs	0	0	0	0	0	0
Groundwater wells (footnote 8)	0	0	0	0	0	0
Local Streams (Surface Water)	0	0	0	185	140	0
Canals/Storage Water	0	0	0	0	0	0
.	0	0	0	0	0	0
.	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
.	0	0	0	0	0	0
.	0	0	0	0	0	0
Total Requirement for New Supplies	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	289	289
Total Remaining Available Supplies	2,807	1,952	1,413	1,231	1,143	1,283
Unavailable Agricultural Water Within Declaration Boundary	0	0	0	0	0	0

FOOTNOTES:

(1) calculated by dividing total water use by a factor of 892.7
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.260 acre-feet per capita times 3,094 = 804 acre-feet
(3) Gallons per capita per day (gpcd) are obtained from Table 6, page 32, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources
(4)Includes potable outdoor use (Table 5, page 31) and Secondary use (Table 7, page 34), "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area," July 2000 by Hansen, Allen and Luce for UDWR.
(5) Table 5, page 10, draft report, "North Utah County Water Needs Study", June 2001, by Parsons for the CUWCD and north Utah County cities.
(6) Table 5, page 31, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for UDWR
(7) Appendix E-5, page 33 (same reported as noted in footnote (5))
(8) Historical groundwater pumping equals 613 acre-feet (combination of line 27 and line 31 equals 613 in year 2000)

(NOTE: All units in acre-feet unless otherwise noted

Table D-22

Cedar Valley

Utah Lake Drainage Basin Water Delivery System

Summary of Available Water Supplies and Demand through Year 2050

February 1, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = acres Irrigated acres =						
Population Projections (State of Utah - Office of Planning and Budget)	510	1,440	2,128	2,968	18,317	33,666
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.213	0.213	0.213	0.213	0.213	0.213
Acre-feet/year[2]	109	306	453	632	3,899	7,165
Total Water Use Gallons per capita per day[3]	190	190	190	190	190	190
Potable Demand (gpcd)	120	120	120	120	120	120
Indoor demand[4]	80	80	80	80	80	80
Outdoor demand[4]	20	20	20	20	20	20
Institutional, Commercial, and Industrial[4]	20	20	20	20	20	20
Non-potable outdoor demand in gpcd[4]	70	70	70	70	70	70

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Springs	0			0		0
Subtotal		0				
Groundwater Wells	0			0		0
Subtotal		0				
South Utah Valley Municipal Water Association (SUVMWA)	0					0
Subtotal		0		0		0
SVP water	0					
Subtotal		0		0		0
Irrigation Company Water	0					
Subtotal		0		0		0
Local streams	0					
Subtotal		0		0		0
Total		0		0		0
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**SVP Yield in acre-feet per acre[12]**		0.00	**Irrigation Water Yield (acre-feet per acre)[13]**		0.00
SVP water	0	0	0	0	0	0
Irrigation water	0	0	0	0	0	0

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

Potable demand in acre-feet	69	194	286	399	2,462	4,526
Springs						
Groundwater wells						
Remaining Demand for Culinary Supplies	69	194	286	399	2,462	4,526
Non-potable demand in acre-feet	40	113	167	233	1,436	2,640
Springs						
Groundwater wells						
SUVMWA						
SVP water						
Spanish Fork River water						
Local front streams						
Remaining Demand for Secondary Supplies	40	113	167	233	1,436	2,640
Future Supplies To Be Developed to Meet Population Growth						
Additional Groundwater Wells						
SVP Water						
Goshen Irrigation Canal						
Total New Supplies Developed						
Remaining Demand Not Met	109	306	453	632	3,899	7,165
Total Remaining Available Supplies	0	0	0	0	0	0
Unavailable Agricultural Water Within Declaration Boundary	0	0	0	0	0	0

FOOTNOTES:

(1) Total water use (220 gpcd) divided by a factor of 892.7 converts gpcd to acre-feet per capita

(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.246 acre-feet per capita times population of 510 equals 103acre-feet.

(3) gallons per capita per day is the sum of Total potable use plus Non-potable use.

(4) An assumed value that is considered to be representative of future use.

Table D-23

Eagle Mountain

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
February 3, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Population Projections (State of Utah - Office of Planning and Budget)	2,157	9,758	16,756	22,770	38,207	53,644
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.287	0.269	0.251	0.239	0.227	0.215
Acre-feet/year[2]	619	2,625	4,206	5,442	8,674	11,538
Total Water Use Gallons per capita per day[3]	256	240	224	213	203	192
Potable Demand (gpcd) (equals the sum of line 8, line 9, and line 10)	256	240	224	213	203	192
Indoor demand	127	119	111	106	101	95
Outdoor demand	31	31	31	31	31	31
Institutional, Commercial, and Industrial	98	90	82	77	71	66
Non-potable outdoor demand in gpcd	0	0	0	0	0	0

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Springs	0		0			
Subtotal		0		0		0
Groundwater Wells (see footnote 4)	620		620			
Subtotal		620		620		0
Local Irrigation Water						
Sod farm, alfalfa, Cedar Valley Water, MonteVista Ranch (see footnote 5)	8,500		0		8,500	
Howard Ault (see footnote 5)	3,000		0		3,000	
Glade Berry (see footnote 5)	3,000		0		3,000	
	0		0		0	
	0		0		0	
Subtotal		14,500		0		14,500
Canals/Storage Water	0		0		0	
(none)	0		0		0	
(none)	0		0		0	
(none)	0		0		0	
(none)	0		0		0	
(none)	0		0		0	
(none)	0		0		0	
Subtotal		0		0		0
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**Irrigation Conversion Yield in ac-ft per acre**		2.00	**Rename this (yield in acre-feet per acre)**		0.00
Agriculture conversion	0	1,689	3,244	4,581	8,011	11,442
(none)	0	0	0	0	0	0

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Potable demand in acre-feet	619	2,623	4,204	5,433	8,688	11,538
Springs	0	0	0	0	0	0
Groundwater wells	619	620	620	620	620	620
Remaining Demand for Culinary Supplies	0	0	3,584	4,813	8,068	10,918
Non-Potable Secondary demand in acre-feet	0	0	0	0	0	0
Springs	0	0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
(none)	0	0	0	0	0	0
(none)	0	0	0	0	0	0
(none)	0	0	0	0	0	0
(none)	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Agriculture conversion	0	0	3,244	4,581	8,011	10,918
Purchase of water rights for exchange or water recycling	0	0	340	232	57	0
(none)	0	0	0	0	0	0
Total Requirement for New Supplies	0	0	3584	4813	8068	10918
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	14,501	14,500	10,916	9,687	6,432	3,582
Unavailable Agricultural Water Within Declaration Boundary	0	0	0	0	0	0

FOOTNOTES:

(1) calculated by dividing total water use by a factor of 892.7
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.287 acre-feet per capita times 2,157 = 619 acre-feet
(3) Gallons per capita per day (gpcd) are obtained from Table 6, page 32, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources
(4) and (5) Information is based on meeting on November 11, 2002 and February 3, 2003 with representatives of Eagle Mountain who stated this water supply would go toward future needs. In addtion the representatives stated that water recycling would help meet future M&I demands.
(NOTE: All units in acre-feet unless otherwise noted

Table D-24

Highland

Utah Lake Drainage Basin Water Delivery System

Summary of Available Water Supplies and Demand through Year 2050

February 1, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = (unknown) acres Irrigated acres = 1,907 acres						
Population Projections (State of Utah - Office of Planning and Budget)	8,172	14,940	20,120	23,564	28,163	28,163
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.270	0.253	0.236	0.228	0.221	0.213
Acre-feet/year[2]	2,206	3,782	4,753	5,383	6,213	5,993
Total Water Use Gallons per capita per day[3]	241	226	211	204	197	190
Potable Demand (gpcd) (equals the sum of line 8, line 9, and line 10)	123	115	108	104	101	97
Indoor demand[3]	101	94	88	84	80	76
Outdoor demand[3]	17	17	17	17	17	17
Institutional, Commercial, and Industrial[3]	5	4	3	2	1	0
Non-potable outdoor demand in gpcd[3]	118	110	103	99	96	92

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Groundwater Wells[4]		4,006		4,006		0
Springs[5]		0		0		0
Local Streams (Surface Water)[6]			0		0	
American Fork River	0		0		0	
Battle Creek	0		0		0	
Dry Creek (Alpine Irrigation Co.)	0		0		0	
Fort Creek (Alpine Irrigation Co.)	0		0		0	
Grove Creek	0		0		0	
Subtotal		0		0		0
Canals/Storage Water[7]					0	
Alpine District (Direct Flow -)	621		621		0	
Alpine District (Storage)	438		438		0	
CUP	394		394		0	
Provo River Project[8]	5,010		0		5,010	
Subtotal		6,463		1,453		5,010
Total		10,469		5,459		5,010
Potential Agricultural Conversion Assuming 1 Acre per 9 People Converted	**Irrigation conversion yield is not a calculated value. It is an input value from unpublished data for north Utah County (footnote 7)**					
Agriculture conversion[8]	0	474	1,068	1,986	1,986	1,986
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	1,126	1,933	2,433	2,757	3,186	3,075
Springs	0	0	0	0	0	0
Groundwater wells	1,126	1,933	2,433	2,757	3,186	3,075
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Non-Potable Secondary demand in acre-feet	1,080	1,849	2,320	2,625	3,028	2,918
Springs	0	0	0	0	0	0
Groundwater wells	1,080	1,849	1,210	1,172	820	931
Local Streams (Surface Water)	0	0	0	0	0	0
Canals/Storage Water	0	0	1,110	1,453	1,453	1,453
	0	0	0	0	0	0
	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	755	534
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Agriculture conversion	0	0	0	0	755	534
	0	0	0	0	0	0
Total Requirement for New Supplies	0	0	0	0	755	534
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	3,253	2,151	1,774	2,063	1,231	1,452
Unavailable Agricultural Water Within Declaration Boundary	5,010	4,536	3,942	3,024	3,024	3,024

FOOTNOTES:

(1) calculated by dividing total water use by a factor of 892.7

(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.250 acre-feet per capita times 8,172 = 2,043 acre-feet

(3) Gallons per capita per day (gpcd) are obtained from Table 6, page 32, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources (UDWR)

(4) Table 7, page 34 (from reported cited in footnote (3)

(5) Table 5, page 10 draft report "North Utah County Water Needs Study", June 2001, by Parsons for the CUWCD and north Utah County cities.

(6) From Table 5, page 31, "Municipal and Industrial Water Supply and Uses in utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for UDWR

(7)From Appendix L, page 88 draft report "North Utah County Water Needs Study", June 2001, by Parsons for the CUWCD and north Utah County cities.

(8) No information is available for how this water is used. It is carried forward (line item 47) and assumed to be irrigation water for urban lots and agricultural land

(NOTE: All units in acre-feet unless otherwise noted

Table D-25

Lehi
Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
February 1, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 14,092 acres Irrigated acres = 7,921 acres (approximately 2,000 acres served by secondary system)						
Population Projections (State of Utah - Office of Planning and Budget)	19,028	31,302	44,437	48,975	69,036	89,098
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.389	0.354	0.319	0.285	0.250	0.213
Acre-feet/year[2]	7,396	11,080	14,187	13,935	17,245	18,963
Total Water Use Gallons per capita per day[3]	347	316	285	254	223	190
Potable Demand (gpcd) (equals the sum of line 8, line 9, and line 10)	78	78	78	78	78	78
Indoor demand[3]	65	65	65	65	65	65
Outdoor demand (residential potable)[3]	0	0	0	0	0	0
Institutional, Commercial, Industrial[3]	13	13	13	13	13	13
Non-Potable outdoor demand (gpcd)[4]	269	238	207	176	145	112

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Groundwater Wells[5]		6,429		6,429		0
Secondary Groundwater Wells[4]		5,125		5,125		0
Springs[6]		338		338		0
Local Streams (Surface Water)[7]						
American Fork River (Lehi Irrigation Co.)	4,390		0		4,390	
Dry Creek (Lehi Irrigation Co.)	8,168		0		8,168	
Subtotal		12,558		0		12,558
Canals/Storage Water[7]			0		0	
Alpine District (Direct Flow)	798		798		0	
Alpine District (Storage)	394		394		0	
CUP	1,116		1,116		0	
Provo River Project (Deer Creek Reservoir)	500		500		0	
Subtotal		2,808		2,808		0
Total		27,258		14,700		12,558

Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**Irrigation Conversion Yield in ac-ft per acre**		2.12	**(see footnote 8 for explanation of 2.12 acre-feet per acre)**		
Agricultural Conversion (footnote 9)	0	2,891	5,985	7,054	11,780	12,558
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	1,663	2,735	3,883	4,279	6,032	7,785
Springs	338	338	338	338	338	338
Groundwater Wells (culinary) (footnote 10)	1,325	2,397	3,545	3,941	5,694	6,429
Remaining Demand for Culinary Supplies	0	0	0	0	0	1,018
Non-Potable Secondary demand in acre-feet	5,734	8,345	10,304	9,656	11,213	11,178
Springs	0	0	0	0	0	0
Secondary Groundwater Wells (footnote 10)	5,466	5,466	5,466	5,466	5,466	5,466
Local Streams (Surface Water)	0	0	0	0	0	0
Canals/Storage Water	268	2,808	2,808	2,808	2,808	2,808
Remaining Demand for Secondary Supplies	0	71	2,030	1,382	2,939	2,904
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Agriculture conversion	0	71	2,030	1,382	2,939	3,922
.	0	0	0	0	0	0
Total Requirement for New Supplies	0	71	2,030	1,382	2,939	3,922
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	7,303	6,511	6,499	7,819	9,235	8,295
Unavailable Agricultural Water Within Declaration Boundary	12,558	9,667	6,573	5,504	778	0

FOOTNOTES:
(1) calculated by dividing total water use by a factor of 892.7
(2) Gallons per capita per day (gpcd) are obtained from Table 6, page 32, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources
(3) From the UDWR - Hansen, Allen, Luce Study - 2000 and the north Utah County Study of 2001
Lehi has a secondary system that historically supplies 5,125 acre-feet to residents, commerical, and includes 2,000 acres of urban irrigated farm lands.
(4) Table 7, page 34,UDWR - Hansen, Allen, Luce -2000 the amount of secondary use for 1998 was 5,125 acre-feet. Based on population of 17,000 in 1998 the per capita water water use rate would be 269 gpcd.
(5) Table 5, page 10, total grounwater pumping 11,554 acre-feet (6,429 plus 5,125) "North Utah County Study", June 2001, by Parsons for the CUWCD and north Utah County cities
(6) From Table 5, page 31, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources
(7) Appendix L, page 86, "North Utah County Water Needs Study", June 2001, by Parsons for the CUWCD and north Utah County cities.
(8) The number 2.12 is derived by dividing volume of water in line 18 (12,558 acre-feet) by irrigated acreage of (7921 acres -2000 acres) 5,921 acres
(9) Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre. This value is then multiplied times the dry year yield of the agricultural water. For example, (31,302 minus 19,028) divided by 6 times 2.12 acre-feet per acre equals 4,337 acre-feet.
(10) From unpublished data "north Utah County Water Needs Study", June 2001, the amount of historical groundwater pumping equals 6,429 acre-feet. groundwater pumping in line 35 is obtained by subtracting 6,429 minus 1,325 (line 31) which equals 5,466 acre-feet

(NOTE: All units in acre-feet unless otherwise noted

Table D-26

Pleasant Grove

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
February 1, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = (unknown) acres Irrigated acres = 2,642 acres						
Population Projections (State of Utah - Office of Planning and Budget)	23,468	27,334	30,415	30,226	40,700	40,700
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year[1]	0.190	0.190	0.190	0.190	0.190	0.190
Acre-feet/year[2]	4,469	5,205	5,792	5,756	7,751	7,751
Total Water Use Gallons per capita per day[3]	170	170	170	170	170	170
Potable Demand (gpcd) (equals the sum of line 8, line 9, and line 10)	170	170	170	170	170	170
Indoor demand[3]	71	71	71	71	71	71
Outdoor demand[3]	24	24	24	24	24	24
Institutional, Commercial, and Industrial[3]	75	75	75	75	75	75
Non-potable outdoor demand in gpcd[3]	0	0	0	0	0	0

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Groundwater Wells[4]		14,716		14,716		0
Springs[5]		1,234		1,234		0
Local Streams (Surface Water)[6]						
American Fork River	4,652		0		4,652	
Battle Creek	2,000		0		2,000	
Grove Creek	2,000		0		2,000	
Subtotal		8,652		0		8,652
Canals/Storage Water[6]						
Alpine District (Storage)	826		826		0	
CUP	1,539		1,539		0	
Provo River Project (Deer Creek Reservoir)	1,011		1,011		0	
Subtotal		3,376		3,376		0
Total		**27,978**		**19,326**		**8,652**
Potential Agricultural Conversion Assuming 1 Acre per 9 People Converted	**Irrigation Conversion Yield in ac-ft per acre**		Variable			
Agricultural conversion[4]	0	1,110	2,130	2,809	2,809	2,809

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

Potable demand in acre-feet	4,469	5,205	5,792	5,756	7,751	7,751
Springs	1,234	1,234	1,234	1,234	1,234	1,234
Groundwater wells	3,235	3,971	4,558	4,522	6,517	6,517
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Non-Potable Secondary demand in acre-feet	0	0	0	0	0	0
Springs	0	0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
Local Streams (Surface Water)	0	0	0	0	0	0
Canals/Storage Water	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
Total Requirement for New Supplies	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	14,857	15,231	15,664	16,379	14,384	14,384
Unavailable Agricultural Water Within Declaration Boundary	8,652	7,542	6,522	5,843	5,843	5,843

From North Utah County Study - 2001
Historical groundwater usage = 7,653 acre-feet
Surface water supply = 2,282 acre-feet

FOOTNOTES:
(1) calculated by dividing total water use by a factor of 892.7
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.304 acre-feet per capita times 23,468 = 7,134 acre-feet
(3) Gallons per capita per day (gpcd) are obtained from Table 6, page 32, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources (UDWR)
(4) Table 5, page 10, draft report, "North Utah County Water Needs Study", June 2001, by Parsons for the CUWCD and north Utah County cities.
(5) Table 5, page 31, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000, Hansen, Allen, Luce for UDWR
(6) From Appendix J-7, page 74 draft report, "North Utah County Water Needs Study", June 2001, by Parsons for the CUWCD and north Utah County cities.

(NOTE: All units in acre-feet unless otherwise noted

Table D-27

Saratoga Springs
Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
February 1, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 15,169 acres Irrigated acres = 4,987 acres						
Population Projections (State of Utah - Office of Planning and Budget)	1,003	8,993	18,005	23,450	38,606	53,762
Future Demand With Conservation						
Acre-feet/capita/year[1]	0.451	0.347	0.250	0.240	0.227	0.215
Acre-feet/year[2]	453	3,123	4,498	5,621	8,779	11,563
Total Water Use Gallons per capita per day[3]	403	310	223	214	203	192
Potable Demand (gpcd) (equals the sum of line 8, line 9, and line 10)	403	105	87	87	87	87
Indoor demand[3]	67	67	67	67	67	67
Outdoor demand (residential potable)[4]	254	0	0	0	0	0
Institutional, Commercial, Industrial[3]	82	38	20	20	20	20
Non-Potable outdoor demand (gpcd)[3]	0	205	136	127	116	105
CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS						
Source of Water	**Gross Amount of Water Available within Declaration Boundary**		**Portion of Gross Water Supply Presently Developed**		**Portion of Gross Water Supply Presently Not Developed or Unavailable**	
Dry Year Yield	**(acre-feet)**		**(acre-feet)**		**(acre-feet)**	
Groundwater Wells[5]		1,598		1,598		0
Springs[6]		0		0		0
Local Streams (Surface Water)[7]	0		0		0	
American Fork River	0.0		0.0		0.0	
Battle Creek	0.0		0.0		0.0	
Dry Creek		0		0		0
Fort Creek						
Grove Creek	0		0		0	
Subtotal		0		0		0
Canals/Storage Water[7]						
Alpine District (Direct Flow -)	0		0		0	
Alpine District (Storage)	0		0		0	
CUP	0		0		0	
Provo River Project (Deer Creek Reservoir)		0		0		0
Welby Jacob Canal	2,168		0		2,168	
Utah Lake Distributing Canal	6,243		342		5,901	
Subtotal		8,411		342		8,069
Total		10,009		1,940		8,069
Potential Agricultural Conversion Assuming 1 Acre per 9 People Converted	**Irrigation Conversion Yield in ac-ft per acre**		1.687	**(see footnote 8 for explanation of 1.687 acre-feet per acre)**		
Agricultural Conversion	0	1,498	3,187	4,208	7,048	8,069
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Potable demand in acre-feet	453	1,058	1,755	2,285	3,762	5,239
Springs	0	0	0	0	0	0
Groundwater wells (footnote 9)	453	1,058	1,598	1,598	1,598	1,598
Remaining Demand for Culinary Supplies	0	0	157	687	2,164	3,641
Non-Potable Secondary demand in acre-feet	0	2,065	2,743	3,336	5,017	6,324
Springs	0	0	0	0	0	0
Groundwater wells (footnote 9)	0	225	0	0	0	0
Canals/Storage Water	0	342	342	342	342	342
(not applicable)	0	0	0	0	0	0
(not applicable)	0	0	0	0	0	0
(not applicable)	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	1,498	2,401	2,994	4,675	5,982
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells from Local Agricultural Exchange (see footnote 10)	0	0	157	687	2,087	2,087
Agricultural Conversion (see footnote 11)	0	1,498	2,401	2,994	4,675	5,982
Additional Purchased Water Exchanged to Wells	0	0	0	0	77	1,554
Total Requirement for New Supplies	0	1,498	2,558	3,681	6,839	9,623
Remaining Demand Not Met	0	0	0	0	Footnote 12	Footnote 12
Total Remaining Available Supplies	1,145	315	629	527	209	0
Unavailable Agricultural Water Within Declaration Boundary	8,411	6,571	4,882	3,861	1,021	0

FOOTNOTES:
(1) calculated by dividing total water use by a factor of 892.7
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.451 acre-feet per capita times 1,003 = 457 acre-feet
(3) Gallons per capita per day (gpcd) are obtained from Table 6, page 32, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources (UDWR)
(4) Table 7, page 34 from report cited in footnote (3)
(5) Table 5, page 10 draft report, "North Utah County Water Needs Study", June 2001, by Parsons for the CUWCD and north Utah County cities.
(6) Table 5, page 31, from report cited in footnote (3)
(7) From Appendix K-5, page 82-83, from report cited in footnote (5)
(8) The number 1.687 is derived by dividing volume of water in line 20 (8,411 acre-feet) by irrigated acreage of 4,987 acres
(9) Historical groundwater pumping equals 453 acre-feet.
(10) The assumption was made that Saratoga Springs would be able to purchase a water supply from other sources and exchange that supply to groundwater pumping.
(11) The assumption was made that through a minimum treatment process the Utah Lake agricultural water could be treated to an acceptable standard for outdoor use.
(12) There is a demand for 77 acre-feet in year 2040 and 1,554 acre-feet in year 2050. As an example, this demand could be met through the purchase of another entities Utah Lake water rights and then exchange this right for groundwater pumping
(NOTE: All units in acre-feet unless otherwise noted

Table D-28

Draper

Utah Lake Drainage Basin Water Delivery System

Summary of Available Water Supplies and Demand through Year 2050

February 1, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Declaration boundary = 15,169 acres Irrigated acres = 4,987 acres						
Population Projections (State of Utah - Office of Planning and Budget)	0	4,758	7,833	10,448	14,000	14,000
Future Demand With Conservation						
Acre-feet/capita/year[1]	0.000	0.213	0.213	0.213	0.213	0.213
Acre-feet/year[2]	0	1,013	1,668	2,225	2,982	2,982
Total Water Use Gallons per capita per day[3]	0	190	190	190	190	190
Potable Demand (gpcd) (equals the sum of line 8, line 9, and line 10)	0	190	190	190	190	190
Indoor demand[3]	0	96	96	96	96	96
Outdoor demand (residential potable)[4]	0	84	84	84	84	84
Institutional, Commercial, Industrial[3]	0	10	10	10	10	10
Non-Potable outdoor demand (gpcd)[3]	0	0	0	0	0	0

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Dry Year Yield	(acre-feet)		(acre-feet)		(acre-feet)	
Groundwater Wells[5]		0		0		0
Springs[6]		0		0		0
Local Streams (Surface Water)[7]	0		0		0	
American Fork River	0.0		0.0		0.0	
Battle Creek	0.0		0.0		0.0	
Dry Creek		0		0		0
Fort Creek						
Grove Creek	0		0		0	
Subtotal		0		0		0
Canals/Storage Water[7]						
Alpine District (Direct Flow -)	0		0		0	
Alpine District (Storage)	0		0		0	
CUP	0		0		0	
Provo River Project (Deer Creek Reservoir)		0		0		0
Welby Jacob Canal	0		0		0	
Utah Lake Distributing Canal	0		0		0	
Subtotal		0		0		0
Total		0		0		0
Potential Agricultural Conversion Assuming 1 Acre per 9 People Converted	**Irrigation Conversion Yield in ac-ft per acre**		0.000	**(see footnote 8 for explanation of 1.687 acre-feet per acre)**		
Agricultural Conversion	0	0	0	0	0	0

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

Potable demand in acre-feet	0	1,013	1,667	2,224	2,980	2,980
Springs	0	0	0	0	0	0
Groundwater wells (footnote 9)	0	0	0	0	0	0
Remaining Demand for Culinary Supplies	0	1,013	1,667	2,224	2,980	2,980
Non-Potable Secondary demand in acre-feet	0	0	0	0	0	0
Springs	0	0	0	0	0	0
Groundwater wells (footnote 9)	0	0	0	0	0	0
Canals/Storage Water	0	0	0	0	0	0
(not applicable)	0	0	0	0	0	0
(not applicable)	0	0	0	0	0	0
(not applicable)	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Agricultural Conversion	0	0	0	0	0	0
(not applicable)	0	0	0	0	0	0
Total Requirement for New Supplies	0	0	0	0	0	0
Remaining Demand Not Met	0	1,013	1,667	2,224	2,980	2,980
Total Remaining Available Supplies	0	0	0	0	0	0
Unavailable Agricultural Water Within Declaration Boundary	0	0	0	0	0	0

FOOTNOTES:

(1) calculated by dividing total water use by a factor of 892.7

(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.451 acre-feet per capita times 1,221 = 551 acre-feet

(3) Gallons per capita per day (gpcd) are obtained from Table 6, page 32, "Municipal and Industrial Water Supply and Uses in Utah & Juab Counties Area, July 2000 by Hansen, Allen, and Luce for the Utah Division of Water Resources (UDWR)

(4) Table 7, page 34 from report cited in footnote (3)

(5) Table 5, page 10 draft report, "North Utah County Water Needs Study", June 2001, by Parsons for the CUWCD and north Utah County cities.

(6) Table 5, page 31, from report cited in footnote (3)

(7) From Appendix K-5, page 82-83, from report cited in footnote (5)

(8) The number 1.687 is derived by dividing volume of water in line 20 (8,411 acre-feet) by irrigated acreage of 4,987 acres

(9) Historical groundwater pumping equals 294 acre-feet. The combination of groundwater wells 204 (line 27) plus 90 (line 31) equals 294 acre-feet for year 2000.

(NOTE: All units in acre-feet unless otherwise noted

Table D-29

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050

Metropolitan Water District of Salt Lake and Sandy (Sandy City Service Area)

Item	Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
1	Declaration Boundary = Sandy City Water Service Area 16,102 acres, Sandy City Corporate Boundaries 14,496 acres						
2	Irrigated acres within declaration boundary = Minimal						
3	Municipal water rights = See Items 10 through 26						
4	Population Projections - Sandy City Service Area (State of Utah - Office of Planning and Budget) (footnote 1)	122,734	140,228	143,424	146,546	172,978	197,558
4a	Population Projections - Sandy City (State of Utah - Office of Planning and Budget) (footnote 1)	88,418	118,161	121,032	124,030	146,724	167,204
5	Future Demand With Conservation (12 1/2 % by Year 2020 and 25% by Year 2050)						
6	Acre-Feet per capita per year (footnote 2)	0.285	0.267	0.2494	0.2375	0.2256	0.2138
7	Acre-Feet per year (footnote 3)	34,979	37,467	35,766	34,803	39,030	42,228
8	Gallons per capita per day (gpcd) (footnote 4)	254	239	223	212	201	191
9	CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS						
10	Sources of Water	Dry Year Yield (Units:acre-feet)		Dry Year Yield (Units:acre feet)		Dry Year Yield (Units:acre-feet)	
11	Water Year Conditions	Dry		Dry		Dry	
12	Wells - (footnote 5)		14,740		14,740		0
13	Springs		0		0		0
14	Surface Water (footnote 5)						
15	Useable Rights in Little Cottonwood Creek	7,450		7,450			0
16	Undeveloped Rights in Bell Canyon	874		0			874
17			8,324		7,450		0
18	Wholesale Water Purchases (footnote 5)						
19	Metropolitan Water District of Salt Lake and Sandy - Preferred Rights	7,940		7,940			0
20	Metropolitan Water District of Salt Lake and Sandy - Surplus	0		0			0
21	Jordan Valley Water Conservancy District	315		315			0
22			8,255		8,255		
23	Total Dependable Water Supply		31,319		30,445		874
24	SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET NEEDS (Dry Year)						
25	Sandy City does not have a separate secondary system for outdoor demand. Hence, the total demand has not been divided between indoor and outdoor demand.						
26		YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
27	Total Demand (indoor and outdoor)	34,979	37,467	35,766	34,803	39,030	42,228
28	Groundwater wells	14,740	14,740	14,740	14,740	14,740	14,740
29	Surface Water - Little Cottonwood Creek	7,450	7,450	7,450	7,450	7,450	7,450
30	Wholesale - Metropolitan Water District of Salt Lake and Sandy - Preferred Rights	7,940	7,940	7,940	7,940	7,940	7,940
31	Wholesale - Jordan Valley Water Conservancy District	315	315	315	315	315	315
32	*Remaining Demand - Dry Year*	4,534	7,022	5,321	4,358	8,585	11,783
33	FUTURE SUPPLIES TO MEET POPULATION GROWTH						
34	Treatment of Bell Canyon water at Little Cottonwood Water Treatment Plant	0	874	874	874	874	874
35							
36							
37	*Sutotal of Future Supplies*	0	874	874	874	874	874
38	Remaining Demands Not Met	4,534	6,148	4,447	3,484	7,711	10,909
39	Total Remaining Available Supplies	0	0			0	0
40	Unavailable Agricultural Water Within Service Boundaries	0	0	0	0	0	0

FOOTNOTES:
(1) GOPB projections were provided for Sandy City for 2000 to 2050. Projections for the Sandy City service area were provided by Bowens-Collins & Assoicates, consultant for Sandy City.
(2)acre-feet per capita is computed from line 8. For example, 254 gpcd divided by a factor of 892.7 converts gpcd to 0.2845 acre-feet per capita in line 6.
(3) Water demand in acre-feet in line 7 is obtained by multiplying 0.2845 times the population in line 6. For example, 0.2845 times 122,734 equals 34,979 acre-feet.
(4) Gallons per capita per day of 254 was provided by Bowens-Collins & Associates, consultant for Sandy City.
(5) Information was provided by Bowens-Collins and Assoicates, consultant for Sandy City.

Table D-30

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050

Metropolitan Water District of Salt Lake and Sandy (Salt Lake City Service Area)

Item	Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
1	Declaration Boundary = Salt Lake City Water Service Area acres						
2	Irrigated acres within declaration boundary = Minimal						
3							
4	**Population Projections - Salt Lake City Service Area (State of Utah - Office of Planning and Budget)** (footnote 1)	296,251	261,753	296,197	335,235	393,149	452,013
5	**Synthetic Salt Lake Population** (see footnote 2)	341,431	301,672	341,369	386,360	453,107	520,948
6	**Future Demand With Conservation (12 1/2 % by Year 2020 and 25% by Year 2050 but limited to 190 gpcd)**						
7	Acre-Feet per capita per year (footnote 3)	0.281	0.264	0.246	0.234	0.223	0.211
8	Acre-Feet per year (footnote 4)	96,000	79,520	83,985	90,527	100,858	109,856
9	Gallons per capita per day (gpcd) (footnote 5)	251	235	220	209	199	188
10	Domestic (footnote 6)	148	143	137	133	130	126
11	Combined commercial, industrial, and other similar uses (footnote 6)	103	93	83	76	69	62
13	**CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS**						
14	**Sources of Water**	**Gross Amount of Water Available within Declaration Boundary**		**Portion of Gross Water Supply Presently Utilized Developed**		**Portion of Gross Water Supply Presently Not Developed or Unavailable**	
15	**Water Year Conditions**	**Dry Year Yield (Units:acre-feet)**		**Dry Year Yield (Units:acre feet)**		**Dry Year Yield (Units:acre-feet)**	
16	**Wells** (footnote 7)						
17	Salt Lake City	18,911		18,911		0	
18	Subtotal Groundwater wells		18,911		18,911		0
19	**Springs**		0		0		0
20	**Surface Water (local streams)** (footnote 7)						
21	Salt Lake City						
22	Little Dell	3,100		3,100	0	0	
23	Big Cottonwood Creek	20,028		20,028		0	
24	City Creek	4,690		4,690		0	
25	Little Cottonwood Creek	13,212		13,212		0	
26	Subtotal Surface Water (local streams)		41,030		41,030		0
27	**Wholesale Water Purchases** (footnote 7)						
28	Deer Creek Reservoir	50,000		50,000		0	
29	Jordanelle Reservoir (Jordanelle comes on line in year 2010)	22,800		22,800		0	
30	Minus Conveyance Losses	(1,600)		(1,600)		0	
31	Less Sandy City's allocation of 7,940	(7,940)		(7,940)		0	
32	Subtotal for Wholesale Water		63,260		63,260		0
33							
34	Total Dependable Water Supply		123,201		123,201		0
35	**SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET NEEDS (Dry Year)**						
36							
37		**YR 2000**	**YR 2010**	**YR 2020**	**YR 2030**	**YR 2040**	**YR 2050**
38	**Total Demand (indoor and outdoor)**	96,000	79,520	83,985	90,527	100,858	109,856
39	Wells	18,911	18,911	18,911	18,911	18,911	18,911
40	Surface Water (local streams)	41,030	41,030	41,030	41,030	41,030	41,030
41	Wholesale Water Purchases (Jordanelle comes on line in 2010)	36,059	19,579	24,044	30,586	40,917	49,915
42							
43	*Remaining Demand - Dry Year*	0	0	0	0	0	0
44	**FUTURE SUPPLIES TO MEET POPULATION GROWTH**						
45							
46	*Sutotal of Future Supplies*						
47	**Remaining Demands Not Met**	0	0	0	0	0	0
48	**Total Remaining Available Supplies**	27,201	43,681	39,216	32,674	22,343	13,345
49	**Unavailable Agricultural Water Within Service Boundaries**						
50							

51 **FOOTNOTES:**

52 (1) GOPB projections were provided for 2010 to 2035. A regression analysis was performed using growth patterns from Midvale, Murray, Taylorsville, West Jordan and
53 West Valley City to estimate population in the Salt Lake City service area for 2040 and 2050.

54 (2) A synthetic population was calculated to account for commuters to Salt Lake Service Area. The synthetic population in 2000 was calculated from
55 the quotient of the known delivered water volume and the known per capita water use (96,000 ac-ft / 0.281 ac-ft per capita). The synthetic population allowed
56 the known water use of 0.281 ac-ft per capita to be maintained as well as the known water delivery of 96,000 ac-ft. The synthetic population projections
57 from 2010 to 2050 mirror the growth rate exhibited by the GOPB population projections in Line 4.

61 (3)acre-feet per capita in line 7 is computed from line 9. For example, 251 gpcd divided by a factor of 892.7 converts gpcd to 0.281 acre-feet per capita in line 7.

63 (4) The initial water use rate of 96,000 ac-ft per year was given by Metropolitan Water of Salt Lake and Sandy. The water use rate for 2010 to 2050 is calculated by
64 multiplying the synthetic population (Line 5) by the per capita water use rate (Line 7).

66 (5) Gallons per capita per day is the sum of line 10, line 11, and line 12 and has conservation measures imposed at a 12.5% and 25% reduction of water use
67 by the years 2020 and 2050, respectively.

68 (6) Information is average of reported water use as found in Utah Division of Water Rights database for 1997, 1998, and 1999.

69 (7) Information was provided by Bowens-Collins and Assoicates, consultant for Metropolitan Water District of Salt Lake and Sandy.

Metropolitan Water District of Salt Lake and Sandy

Salt Lake City Service Area

Table D-31

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050

JORDAN VALLEY WATER CONSERVANCY DISTRICT
SUMMARY OF WATER SUPPLIES AND DEMANDS

Item	Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
1	Declaration Boundary = approximately 144 square miles						
2	**Population Projections - Salt Lake City Service Area (State of Utah - Office of Planning and Budget)** (footnote 1)	464,763	578,510	730,636	844,755	993,415	1,141,974
3	**Future Demand With Conservation (12 1/2 % by Year 2020 and 25% by Year 2050)**						
4	Acre-Feet per capita per year (see footnote 2	0.2863	0.2684	0.2505	0.2386	0.227	0.2147
5	Acre-Feet per year	133,061	155,275	183,033	201,535	225,170	245,209
6	Gallons per capita per day (gpcd)(see footnote 3)	256	240	224	213	202	192
7	**CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS**						
8	**Sources of Water**	**Gross Amount of Water Available within Declaration Boundary**		**Portion of Gross Water Supply Presently Utilized Developed (Year 2002)**		**Portion of Gross Water Supply Presently Not Developed or Unavailable**	
9	**Water Year Conditions**	**Dry Year Yield (Units:acre-feet)**		**Dry Year Yield (Units:acre-feet)**		**Dry Year Yield (Units:acre-feet)**	
	Water Supply of Member Agencies	67,000		57,394		9,606	
			67,000		57,394		9,606
	Wells						
11	High Quality	25,000		19,097		5,903	
12							
13	Subtotal Groundwater wells		25,000		19,097		5,903
14	**Springs**	360		0		360	360
15	**Surface Water**		360		0		
16	High Quality (SLCo mountain streams)	2,670		2,670		0	
17	High Quality (Weber/Provo Rivers, Welby Jacob Exchange)	15,500		15,500		0	
18	High Quality (CUP petition from Jordanelle Res.)	50,000		38,400		11,600	
19	Subtotal Surface Water		68,170		56,570		11,600
21	Total Dependable Water Supply		160,530		133,061		27,469
22	**SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET NEEDS (Dry Year)**						
23	Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
24	**Total Demand (indoor and outdoor)**	133,061	155,275	183,033	201,535	225,170	245,209
25	Water supply of member agencies	57,394	57,394	57,394	57,394	57,394	57,394
	Wells	19,097	19,097	19,097	19,097	19,097	19,097
	Surface Water	56,570	56,570	56,570	56,570	56,570	56,570
27	*Remaining Demand - Dry Year*	0	22,214	49,972	68,474	92,109	112,148
28	**FUTURE SUPPLIES TO MEET POPULATION GROWTH**						
30	Springs	0	360	360	360	360	360
	Wells (member agencies)	0	4,351	9,606	9,606	9,606	9,606
	Wells		5,903	5,903	5,903	5,903	5,903
	High Quality Salt Lake County Mountain Streams	0	0	0	0	0	0
32	Remainder of CUP Petition Water	0	11,600	11,600	11,600	11,600	11,600
33	Provo River (PRWUC share purchases less return flows)	0	0	0	0	0	0
34	*Subtotal of Future Supplies*	0	22,214	27,469	27,469	27,469	27,469
35							
36	**Remaining Demands Not Met**	0	0	22,503	41,005	64,640	84,679
37	**Total Remaining Available Supplies**	0	0	0	0	0	0

FOOTNOTES:
(1) GOPB projections were provided for 2000 to 2020 and 2050. 2030 and 2040 projections are straight-line interpolations.
(2) 0.2863 is computed by dividing present water utilized of 158,349 acre-feet by 2000 population of 553,181
(3) 256 gpcd computed by multiplying 0.2863 acre-feet per capita by conversion factor of 892.7

NOTE: Data supplied by Jordan Valley Water Conservancy District 12/21/2001

Table D-32

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
Charleston
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Population Projections (State of Utah - Office of Planning and Budget)	378	871	1,354	2,106	3,500	5,482
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year (footnote 1)	0.336	0.315	0.294	0.280	0.266	0.252
Acre-feet/year (footnote 2)	127	274	398	590	931	1,381
Gallons per capita per day (gpcd) (footnote 3)	300	281	262	250	237	225
Indoor demand (footnote 4)	80	80	80	80	80	80
Combined outdoor, commercial, industrial and similar uses (footnote 4)	220	201	182	170	157	145

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water (footnote 5)	Gross Amount of Water Available within Declaration Boundary		Portion of Gross Water Supply Presently Developed		Portion of Gross Water Supply Presently Not Developed or Unavailable	
Groundwater Wells		228		228		0
Springs		180		180		0
CUP water						
	0		0		0	
Subtotal		0		0		0
Provo River water						
	50		0		50	
Subtotal		50		0		50
Local streams						
	0		0		0	
Subtotal		0		0		0
Total		458		408		50
Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**Ag. Irrig. Yield in acre-feet per acre** (footnote 6)		3.0			
Charleston Irrigation Company (footnote 7)	0	247	488	864	1,561	2,552

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

Culinary indoor demand in acre-feet (footnote 8)	34	78	121	189	314	491
Springs	34	78	121	180	180	180
Groundwater wells	0	0	0	9	134	228
Remaining Demand for Culinary Supplies	0	0	0	0	0	83
Secondary (outdoor) demand in acre-feet (footnote 9)	93	196	277	401	617	890
Springs	93	102	59	0	0	0
Groundwater wells	0	94	218	219	94	0
CUP water	0	0	0	0	0	0
Provo River water	0	0	0	0	0	0
Local front streams	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	182	523	890
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Agricultural Irrigation water	0	0	0	132	523	973
Provo River water	0	0	0	50	0	0
Requirements for New Supplies	0	0	0	182	523	973
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	281	381	498	682	1,038	1,579
Unavailable Agricultural Water Within Declaration Boundary	unknown	unknown	unknown	unknown	unknown	unknown

Footnotes:
(1) acre-feet per capita computed from line 6. For example, 300 gpcd divided by a factor of 892.8 converts gpcd to 0.336 acre-feet per capita
(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.336 acre-feet per capita times 378 = 127 acre-feet
(3) Gallons per capita per day (gpcd) are obtained from page B1-10, "Wasatch County Water Efficiency Study, Preliminary Planning Report" by James M. Montgomery, February 1993
(4) 80 gpcd indoor use was assumed as an average indoor water demand
(5) Water rights information obtained from page B1-6 and Table B-5A, "Wasatch County Water Efficiency Study, Preliminary Planning Report" by James M. Montgomery, February 1993, and additional sources obtained from Utah Division of Water Rights
(6) From JMM 1993 report
(7) Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre then multiplying by the agricultural irrigation yield. For example, (871 minus 378) divided by 6 times 3.0 equals 247 acre-feet
(8) Calculated by multiplying Indoor Demand (line 7) by the Population Projection (line 2) and converting to acre-feet
(9) Outdoor demand is the difference between Gallons per Capita per Day (line 6) and Indoor Demand (line 26)

Table D-33

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
Heber

January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Population Projections (State of Utah - Office of Planning and Budget)	7,291	8,552	10,496	12,880	16,320	20,697
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year (footnote 1)	0.392	0.368	0.343	0.327	0.310	0.294
Acre-feet/year (footnote 2)	2,858	3,143	3,600	4,207	5,065	6,085
Gallons per capita per day (gpcd) (footnote 3)	350	328	306	292	277	262
Indoor demand (footnote 4)	80	80	80	80	80	80
Combined outdoor, commercial, industrial and similar uses (footnote 4)	270	248	226	212	197	182

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water (footnote 5)	Gross Amount of Water Available within Declaration Boundary	Portion of Gross Water Supply Presently Developed	Portion of Gross Water Supply Presently Not Developed or Unavailable
Groundwater Wells	3,929	3,929	0
Springs	3,519	3,519	0
CUP water			
	0	0	0
Subtotal	0	0	0
Provo River water			
	0	0	0
Subtotal	0	0	0
Local streams			
	0	0	0
Subtotal	0	0	0
Total	7,448	7,448	0

Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	**Ag. Irrig. Yield in acre-feet per acre** (footnote 6)		3.0			
Agricultural Irrigation conversion (footnote 7)	0	631	1,603	2,795	4,515	6,703
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Culinary indoor demand in acre-feet (footnote 8)	653	766	941	1,154	1,463	1,855
Springs	653	766	941	1,154	1,463	1,855
Groundwater wells	0	0	0	0	0	0
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Secondary (outdoor) demand in acre-feet (footnote 9)	2,205	2,376	2,660	3,053	3,602	4,230
Springs	2,205	2,376	2,578	2,365	2,056	1,664
Groundwater wells	0	0	82	688	1,546	2,566
N/A	0	0	0	0	0	0
CUP water	0	0	0	0	0	0
Provo River water	0	0	0	0	0	0
Local front streams	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	0	0	0	0	0
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Agricultural Irrigation water	0	0	0	0	0	0
Provo River water	0	0	0	0	0	0
Requirements for New Supplies	0	0	0	0	0	0
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	4,590	4,936	5,450	6,036	6,898	8,066
Unavailable Agricultural Water Within Declaration Boundary	unknown	unknown	unknown	unknown	unknown	unknown

Footnotes:

(1) acre-feet per capita computed from line 6. For example, 350 gpcd divided by a factor of 892.8 converts gpcd to 0.392 acre-feet per capita

(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.392 acre-feet per capita times 7,291 = 2,858 acre-feet

(3) Gallons per capita per day (gpcd) are obtained from page B1-10, "Wasatch County Water Efficiency Study, Preliminary Planning Report" by James M. Montgomery, February 1993

(4) 80 gpcd indoor use was assumed as an average indoor water demand

(5) Water rights information obtained from page B1-3 and Table B-5A, "Wasatch County Water Efficiency Study, Preliminary Planning Report" by James M. Montgomery, February 1993, and additional sources obtained from Utah Division of Water Rights

(6) From JMM 1993 report

(7) Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre then multiplying by the agricultural irrigation yield. For example, (8,552 minus 7,291) divided by 6 times 3.0 equals 631 acre-feet

(8) Calculated by multiplying Indoor Demand (line 7) by the Population Projection (line 2) and converting to acre-feet

(9) Outdoor demand is the difference between Gallons per Capita per Day (line 6) and Indoor Demand (line 26)

Table D-34

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
Midway
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Population Projections (State of Utah - Office of Planning and Budget)	2,121	3,681	4,755	6,143	8,449	11,095
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year (footnote 1)	0.633	0.593	0.554	0.528	0.501	0.475
Acre-feet/year (footnote 2)	1,343	2,184	2,634	3,240	4,234	5,267
Gallons per capita per day (gpcd) (footnote 3)	565	530	494	471	447	424
Indoor demand (footnote 4)	80	80	80	80	80	80
Combined outdoor, commercial, industrial and similar uses (footnote 4)	485	450	414	391	367	344

CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS

Source of Water (footnote 5)	Gross Amount of Water Available within Declaration Boundary	Portion of Gross Water Supply Presently Developed	Portion of Gross Water Supply Presently Not Developed or Unavailable
Groundwater Wells	455	455	0
Springs	1,564	1,564	0
CUP water			
	0	0	0
Subtotal	0	0	0
Provo River water			
	0	0	0
Subtotal	0	0	0
Local streams			
Snake Creek, Provo River, Ontario Tunnel	900	900	0
Subtotal	900	900	0
Total	2,919	2,919	0

Potential Agricultural Conversion Assuming 1 Acre per 6 People Converted	Ag. Irrig. Yield in acre-feet per acre (footnote 6)		3.0			
Agricultural Irrigation Conversion (footnote 7)	0	780	1,317	2,011	3,164	4,487

SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS

	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Culinary indoor demand in acre-feet (footnote 8)	190	330	426	551	757	994
Springs	190	330	426	551	757	994
Groundwater wells	0	0	0	0	0	0
Remaining Demand for Culinary Supplies	0	0	0	0	0	0
Secondary (outdoor) demand in acre-feet (footnote 9)	1,153	1,855	2,208	2,690	3,477	4,273
Springs	1,153	1,234	1,138	1,013	807	570
Groundwater wells	0	455	455	455	455	455
N/A	0	0	0	0	0	0
CUP water	0	0	0	0	0	0
Provo River water	0	0	0	0	0	0
Local front streams	0	165	615	900	900	900
Remaining Demand for Secondary Supplies	0	0	0	321	1,315	2,348
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Agricultural Irrigation water	0	0	0	0	0	0
Provo River water	0	0	0	321	1,315	2,348
Requirements for New Supplies	0	0	0	321	1315	2348
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	1,576	1,515	1,602	1,690	1,849	2,139
Unavailable Agricultural Water Within Declaration Boundary	unknown	unknown	unknown	unknown	unknown	unknown

Footnotes:

(1) acre-feet per capita computed from line 6. For example, 565 gpcd divided by a factor of 892.8 converts gpcd to 0.633 acre-feet per capita

(2) acre-feet per year is computed by multiplying acre-feet per capita times population. For example, 0.633 acre-feet per capita times 2,121 = 1,343 acre-feet

(3) Gallons per capita per day (gpcd) are obtained from page B1-10, "Wasatch County Water Efficiency Study, Preliminary Planning Report" by James M. Montgomery, February 1993

(4) 80 gpcd indoor use was assumed as an average indoor water demand

(5) Water rights information obtained from page B1-4 and Table B-5A, "Wasatch County Water Efficiency Study, Preliminary Planning Report" by James M. Montgomery, February 1993, and additional sources obtained from Utah Division of Water Rights

(6) From JMM 1993 report

(7) Amount of agricultural conversion is computed by taking the incremental difference in population and dividing by 6 people per acre then multiplying by the agricultural irrigation yield. For example, (3,681 minus 2,121) divided by 6 times 3.0 equals 780 acre-feet

(8) Calculated by multiplying Indoor Demand (line 7) by the Population Projection (line 2) and converting to acre-feet

(9) Outdoor demand is the difference between Gallons per Capita per Day (line 6) and Indoor Demand (line 26)

Table D-35

Utah Lake Drainage Basin Water Delivery System
Summary of Available Water Supplies and Demand through Year 2050
Unincorporated (Jordanelle Special Service District)
January 30, 2003

Year	YR 2000	YR 2010	YR 2020	YR 2030	YR 2040	YR 2050
Population Projections (footnote 1)	0	663	2,034	3,705	6,207	9,246
Future Demand With Conservation (12 1/2% by Year 2020 and 25% by Year 2050)						
Acre-feet/capita/year (footnote 2)	0.254	0.238	0.222	0.212	0.201	0.191
Acre-feet/year (footnote 3)	0	158	452	784	1,248	1,761
Gallons per capita per day (gpcd) (footnote 4)	0	213	198	189	180	170
Indoor demand (footnote 5)	0	80	80	80	80	80
Combined outdoor, commercial, industrial and similar uses (footnote 4)	0	133	118	109	100	90
CAPABILITY OF EXISTING WATER SUPPLIES TO MEET NEEDS						
Source of Water (footnote 6)	**Gross Amount of Water Available within Declaration Boundary**		**Portion of Gross Water Supply Presently Developed**		**Portion of Gross Water Supply Presently Not Developed or Unavailable**	
Groundwater Wells		0		0		0
Springs		0		0		0
CUP water						
	1,500		0		1,500	
Subtotal		1,500		0		1,500
Exchange Water						
Beaver and Shingle Creek Irrigation Co.	700		0		700	
Salt Lake City Corp.	1,700		0		1,700	
Davis/ Weber	3,000		0		3,000	
Subtotal		5,400		0		5,400
Local Water						
United Park City Mine Co.	1,900		0		1,900	
Ontario Tunnel	2,000		0		2,000	
Wells and Misc.	1,000		0		1,000	
Subtotal		4,900		0		4,900
Total		11,800		0		11,800
Potential Water Source Development to Meet Demands						
Water Source Development	0	158	452	784	1,248	1,761
SUMMARY OF EXISTING M&I WATER SUPPLIES TO MEET DEMANDS						
Culinary indoor demand in acre-feet	0	59	182	332	556	829
Springs	0	0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
Remaining Demand for Culinary Supplies	0	59	182	332	556	829
Secondary (outdoor) demand in acre-feet	0	98	270	452	692	933
Springs	0	0	0	0	0	0
Groundwater wells	0	0	0	0	0	0
N/A	0	0	0	0	0	0
CUP water	0	0	0	0	0	0
Provo River water	0	0	0	0	0	0
Local front streams	0	0	0	0	0	0
Remaining Demand for Secondary Supplies	0	98	270	452	692	933
Future Supplies Developed to Meet Population Growth						
Additional Groundwater Wells	0	0	0	0	0	0
Local Water	0	158	452	784	1,248	1,761
CUP water	0	0	0	0	0	0
Exchange Water						
Requirements for New Supplies	0	158	452	784	1,248	1,761
Remaining Demand Not Met	0	0	0	0	0	0
Total Remaining Available Supplies	0	0	0	0	0	0
Unavailable Agricultural Water Within Declaration Boundary	unknown	unknown	unknown	unknown	unknown	unknown

Footnotes:
(1) Assumed no population in 2000 and used conservative population growth equal to entire growth in Wasatch County unicorporated areas.
(2) Calculated from correspondence dated April 26, 2001 (1.B.02.029.B0.114) to Mark Breitenbach, CUWCD Project Manager, from Michael K. Davis, Director of Water Resource Department in Wasatch County, which states that State requirment for Wasatch County is 0.9 acre-feet per culinary hook-up and 3.54 people per hook-up. This results in a usage of 0.9 acre-feet per hook-up divided by 3.54 people per hook-up equals 0.254 acre-feet per capita.
(3) Product of Population Projection (line 2) and Acre-feet/capita/year (line 5)
(4) Conversion of Acre-feet/capita/year (line 4) by multiplying by conversion factor 892.7 gpcd/afpc
(5) 80 gpcd indoor use was assumed as an average indoor water demand
(6) From modified Figure 9, page 53 of ""