

**STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RESOURCES**

**MUNICIPAL AND INDUSTRIAL
WATER SUPPLY AND USES
in the
UTAH AND EAST JUAB COUNTIES AREA**

(Data Collected for Calendar Year 1998)

July 2000

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EXECUTIVE SUMMARY

This document describes the municipal and industrial (M&I) water supplies and uses for a study area in Utah and East Juab counties. This study area is defined as the area supplied by 38 public community water systems. Total M&I water supplies and uses for the study area are computed by tabulating data from each of the water systems in the study area. Water system data is compiled after meeting with and surveying the individual public community systems. The results reported herein represent totals for the 1998 calendar year.

The maximum annual potable water supply available under present conditions for the surveyed Public Community Systems is 226,478 acre-feet. Of this maximum water supply springs account for 18 percent, wells 76 percent, and surface sources 6 percent. The reliable system source capacity available to meet peak day demands for these systems is 111,647 acre-feet. Following, Table I presents this data.

TABLE I
UPPER JORDAN RIVER BASIN
Maximum 1998 Culinary Water Supplies
for Public Community Systems.

Source	Utah County (Ac-Ft/Yr)	Juab County (Ac-Ft/Yr)	Total (Ac-Ft/Yr)
Springs	38,426.4	3,090.8	41,517.2
Wells	160,095.6	10,971.9	171,067.5
Surface	13,893.4	0.0	13,893.4
TOTALS	212,415.4	14,062.7	226,478.1
Reliable System Source Capacity	105,291.5	6,355.8	111,647.2

M&I water use can be divided into two categories: potable (culinary) and non-potable (secondary). Potable water is treated to state drinking water standards and is delivered by the public community water systems. Non-potable is untreated water usually delivered by separate irrigation companies. However, in some cases non-potable water is delivered by the communities through systems separate from those for their potable water. Both potable and non-potable water are

commonly used for residential, commercial, institutional, and industrial applications. Table II presents data on the use of potable and non-potable water for each of four applications. The table shows that the residential indoor category accounts for 36 percent, residential outdoor 29 percent, commercial 11 percent, institutional 17 percent, and industrial 6 percent of the total public community system potable water use (83,301 acre-feet) in this area.

Non-potable, or secondary water use, accounts for 20 percent (21,430 acre-feet) of the total water use in the area. Table II indicates that the residential secondary category accounts for 16 percent, while all the other secondary water use categories combined were about 4 percent of the total water use of 104,731 acre-feet in 1998.

TABLE II
UPPER JORDAN RIVER BASIN
1998 Water Uses for Public Community Systems

Source	Utah County (Ac-Ft/Yr)	Juab County (Ac-Ft/Yr)	Total (Ac-Ft/Yr)
<i>Potable Uses:</i>			
Residential Indoor	29,626.6	601.4	30,228.0
Residential Outdoor	24,143.8	350.0	24,493.8
Commercial	9,254.6	125.0	9,379.6
Institutional	13,802.8	267.7	14,070.5
Industrial/Stockwater	4,991.8	136.9	5,128.7
TOTAL CULINARY	81,819.6	1,481.0	83,300.6
<i>Non-Potable Uses:</i>			
Residential	15,625.7	328.2	15,953.9
Commercial	2,991.5	2.2	2,993.7
Institutional	1,870.1	47.2	1,917.3
Industrial/Stockwater	565.6	0.0	565.6
TOTAL SECONDARY	21,052.9	377.6	21,430.5
TOTAL WATER USE	102,872.5	1,858.6	104,731.1

Table III presents the total M&I water use for the study area. Public community systems deliver the majority of the potable water. The table shows that total potable M&I use in 1998 is

112,513 acre-feet. Non-Potable M&I use is 21,430 acre-feet. Therefore total M&I use is about 133,943 acre-feet.

TABLE III
UPPER JORDAN RIVER BASIN
1998 Total Municipal and Industrial Water
 Use for all Categories

Source	Utah County (Ac-Ft/Yr)	Juab County (Ac-Ft/Yr)	Total (Ac-Ft/Yr)
<i>Potable Suppliers:</i>			
Public Community Systems	81,819.6	1,481.0	83,300.6
Public Non-Community Systems	91.0	0.0	91.0
Self-Supplied Industries	26,621.0	0.0	26,621.0
Private Domestic	2,500.0	0.0	2,500.0
TOTAL CULINARY	111,031.6	1,481.0	112,512.6
<i>Non-Potable Suppliers:</i>			
Secondary Irrigation Companies	21,052.9	377.6	21,430.5
Non-Community Systems	0.0	0.0	0.0
Self-Supplied Industries	0.0	0.0	0.0
Private Domestic	0.0	0.0	0.0
TOTAL SECONDARY	21,052.9	377.6	21,430.5
TOTAL WATER USE	132,084.5	1,858.6	133,943.1

INTRODUCTION

Authority

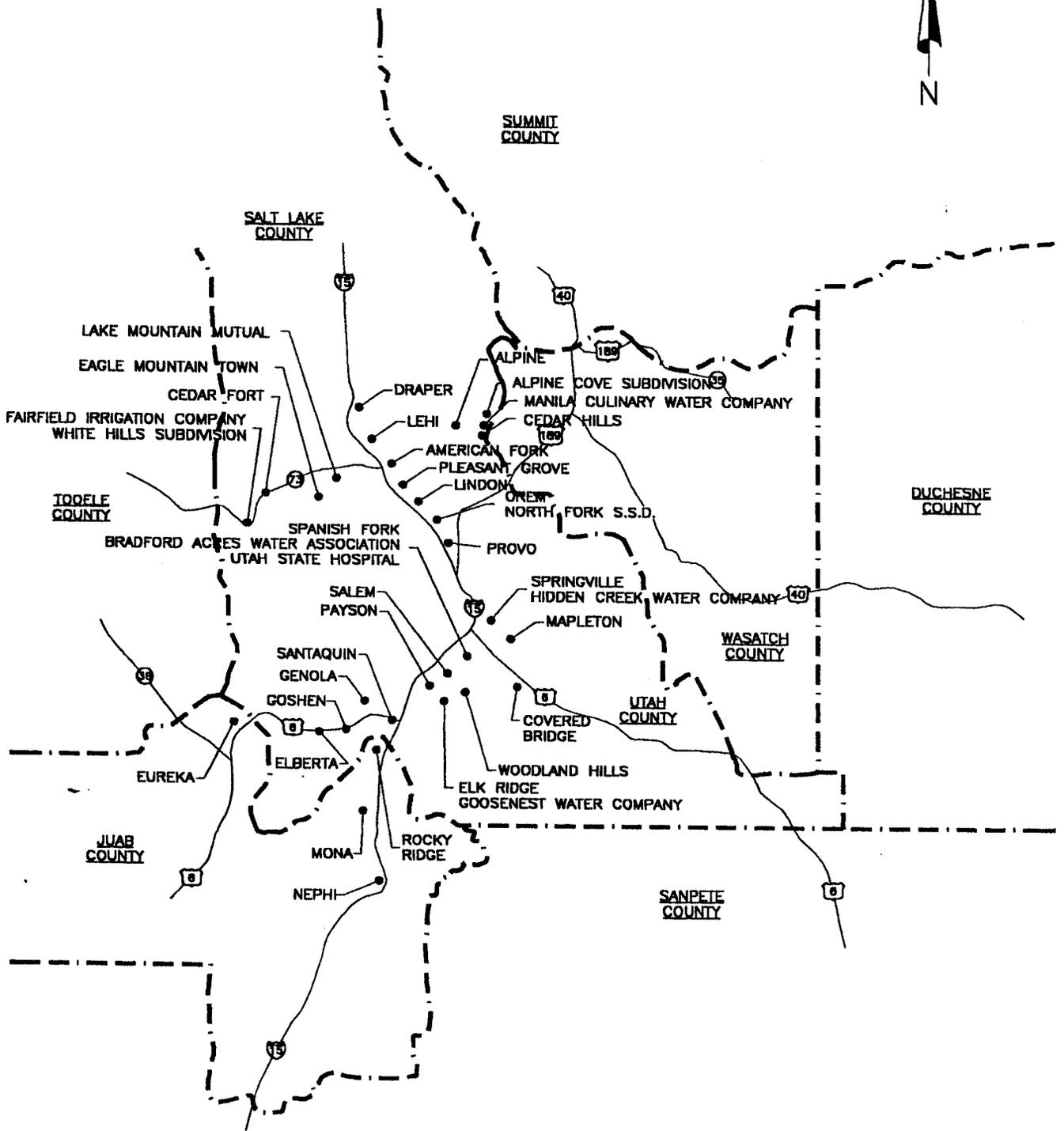
The Utah Division of Water Resources has overall responsibility for completing studies, investigations, and plans directed at the responsible development and utilization of the water resources of the state of Utah. The State Water Plan, prepared and distributed in early 1990, provided the foundation and overall direction to establish and implement the state policy framework of water management. As part of the state water planning process, detailed plans are prepared for each of the 11 hydrologic basins in the state. Each basin water plan will identify potential conservation and development projects and describe alternatives to satisfy the problems, needs, and demands. As part of this effort, background data reports are completed for each river basin, or subdivision of a basin. These include a water-related land use report and a water budget report.

Scope

This data report is an estimate of present municipal and industrial (M&I) water supplies and water uses within a study area in Utah and East Juab counties. Hansen, Allen, and Luce Inc. was retained by the Division of Water Resources to assist with the collection and evaluation of data, and in the preparation of this data report for the outlined study area. The data presented in this report will be used in the State Water Plan for the Upper Jordan River Basin as well as other Division reports and studies. Location of communities that comprise the study area are shown on Figure 1.

Data Collection

The initial phase of this study began in April 1999 for a study area within the South Utah and East Juab counties area. In December 1999, the study area was expanded to include all public-community water systems serving Utah County. Representatives of each water system within the study area were contacted and asked to supply water supply and use information. Data was collected using forms and by interviewing water system managers.



028\06.100\NEW AREA.DWG 5/11/00 (NCE)

**HANSEN
ALLEN
& LUCE inc.**

LOCATION OF PUBLIC
COMMUNITY WATER SUPPLIERS
IN THE STUDY AREA

FIGURE
1

Telephone contacts were made when personal contacts were not possible. Follow-up contacts were made as necessary to clarify or obtain additional data. The *1998 Municipal and Industrial Water Use Forms*, distributed by the Division of Water Rights, in cooperation with the Division of Water Resources and the Division of Drinking Water, were also used as information sources.

All water use and supply data included in the report are from the 1998 calendar year. Information concerning the numbers of connections, and general information may have been obtained from the annual water use reports. The data collection process is as described in the following section, *Water Supply and Use Methodology*. Water rights discussions presented herein were prepared based on conversations with the Area Engineer from the State Engineer's Office.

General Description of the Study Area

A total of 38 public community water systems located in Utah County and in East Juab County comprise the study area. These public community water systems serve approximately 342,700 people. In Utah County, the study area includes the following public community water systems.

- Alpine
- Alpine Cove Subdivision
- American Fork
- Bradford Acres
- Cedar Fort
- Cedar Hills
- Covered Bridge Canyon
- Eagle Mountain
- Elberta
- Elk Ridge
- Fairfield Irrigation Co.
- Genola
- Goosenest Water Co.
- Goshen
- Hidden Creek Water Co.
- Highland Water Co.
- Lehi
- Lindon
- Manila Culinary Water Co.
- Mapleton
- North Fork SSD
- Orem
- Payson
- Pleasant Grove
- Provo
- Salem
- Santaquin
- Saratoga Springs Town (Lake Mt. Mutual)
- Spanish Fork
- Spring Lake Water Works
- Springdell Plat A&B
- Springville
- Utah State Hospital
- White Hills Subdivision
- Woodland Hills

In East Juab County the study area includes the following public community water systems:

- Eureka
- Nephi
- Mona
- Rocky Ridge

The study area, with the exception of Eureka, is located entirely within the Upper Jordan River Basin. Eureka is located within the Sevier River Drainage. However, wells which supply Eureka's water are located within the Upper Jordan River Basin. Therefore Eureka is included in the study area.

The study area is located in central Utah in the basin and range physiographic province. The general location of the study area is shown on Figure 1. Topography of the area consists of a series of mountains and valleys with altitudes varying from about 11,000 feet in the mountain peaks along the Wasatch Front to less than 5,000 feet in the valley floor along Utah Lake. The climate of the area ranges from semi-arid in the valleys to humid on the high mountain areas.

Most of the water flowing into the valleys originates as snowmelt in the mountains. M&I water use in the area is supplied by both surface water and ground water. Surface water and ground water supplies are closely related. Inflow from the mountains and perennial streams has been identified as the largest source of ground water recharge.

Important sources of surface water in the study area are Spanish Fork/Soldier Creek, Hobble Creek, Salt Creek, Provo River, American Fork Creek and their tributaries which include several small perennial streams. The Provo River, Spanish Fork/Soldier Creek, American Fork Creek, and Hobble Creek drainages are the largest in the study area.

Unconsolidated and semi-consolidated fill underlying the valleys form the principal ground water reservoir for the area. Ground water movement is generally from recharge areas in and at the base of the mountains toward discharge areas in the valleys. Discharge of ground water occurs from

both springs and wells. Both sources of ground water are important municipal and industrial water supplies.

M&I water use is steadily increasing within the study area. The communities in Utah County and eastern Juab County are experiencing high growth rates due to expansion along the Wasatch Front.

WATER SUPPLY AND USE METHODOLOGY

Background

Over the past 40 years the Division of Water Resources has employed various procedures to obtain needed M&I data. In recent years, these procedures have become more comprehensive. When the Division began water planning in the 1960's, available data consisted mainly of supplies and uses for the entire state. At that time, agriculture uses far exceeded M&I uses in Utah and M&I water use was generally calculated by using available or estimated per capita rates multiplied by the census population data.

By the early 1980's, M&I diversions made up a larger percent of all statewide water uses and the entire water community began an increased focus on M&I water supplies and uses. The Division of Water Rights launched a program to collect yearly, statewide M&I data. The procedure involved mailing a survey designed to query each major public water supplier about their sources of water supply. In addition, the United States Geological Survey (USGS) began M&I water use studies. The Division relied on both of these data sources in its planning efforts by the late 1980's.

With the preparation of the State Water Plan Basin reports, the Division saw the need to check and improve the quality and quantity of the available data through two methods. The first was to join with the Division of Water Rights to improve their M&I data collection program. Secondly, the Division began exploring the accuracy of the data through yearly field surveys described in the following four sections.

Present Methodology for Community Water Systems

Each year, the Division of Water Resources targets a particular hydrologic basin or study area for M&I water supply and use analysis. The Division of Water Rights' most recent water use form

is the primary tool for these analyses. As an example, the following three pages exhibit the 1998 water use form submitted by Eureka Municipal Water System.

The manager or operator of each community water system (as defined by the Division of Drinking Water) was contacted to schedule a data analysis meeting. Many times operators inadvertently omit necessary information on their yearly form. During such meetings, attempts were made to retrieve missing data and estimate unavailable data. In most cases, additional data request forms were sent to the water systems requesting clarification of data on the water use form, and requesting additional data.

During the analysis, a determination was made of the system's water supply and use. Two factors define water supply: 1) Maximum water supply available under present conditions; and 2) Reliable system source capacity. The maximum water supply available under present conditions is defined as the water resource which is presently developed. The resource is limited by either a mechanical constraint (such as pump capacity or pipe size), a hydrologic constraint (such as reliable streamflow or groundwater safe yield) or a legal constraint (such as a water right or contract). The most restrictive of these three constraints is used in this study to estimate the maximum water supply available under present conditions. Determination of well pump capacities, spring flow estimates, treatment plant capacities, and water right information aid in the calculation of this value. Water rights constraints were determined based upon information supplied by the community and information available in a cursory review of the State's water right computer database. It should be noted that water rights can be complex due to contracts, exchanges, etc., and a full evaluation of water right limitations associated with each entity is beyond the scope of this study.

The reliable system source capacity is defined as the capacity to meet peak day demands, expressed as an annual volume. The maximum water supply available under present conditions (defined earlier) deals with an average annual volume. Many water supply components in M&I systems (treatment plants, storage facilities, pump motors, etc.) are sized using demand during a peak 24-hour period. The relationship between average day and peak day demand is important. It is for this reason that a more reliable system source capacity is determined to accurately reflect future M&I

UTAH WATER USE DATA FORM
DATA FOR 1998

Return completed form to:
 Utah Division of Water Rights
 PO Box 146300
 Salt Lake City, UT 84114-6300

Population Served: 750 ID #: 1036/12004
 Total No. Connections: 347 County: Juab
 Average Lot Size Served: 2 acre(s).
 Estimated Percent of Lot Irrigated: _____ %
 Phone Number: (435) 433-6915
 Phone Number: (435) 433-6891 FAX

System Name: Eureka City Water
 Address: Box 156
Eureka, UT 84628
 Contact Person: Fred Garbett, City Manager
 Form filled out by: Patricia Bigler, City Recorder
 Number of Tanks: 1 in gallons.

I. STORAGE INVENTORY: Total treated storage capacity: 500,000

II. SOURCE INVENTORY:

1 Source Name: Blue Rock Well Type: WE Location: Sec 8, T10S, R2W, SLB&M WR Number: 53-261, 53-327, 53-328
 Method of Measurement: Master Meter, Estimate, Other
 Units of Measurement: Gallons Rated Pump Capacity: 1762 gpm, cfs
 Date of Last Pump Test Nov 19-20, 1990 Yield of Well 79 gpm, cfs

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
498,840	465,120	498,840	487,600	498,840	487,600	498,840	498,840	498,840	487,600	498,840	487,600	498,840	5,907,400

2 Source Name: Dolinar Well Type: WE Location: Sec 5, T10S, R2W, SLB&M WR Number: 53-261, 53-327, 53-328
 Method of Measurement: Master Meter, Estimate, Other
 Units of Measurement: Gallons Rated Pump Capacity: 1762 gpm, cfs
 Date of Last Pump Test Nov 19-20, 1990 Yield of Well 79 gpm, cfs

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
498,940	465,120	498,840	487,600	498,840	487,600	498,840	498,840	498,840	487,600	498,840	487,600	498,840	5,907,400

3 Source Name: Eureka Hill Well Type: WE Location: Sec 8, T10S, R2W, SLB&M WR Number: 53-261, 53-327, 53-328
 Method of Measurement: Master Meter, Estimate, Other
 Units of Measurement: Gallons Rated Pump Capacity: 1762 gpm, cfs
 Date of Last Pump Test Nov 19-20, 1990 Yield of Well 79 gpm, cfs

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
498,840	465,120	498,840	487,600	498,840	487,600	498,840	498,840	498,840	487,600	498,840	487,600	498,840	5,907,400

Source Name: Vulcan Well
 Type: WE Location: Sec 8, T10S, R2W, SLBEM
 WR Number: 53-261, 53-327, 53-328

Method of Measurement: Master Meter, Estimate, Other
 Units of Measurement: Gallons
 Rated Pump Capacity: 1762 gpm, cfs
 Date of Last Pump Test: Nov 19-20, 1990
 Yield of Well: 79

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
498,840		465,120	498,840	487,600	498,840	487,600	498,840	498,840	487,600	498,840	487,600	498,840	5,907,400

Source Name: Eagle Well
 Type: WE Location: Sec 8, T10S, R2W, SLBEM
 WR Number: 53-261, 53-327, 53-328

Method of Measurement: Master Meter, Estimate, Other
 Units of Measurement: Gallons
 Rated Pump Capacity: 1762 gpm, cfs
 Date of Last Pump Test: Nov 19-20, 1990
 Yield of Well: 79

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
498,840		465,120	498,840	487,600	498,840	487,600	498,840	498,840	487,600	498,840	487,600	498,840	5,907,400

** If you are using other sources which are not shown above, please enter the appropriate data in the space provided below. **

WR Number:

Type: Location:

Method of Measurement: Master Meter, Estimate, Other

Units of Measurement:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

WR Number:

Type: Location:

Method of Measurement: Master Meter, Estimate, Other

Units of Measurement:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

WR Number:

Type: Location:

Method of Measurement: Master Meter, Estimate, Other

Units of Measurement:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

SOURCE COMMENTS: Water supply conditions were: Above normal, Normal, Below normal

WATER USE BREAKDOWN: (Please use sum of readings from individual meters. If quantities are not know, please estimate percentages. See instructions for definition of uses shown in bold.)

Units of Measurement: Gallons

Source of data: Meter readings at the source; Meter readings at individual connections; or Estimated

Residential: Annual quantity of water delivered for residential purposes - 21,912,260 . Total number of residential connections 321

Commercial: Annual quantity of water delivered for commercial purposes - 585,740 . Total number of commercial connections 17

Industrial: Annual quantity of water delivered for industrial purposes - _____ . Total number of industrial connections _____

Institutional: Annual quantity of water delivered for institutional purposes - 3,034,000 . Total number of institutional connections 4

Stockwatering: Annual quantity of water delivered for stockwatering purposes - _____ . Total number of stockwatering connections _____

Unmetered: Annual quantity of water delivered by unmetered connections - 5,000 . Total number of unmetered connections 5

Wholesale: Annual quantity of water delivered to other systems - _____ . Please attach a listing of those supplied.

Other Uses: Annual quantity of water delivered for other purposes - _____ . Total number of other connections _____

Describe other uses _____

IV. IRRIGATION SYSTEM (Separate lawn and garden irrigation system, whether controlled by the drinking water supplier or not)

Is your area served by a separate irrigation water system? Yes, No If yes, please provide the following information:
 What percent of your customers are served by a separate irrigation system? _____ % The water is delivered _____ % by ditch & _____ % by pressurized system
 If system is operated by another entity, please give name of company, contact person & phone number: _____

Quantity of water delivered by the irrigation system: Units of measurement: _____
 Total water delivered: _____

Estimated acreage served by the irrigation/secondary system: _____ acres.

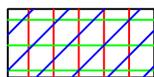
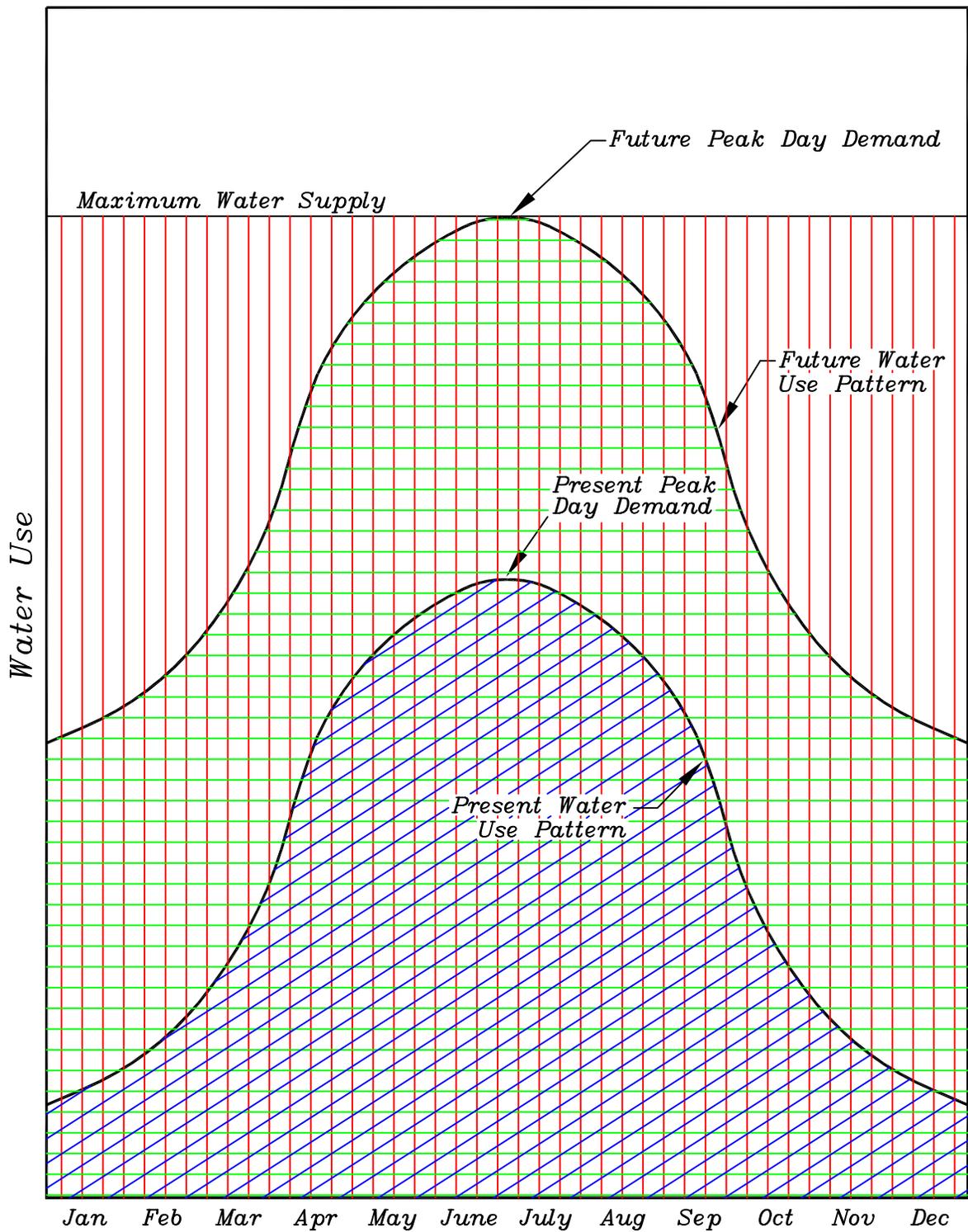
water conditions for each system. The following relationship between peak day demand and average day demand was provided by the Division of Water Resources for use in this study:

$$PD = -49.4 + 2.5 AD$$

where PD is peak day demand (gpcd) and AD is average daily demand (gpcd). For each public community system, the average per capita use (described later) is used in the relationship above to determine a peak factor, and the maximum water supply available under present conditions is used to determine a peak day supply. These two values are then used in calculating the reliable system source capacity which represents the systems' annual maximum water supply's ability to meet peak day demand conditions. It also represents the volume of water which, when divided by the average annual per capita water use, gives the population that can be reliably served by the present system sources.

Figure 2 graphically presents the relationship between maximum water supply and reliable system source capacity. Current water use is shown in the figure as the volume under the lower curve. The future water use is shown as the volume under the upper curve. The maximum water supply under present conditions is shown by the volume under the upper line. Because this amount is associated with a maximum daily flow rate (limited by the water right or system capacity), the line in the figure must pass through the peak day demand point on the future water use curve. It is for this reason (and the fact that most culinary water system storage tanks are designed to store only about one days' worth of water demand) that not all of the maximum water supply is available to meet future water needs. Therefore, the reliable system source capacity, which is equal to the volume under the future water use curve, is a better indication for meeting future water needs. For most systems this value is about one half of the maximum water supply.

The reliable system source capacity is valuable in determining future water capacities of the particular community water system sources (wells, springs, etc.). Although future water projections are not addressed in this study, the data provided here are used in the state water plans which the



Present Yearly Water Use (Volume under curve)



Present Reliable System Source Capacity/Future Water Use (Volume under curve)
When this volume is divided by annual per capita water use, this yields the population that can be reliably served.



Maximum Source Capacity Available Under Present Conditions (Volume under line)

Figure 4. Water Supply and Use Hydrograph.

Division is formulating for each major hydrologic basin in the state. These basin plans deal with considerable detail about future water demands and supplies.

The last part of the data collection process is to determine the present water use for each community water system. Present water use, as defined herein, includes the water which is actually diverted into the distribution system from surface or subsurface sources. The data collected represents the latest complete calendar year available when the study was started. Water use is divided into four categories: residential, commercial, institutional and industrial. For comparative purposes the Division chose these categories to correlate with the United States Geological Survey's (USGS) categories of domestic, commercial, industrial, and mining. The Division's residential category is equivalent to the USGS domestic category and includes water used inside and outside of residential homes. The USGS commercial category is equivalent to the Division's combined commercial and institutional categories. The commercial category includes water use for retail establishments and businesses. The institutional category includes water use for government facilities, military facilities, schools, hospitals, churches, parks, cemeteries, public golf courses, etc. The Division's industrial category is equivalent to the combined USGS categories of industrial and mining which includes a wide variety of water uses associated with businesses that produce a specific product.

Residential Use

Water use in this category is divided into three subcategories: culinary-outside, culinary-inside, and secondary-outside use. The first step in calculating the amount of water used in each of these subcategories is dividing culinary-outside and culinary-inside use. Because outside water use is rarely metered, water use for these subcategories was usually estimated.

Outside water use was estimated based upon the irrigated acreage and the calculated irrigation demand. In somecases it was possible to estimate culinary-outside use by subtracting indoor residential use from the total residential use. Irrigated acreage estimates were made based upon

average lot size, the percentage of the lot area that is irrigated, the percentage of residences that are supplied by separate secondary (pressurized and ditch) irrigation systems, and other related information. This information was generally supplied by water system operators. However, field observations were used to estimate irrigated acreage if the information available from water system operators was inadequate. Average seasonal irrigation demand was calculated based upon climatological factors as outlined in "Consumptive Use of Irrigated Crops in Utah," Research Report 145, Utah Agricultural Experiment Station, Utah State University, Logan, Utah. This report presents the net irrigation requirement in inches per year for Elberta, Nephi, Payson, Santaquin, and Spanish Fork. The total irrigation demand was calculated using an irrigation efficiency of 60%. For communities not included in the publication, the net irrigation demand for the closest given location was used to estimate the total irrigation demand.

When sufficient metered use amounts were available, inside-culinary water use was estimated from metered use during winter periods when it was assumed that no outside water use was occurring. If metered use amounts were not available, then inside culinary water use was estimated based upon inside-culinary water use in a similar community. Inside-culinary use varied from 51 to 127 gallons per capita day (gpcd), but was generally near 80 gpcd.

An important factor in evaluating residential water use is the population served by the water system. Populations for each community were estimated using information from the community, the Governor's Office of Planning and Budget, and Mountainland Association of Governments. Adjustments to the population were made as necessary for areas served outside political boundaries. As expected, population estimates for each community varied depending upon the information source. Population estimates were evaluated on a case-by-case basis to determine which data source was most appropriate and provided the most reliable population for the community. Population estimate sources for each public community system are given in Appendix A and Appendix B.

Commercial Use

For most systems, the system operator can separate metered commercial water use data from the total water use. In cases where this data was not available or extremely difficult to obtain, attempts were made to estimate commercial water use by inventorying commercial businesses in the area and using published commercial water use estimates. These publications come from the Division of Drinking Water and from reports published by the Utah State Water Lab. In some rural communities where there is a relatively small number of commercial connections, general knowledge of the water system managers was used in addition to using published water use estimates.

Institutional Use

Institutional water use is defined as water use by school district, hospital, church, municipal government, county government, state government, and federal government facilities. Metered use amounts were used when available. However, water use at city facilities is often not metered because it does not generate revenue. When metered use amounts were not available, institutional uses at facilities were estimated based upon irrigated acreage, irrigation demand, and other factors. Water system operators and city personnel were asked to provide information such as the number and size of parks, schools, churches, and golf courses. Average seasonal irrigation demand was calculated based upon climatological factors as outlined in “Consumptive Use of Irrigated Crops in Utah,” Research Report 145, Utah Agricultural Experiment Station, Utah State University, Logan, Utah.

Industrial Use

Industrial water use is defined as water used in the production of a product. Therefore, agricultural uses such as livestock watering and dairy farms are included in this category, provided a community system serves them. Industrial use within community water systems was calculated from metered use amounts when available, and was estimated based upon the type of industry when metered use amounts were not available.

Non-Community Water Systems

Water use by non-community water systems was estimated by the Division of Water Resources staff. Non-community systems rarely meter their water use, so estimates are made as to their actual use. Information used to estimate water use includes the type of facility, population served, water source information, irrigation of outside areas, etc. This data, along with other water related publications are used to determine water use. The maximum water supply for these systems is often not available and is not in the scope of this study.

Self-Supplied Industrial Water Systems

Water use by self-supplied industries was acquired by Division of Water Resources Staff using data given on the Division of Water Rights Industrial Water Use Form. The Division of Water Rights collects annual water use data from most of the major self-supplied industrial water users in the state. This data is confidential. Therefore, the data presented in this study is only given as county totals. Again, the maximum water supply is often not available and is not in the scope of this study.

Private Domestic Water Systems

Private domestic systems are residences that are not connected to any public community or non-community water system. They are usually supplied by individual wells. The water use data for this category is acquired by taking the State Office of Budget county population data and subtracting the population served by community water systems. The remainder is the population that is served by private domestic systems. A reasonable per capita rate(usually determined from the residential per capita rates from nearby community systems) is applied to this population to determine the total water use by private domestic systems. Since the maximum water supply for private wells is really an analysis of the total groundwater reservoir/recharge area, it is not in the scope of this study.

DEFINITIONS OF WATER TERMS

Some water terms peculiar to the water industry have been defined by the Division of Water Resources and are included herein to more clearly define the information presented.

Water Supply Terms

Water is supplied by a variety of systems for many users. The general term supply is defined as amount of water available. Most water supply systems are owned by a municipality, but in some cases the owner/operator is a private company or is a state or federal agency. Thus, a "public" water supply may be either publicly or privately owned. Also, systems may supply treated or untreated water.

Maximum Water Supply Available Under Present Conditions - The annual volume of water which is the lesser of the hydrologic capacity of the water source, the physical capacity of the water system, or the use allowed by the water right. See Figure 2.

Reliable System Source Capacity - The actual annual quantity of the maximum water supply that is available to meet peak demands. When this number is divided by the average per capita usage, the resulting number represents the maximum population that the water source can serve. See Figure 2.

Municipal Water Supply - A supply that provides potable (culinary) water for residential, commercial, and institutional uses. The terms municipal, community and city are often used interchangeably.

Municipal and Industrial Water Supply - Includes all water (potable and non-potable) supplied for residential, commercial, institutional, light industry, and large self-supplied industries. This supply is available for public community systems, public non-community (transient and non-transient) systems, self-supplied industrial systems, unregulated Indian systems and private wells.

Potable Water Supply - Water meeting all applicable safe drinking water requirements for residential, commercial, institutional and industrial uses. Sometimes referred to as culinary water supply.

Non-Potable Water Supply - Water not meeting safe drinking water requirements. Secondary irrigation companies and self-supplied industries supply this water. Sometimes referred to as non-culinary water supply, but usually referred to as secondary water.

Public Community Water Supply - Includes potable water supplied by either privately or publicly owned community systems which serve at least 15 service connections or 25 individuals in residences occupied year round. Water from public community supplies may be used for residential, commercial, institutional, and industrial purposes. This can include both indoor and outdoor uses.

Public Non-Community Water Supply - Includes potable water supplied by either privately or publicly owned systems of two types; transient and non-transient. Transient systems are systems that do not serve 25 of the same non-resident persons per day for more than six months per year. Examples include campgrounds, RV parks, restaurants, convenience stores, etc. Non-transient systems are systems that regularly serve 25 of the same non-resident persons per day for more than six months per year. Examples include churches, schools and industries. This report combines transient and non-transient systems together and calls them all public non-community systems. Industries are reported under self-supplied industries.

Secondary Water Supply - Pressurized or open ditch water supply systems that supply untreated water for irrigation of privately and publicly owned lawns, gardens, parks, cemeteries, golf courses and other open areas. These systems, sometimes called "dual" water systems, are installed to provide an alternative to irrigating with culinary water for these outdoor areas. This supply is often provided by irrigation companies. Self-supplied industries can also use secondary water for industrial processes.

Self-supplied Industrial Supply - Includes potable or non-potable water supplied by individual privately owned industries usually from their own wells or springs.

Water Use Terms

Water is used in a variety of ways and for many purposes. Water is often said to be "used" when it is diverted, demanded, withdrawn, depleted or consumed. But it is also "used" in place for such things as fish and wildlife habitat, recreation and hydropower production. The word use can be inserted where the word supply is written in most of the previous water supply terms to define the current demand associated with those definitions. Some additional water use terms are as follows:

Commercial Use - Uses normally associated with small business operations which may include drinking water, food preparation, personal sanitation, facility cleaning and maintenance and irrigation of facility landscapes. Retail businesses, restaurants and hotels are some examples.

Industrial Use - Uses associated with the manufacturing or production of products. The volume of water used by industrial businesses can be considerably greater than water used by commercial businesses. Manufacturing plants, oil and gas producers, mining companies, mink farms and dairies are some examples.

Institutional Use - Uses normally associated with general operation of various public agencies and institutions including drinking water, personal sanitation, facility cleaning and maintenance and irrigation of parks, cemeteries, playgrounds, recreational areas, golf courses, and other facilities. Many times the amount used by cities for outside irrigation of public areas is not metered.

Municipal and Industrial (M&I) Use - Term includes all residential, commercial, institutional, and industrial uses. It includes total uses (potable and non-potable) supplied by public water systems (community and non-community), self-supplied industries, private domestic systems, and secondary irrigation companies.

Private-Domestic Use - Includes water from private wells or springs for use in individual homes, usually in rural areas not accessible to public water supply systems.

Residential Use - Water use associated with residential cooking; drinking water; washing clothes; miscellaneous cleaning; personal grooming and sanitation; irrigation of lawns, gardens and landscapes, and washing automobiles, driveways and other outside facilities. Single family homes, apartments, duplexes and condominiums are some examples.

Other Water Terms

Consumption - Water evaporated, transpired or irreversibly bound in either a physical, chemical or biological process.

Consumptive Use - Losses of water brought about by human endeavors when used for residential, commercial, institutional, industrial, agricultural, power generation, and recreation. Naturally occurring vegetation and fish and wildlife also consumptively use water.

Depletion - Water lost or made unavailable for return to a given designated area, river system or basin. It is intended to represent the net loss to a system. The terms consumption and depletion are often used interchangeably but are not the same. For example, water exported from a basin is depletion to the basin system but is not consumed in the basin. The exported water is available for use in another system. Water diverted to irrigated crops in a given system, but not returned for later use, is depletion. Precipitation that falls on irrigated crops is not considered a part of the supply like surface water and groundwater diversions. For this reason, precipitation falling on and consumed by irrigated crops is not considered as being a depletion to the system.

Diversion - Water diverted from supply sources such as streams, lakes, reservoirs or groundwater for a variety of uses including crop land irrigation, residential, commercial, institutional and industrial. The terms diversion and withdrawal are often used interchangeably.

Withdrawal - Water withdrawn from supply sources such as lakes, streams, reservoirs or groundwater. This term is normally used in association with groundwater withdrawal.

WATER RIGHTS IN THE UPPER JORDAN RIVER BASIN

Although a detailed analysis of water rights is not within the scope of this study, a water supply and use study would not be complete without a discussion on the current water right regulations in the area. The following discussion was obtained from the Division of Water Rights. It explains the current water rights conditions in the study area.

All mountains and canyons within the study area are closed to new appropriations. In general, the rest of the study area is also closed to new appropriations with the exception of somewhat restricted single family domestic and stockwatering uses. There are additional restrictions for more specific locations within the study area based on location specific circumstances.

Water rights information for each public water system in the study area was obtained from information supplied by the community and by a cursory search of the State's water rights computer database. The allowable groundwater withdrawal amount for each entity was calculated from the water rights information and used to determine the reliable system source capacity. It should be noted that water rights can be complex due to contracts, exchanges, etc., and a full evaluation of water right limitations associated with each entity is beyond the scope of this study.

JUAB COUNTY M&I WATER SUPPLIES AND USES

The portion of the study area in Juab County includes the incorporated communities of Eureka, Mona, Nephi, and Rocky Ridge, each with its own public community water system. Culinary water supply for these entities comes from wells and springs. Springs are the preferred source where available due to the higher cost of pumping from wells. Figure 1 illustrates the locations of the public community systems.

Table 1 shows that the maximum annual potable water supply for public community systems in this portion of Juab County is 14,063 acre-feet; 3,091 acre-feet from springs, and 10,972 acre-feet from wells. No surface water is used for potable water supplies. Reliable system source capacity is less than half that amount at 6,356 acre-feet.

TABLE 1
JUAB COUNTY
Potable Water Supplies for Public Community Systems

WATER SUPPLIER	Springs (Ac-Ft/Yr)	Wells (Ac-Ft/Yr)	Surface (Ac-Ft/Yr)	Total (Ac-Ft/Yr)
Eureka*	0.0	126.7	0.0	126.7
Mona	338.8	0.0	0.0	338.8
Nephi	2752.0	10,280.8	0.0	13,572.8
Rocky Ridge	0.0	24.4	0.0	24.4
TOTALS	3,090.8	10,971.9	0.0	14,062.7

* Eureka supplies an additional 12.0 acre-feet/year through a secondary system.

Note: These values represent maximum supply capacity limited by water rights, hydrologic constraints and/or system constraints.

Table 2 shows the reliable system source capacity along with a breakdown of potable water use for each public community system. Table 2 indicates that for this portion of Juab County the current annual use of 1,481 acre-feet is about 23 percent of the reliable system source capacity.

**TABLE 2
JUAB COUNTY
WATER USE AND SUPPLY FOR PUBLIC COMMUNITY :**

WATER SUPPLIER	POTABLE USAGE						POTABLE PER CAPITA USE			Maximum Water Supply Available Under Present Conditions (Ac-Ft/Yr)	POTABLE ESTIMATED PEAK DAY VARIATION				Reliable System Source Capacity to Meet Peak Day Demand (Ac-Ft/Yr)
	Residential Outdoor Use (Ac-Ft/Yr)	Residential Indoor Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Industrial Use (Ac-Ft/Yr)	Total M&I" Use (Ac-Ft/Yr)	Population	Average Per Capita Water Use (Ac-Ft/C-Y)	Average Per Capita Water Use (GPCPD)		Assumed Peaking Factor (PD/AD)	Peak Day Supply (MGD)	Peak Day Demand (MGD)	Peak Day Supply Over Demand (MGD)	
Eureka	16.9	62.7	9.3	1.8	0.0	90.7	700	0.1296	116	126.7	2.0731	0.168 *	0.168	0.000	90.7
Mona	122.4	78.9	33.1	0.2	0.3	234.9	880	0.2670	238	338.8	2.2927	0.481 *	0.481	0.000	234.9
Nephi	207.2	443.6	224.7	123.0	136.2	1,134.7	4,950	0.2292	205	13,572.8	2.2586	12.116	2.288	9.828	6,009.4
Rocky Ridge	3.5	16.2	0.6	0.0	0.4	20.7	261	0.0793	71	24.4	1.8022	0.033 *	0.033	0.000	20.7
										see note					
TOTALS	350.0	601.4	267.7	125.0	136.9	1,481.1	6,791	0.2181	195	14,062.70	2.2463	12.798	2.970	9.828	6,355.8
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P

* NOTE: Peak Day Demand exceeds the calculated Peak Day Supply. Per DWR, an assumption was made that in these cases the Peak Day Supply has been exactly met and should be set equal to the Peak Day Demand. Although hydrologic conditions may allow some systems to withdraw the maximum water supply available under present conditions, the hydrologic conditions will probably limit all systems collectively from withdrawing the maximum water supply available under present conditions.

A, B, C, D, E, F, H, and K are all input data.

G=B+C+D+E+F

I=G/H

J=I*892.682; (converts from ac.ft./yr. to GPD)

L=(2.5*J-49.4)/J

M=K*892.682/1000000; (except as provided in the note above) The factor which when multiplied by the average per capita water use represents water use during peak day supply of potable water based on maximum reliable source capacity (converted to MGD). Where the calculated Peak Day Supply is less than the Peak Day Demand of potable water, this value was set equal to the Peak Day Demand.

N=H*J*L/1000000

O=M-N

P={M/(L*J)}*J*1120.22; (1120.22 converts from MGD to Acre-Ft/Yr) Reliable system source capacity represents that volume of water which, when divided by the average annual water per capita use, gives the amount of water which can be reliably served by the system sources under peak day demand conditions.

Secondary water is another important aspect of total M&I use. Table 3 summarizes the amount of secondary water used for various categories within the boundaries of the public community systems. In this portion of Juab County various irrigation companies deliver secondary water to customers. Total secondary use is 378 acre-feet.

TABLE 3
JUAB COUNTY

Secondary (Non-Potable) Water Use Within Public Community Systems

WATER SUPPLIER	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial / Stockwater Use (Ac-Ft/Yr)	Total Secondary Use (Ac-Ft/Yr)
Eureka	0.0	0.0	12.0	0.0	12.0
Mona	21.6	0.0	0.0	0.0	21.6
Nephi	306.6	2.2	35.2	0.0	344.0
Rocky Ridge	0.0	0.0	0.0	0.0	0.0
TOTALS	328.2	2.2	47.2	0.0	377.6

Note: Separate irrigation companies provide secondary to the water suppliers unless indicated by an **.

Total potable M&I water use in this portion of the county is 1,481 acre-feet, while secondary use is 378 acre-feet; giving a total M&I water use of 1,859 acre-feet. Since the current population of systems in the area is approximately 6,791, the total M&I per capita use is 244 gpcd including secondary water. Table 4 gives per capita water use for public community systems. Appendix A shows the data for each public community system that is presented in the tables.

TABLE 4
JUAB COUNTY

Average Per Capita M&I Water Use for all Public Community Systems

CATEGORIES	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.140	125
Residential Potable Plus Secondary Use	0.196	175
Total Potable Use	0.218	195
Total Potable Plus Secondary Use	0.274	244

Note: Total potable categories include residential, commercial, institutional and industrial uses.

UTAH COUNTY M&I WATER SUPPLIES AND USES

The portion of the study area within Utah County includes the following public community water systems:

- Alpine
- Alpine Cove Subdivision
- American Fork
- Bradford Acres
- Cedar Fort
- Cedar Hills
- Covered Bridge Canyon
- Eagle Mountain
- Elberta
- Elk Ridge
- Fairfield Irrigation Co.
- Genola
- Gooseneck Water Co.
- Goshen
- Hidden Creek Water Co.
- Highland Water Co.
- Lehi
- Lindon
- Manila Culinary Water Co.
- Mapleton
- North Fork SSD
- Orem
- Payson
- Pleasant Grove
- Provo
- Salem
- Santaquin
- Saratoga Springs Town (Lake Mt. Mutual)
- Spanish Fork
- Spring Lake Water Works
- Springdell Plat A&B
- Springville
- Utah State Hospital
- White Hills Subdivision
- Woodland Hills

Culinary water supply for these entities comes from wells, springs and surface waters. Springs are the preferred source where available due to the higher cost of pumping from wells. Additionally wells are generally preferred over surface waters due to the higher treatment costs of surface water. Figure 1 illustrates the location of the public community systems.

Table 5 shows that the maximum annual water supply for public community systems in Utah County is 212,415 acre-feet; 38,426 acre-feet from springs, 160,096 acre-feet from wells, and 13,893 acre-feet from surface water. The reliable system source capacity, at 105,299 acre-feet, is less than half of the maximum annual water supply of 212,415 acre-feet.

Table 6 shows the reliable system source capacity along with a breakdown of potable water use for each public community system. Table 6 also indicates that for Utah County the current annual use of 81,820 acre-feet is about 78 percent of the reliable system source capacity.

TABLE 5
UTAH COUNTY
Potable Water Supplies for Public Community Systems

Water Supplier	Reliable System Capacity (ac-ft/yr)			
	Spring	Well	Surface	Total
Alpine	292.0	5,174.8	0.0	5,466.8
Alpine Cove Subdivision	0.0	91.2	0.0	91.2
American Fork	1,234.0	25,423.0	0.0	26,657.0
Bradford Acres	0.0	53.0	0.0	53.0
Cedar Fort	62.0	0.0	0.0	62.0
Cedar Hills	0.0	391.6	0.0	391.6
Covered Bridge Canyon	0.0	73.3	0.0	73.3
Eagle Mountain	0.0	3,476.1	0.0	3,476.1
Elberta	0.0	80.4	0.0	80.4
Elk Ridge	0.0	603.1	0.0	603.1
Fairfield Irrigation Co.	97.0	0.0	0.0	97.0
Genola	161.3	645.2	0.0	806.5
Goosenest Water Co.	80.7	116.2	0.0	196.9
Goshen	846.9	0.0	0.0	846.9
Hidden Creek Water Co.	0.0	144.8	0.0	144.8
Highland Water Co.	0.0	7,745.2	0.0	7,745.2
Lehi	338.0	3,968.3	0.0	4,306.3
Lindon	60.0	4,258.6	0.0	4,318.6
Manila Culinary Water Co.	113.0	1,556.0	0.0	1,669.0
Mapleton	1,903.5	5,323.3	0.0	7,226.8
North Fork S.S.D.	676.3	0.0	0.0	676.3
Orem	2,490.0	20,137.6	13,000.0	35,627.6
Payson	1,680.3	6,194.4	0.0	7,874.7
Pleasant Grove	1,164.0	12,259.7	0.0	13,423.7
Provo	11,939.0	37,488.8	893.4	50,321.2
Salem	1,330.8	3,344.2	0.0	4,675.0
Santaquin	483.9	774.3	0.0	1,258.2
Saratoga Springs (Lake Mountain Mutual)	0.0	905.0	0.0	905.0
Spanish Fork	2,742.3	8,388.2	0.0	11,130.5
Spring Lake Water Works	145.0	395.0	0.0	540.0
Springdell Plat A & B	262.8	0.0	0.0	262.8
Springville	10,162.6	8,246.3	0.0	18,408.9
Utah State Hospital	161.0	726.0	0.0	887.0
White Hills Subdivision	0.0	1,854.0	0.0	1,854.0
Woodland Hills	0.0	258.0	0.0	258.0
TOTALS	38,426.4	160,095.6	13,893.4	212,415.4

Note: These values represent maximum supply capacity limited by water rights, hydrologic, and/or system constraints

**TABLE 6
UTAH COUNTY
WATER USE AND SUPPLY FOR PUBLIC COMMUNITY SYSTEMS**

WATER SUPPLIER	POTABLE USAGE						POTABLE PER CAPITA USAGE			Reliable Water Supply Available Under Present Conditions (Ac-Ft/Yr)	POTABLE ESTIMATED PEAK DAY VALUES			
	Residential Indoor Use (Ac-Ft/Yr)	Residential Outdoor Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial Use (Ac-Ft/Yr)	Total M&I* Use (Ac-Ft/Yr)	Population	Average Per Capita Water Use (Ac-Ft/C-Yr)	Average Per Capita Water Use (GPCPD)		Assumed Peaking Factor (PD/AD)	Peak Day Supply (MGD)	Peak Day Demand (MGD)	Peak Day Supply Over Demand (MGD)
Alpine	324.2	314.9	30.4	62.9	31.9	764.3	5,674	0.1347	120	5466.8	2.0892	4.880	1.425	3.455
Alpine Cove Subdivision	12.2	49.2	0.0	0.1	0.0	61.5	160	0.3844	343	91.2	2.3560	0.129 *	0.129	0.000
American Fork	1,750.1	2,265.6	1,080.3	975.8	0.0	6,071.8	20,831	0.2915	260	26,657.0	2.3101	23.796	12.521	11.275
Bradford Acres Water Association	3.8	5.4	0.0	0.0	0.0	9.2	50	0.1840	164	53.0	2.1992	0.047	0.018	0.029
Cedar Fort	30.4	26.8	0.6	15.0	0.0	72.8	396	0.1838	164	62.0	2.1990	0.143 *	0.143	0.000
Cedar Hills	197.9	177.1	0.0	16.4	0.0	391.4	1,510	0.2592	231	392.0	2.2865	0.799 *	0.799	0.000
Covered Bridge Canyon	20.8	20.6	0.0	0.0	0.0	41.4	232	0.1784	159	73.3	2.1899	0.081 *	0.081	0.000
Eagle Mountain	102.5	25.2	4.8	74.1	0.0	206.6	720	0.2869	256	3,476.0	2.3071	3.103	0.426	2.677
Elberta	21.8	28.2	0.3	0.3	27.6	78.2	243	0.3217	287	80.4	2.3280	0.162 *	0.162	0.000
Elk Ridge	191.0	225.3	0.0	22.9	0.0	439.2	1,530	0.2871	256	603.1	2.3072	0.905 *	0.905	0.000
Fairfield Irrigation Co.	3.2	1.0	0.0	0.6	1.8	6.6	42	0.1571	140	97.0	2.1478	0.087	0.013	0.074
Genola	83.9	45.2	0.0	0.3	25.3	154.7	936	0.1653	148	806.5	2.1652	0.720	0.299	0.421
Goosene Water Co.	13.6	26.4	0.0	0.0	0.0	40.0	110	0.3636	325	196.8	2.3478	0.176	0.084	0.092
Goshen	69.9	121.6	0.5	38.3	3.9	234.2	780	0.3003	268	846.9	2.3157	0.756	0.484	0.272
Hidden Creek Water Co.	2.1	2.0	0.0	0.0	0.0	4.1	28	0.1464	131	144.8	2.1221	0.129	0.008	0.121
Highland Water Company	794.7	36.5	6.8	94.2	35.0	967.2	7,005	0.1381	123	7,745.0	2.0992	6.914	1.812	5.101
Lehi	1,095.4	0.0	184.1	28.5	1.3	1,309.3	15,048	0.0870	78	4,306.0	1.8640	3.844	2.179	1.665
Lindon	549.4	0.0	174.6	16.3	152.5	892.8	6,471	0.1380	123	4,319.0	2.0989	3.855	1.673	2.183
Manila Culinary Water Co.	190.4	383.0	0.0	18.1	12.1	603.6	2,500	0.2414	216	1,669.0	2.2708	1.490	1.224	0.266
Mapleton	452.6	910.1	4.4	90.9	27.1	1,485.1	5,050	0.2941	263	7,226.8	2.3118	6.451	3.065	3.386
North Fork Special Service District	200.0	20.0	44.9	42.7	0.0	307.6	200	1.5380	1373	676.3	2.4640	0.677 *	0.677	0.000
Orem	7,303.7	8,281.0	2,854.0	5,360.0	951.0	24,749.7	81,499	0.3037	271	35,628.0	2.3178	51.208 *	51.208	0.000
Payson	1,254.7	21.8	625.8	477.8	0.0	2,380.0	14,128	0.1685	150	7,874.7	2.1715	7.030	4.614	2.416
Pleasant Grove	1,576.5	1,648.7	240.4	298.0	0.0	3,763.6	19,895	0.1892	169	13,423.7	2.2075	11.983	7.416	4.567
Provo	9,089.6	5,050.8	3,030.1	5,116.7	1,010.1	23,297.3	101,426	0.2297	205	50,321.2	2.2591	46.982 *	46.982	0.000
Salem	342.7	545.7	20.7	69.1	8.3	986.5	3,824	0.2580	230	4,675.0	2.2855	4.173	2.013	2.161
Santaquin	308.8	231.7	27.6	4.9	3.1	576.1	3,580	0.1609	144	1,258.2	2.1561	1.123	1.109	0.014
Saratoga Spgs (Lake Mt. Mut.)	49.1	185.3	0.0	60.0	0.0	294.4	650	0.4529	404	905.0	2.3778	0.808	0.625	0.183
Spanish Fork	1,512.3	1,563.8	201.6	101.0	705.9	4,084.6	18,000	0.2269	203	11,130.5	2.2561	9.936	8.226	1.710
Spring Lake Water Works	36.1	60.3	1.2	7.2	0.0	104.8	460	0.2278	203	540.0	2.2571	0.482	0.211	0.271
Springdell Plat A&B	7.6	1.3	0.0	1.2	0.0	10.1	100	0.1010	90	262.8	1.9521	0.235	0.018	0.217
Springville	1,922.3	1,760.6	718.2	577.0	1,994.9	6,973.0	21,450	0.3251	290	18,408.9	2.3298	16.433	14.502	1.931
Utah State Hospital	0.0	0.0	0.0	232.5	0.0	232.5	500	0.4650	415	887.0	2.3810	0.792	0.494	0.298
White Hills Subdivision	22.9	28.9	3.3	0.0	0.0	55.1	300	0.1837	164	1,854.0	2.1987	1.655	0.108	1.547
Woodland Hills	90.5	79.8	0.0	0.0	0.0	170.3	1,010	0.1686	151	258.0	2.1718	0.330 *	0.330	0.000
TOTALS	29,626.6	24,143.8	9,254.6	13,802.8	4,991.8	81,819.6	336,338	0.2433	217	212,415.9	2.2725	212.314	165.982	46.332
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O

* NOTE: Peak Day Demand exceeds the calculated Peak Day Supply. Per DWR, an assumption was made that in these cases the Peak Day Supply has been exactly met and should be set equal to the Peak Day Demand. Although hydrologic conditions may allow some systems to withdraw the maximum water supply available under present conditions, the hydrologic conditions will probably limit all systems collectively from withdrawing this quantity as presented.

A, B, C, D, E, F, H, and K are all input data.
G=B+C+D+E+F
I=G/H
J=I*892.682; (converts from ac.ft./yr. to GPD)
L=(2.5*J-49.4)/J
M=K*892.682/1000000; (except as provided in the note above)

This value represents only Potable M&I Water Use.
This value represents Secondary Water Use combined with Potable M&I Water Use.
Average per capita water use based only on use of potable water.
The factor which when multiplied by the average per capita water use represents water use during peak demands.
Peak Day Supply of potable water based on maximum reliable source capacity (converted to MGD). Where the calculated Peak Day Supply of potable water is less than the Peak Day Demand of potable water, this value was set equal to the Peak Day Demand of potable water.
Peak Day Demand on potable water based on the total potable M&I water use multiplied by the peaking factor.
The amount of Peak Day Supply of potable water exceeding the amount of the Peak Day Demand of potable water.

N=H*J/L/1000000
O=M-N

Secondary water is another important aspect of total M&I use. Table 7 gives the amount of secondary water used for various categories within the boundaries of the public community systems. In Utah County various irrigation companies deliver secondary water to customers. Total secondary use is 20,768 acre-feet.

Table 8 gives annual water use for public non-community systems (transient and non-transient) and private domestic systems. All those uses amount to 29,212 acre-feet.

Total potable M&I water use in the County is 111,032 acre-feet, while secondary use is 20,768 acre-feet; giving a total M&I water use of 131,800 acre-feet. Since the current population of the county is approximately 361,213, the total M&I per capita use is 325 gpcd, including secondary water. Table 9 gives water use per capita rates for public community systems. Appendix B shows the data for each public community system that is presented in the tables.

TABLE 7
UTAH COUNTY
Secondary (Non-Potable) Water Use Within Public Community Systems

WATER SUPPLIER	Secondary Water Use (Ac-Ft/Yr)				Total Secondary
	Residential	Commercial	Institutional	Industrial	
Alpine	81.8	0.0	0.0	0.0	81.8
Alpine Cove Subdivision	0.0	0.0	0.0	0.0	0.0
American Fork	116.3	0.0	285.0	0.0	401.3
Bradford Acres	1.2	0.0	0.0	0.0	1.2
Cedar Fort	26.4	0.0	0.0	0.0	26.4
Cedar Hills	0.0	0.0	0.0	0.0	0.0
Covered Bridge Canyon	0.0	0.0	0.0	0.0	0.0
Eagle Mountain	0.0	0.0	0.0	0.0	0.0
Elberta	13.9	0.0	6.0	9.2	29.1
Elk Ridge	0.0	0.0	0.0	0.0	0.0
Fairfield Irrigation Co.	4.2	0.0	0.0	0.0	4.2
Genola	84.0	0.0	7.2	0.0	91.2
Goosenest Water Co.	0.0	0.0	0.0	0.0	0.0
Goshen	121.0	0.0	6.0	0.0	127.0
Hidden Creek Water Co.	1.1	0.0	0.0	0.0	1.1
Highland Water Co.	739.6	280.6	187.3	0.0	1,207.5
Lehi	3,947.6	285.0	386.4	506.4	5,125.4
Lindon	6,420.0	0.0	84.0	0.0	6,504.0
Manila Culinary Water Co.	23.5	0.0	0.0	0.0	23.5
Mapleton	1,544.4	0.0	0.0	0.0	1,544.4
North Fork SSD	0.0	0.0	0.0	0.0	0.0
Orem	418.3	120.0	0.0	0.0	538.3
Payson *	1,069.2	1,806.5	0.0	0.0	2,875.7
Pleasant Grove	0.0	0.0	0.0	0.0	0.0
Provo	327.9	500.0	0.0	0.0	827.9
Salem	0.0	0.0	0.0	0.0	0.0
Santaquin	0.0	0.0	230.2	0.0	230.2
Saratoga Springs Town (Lake Mt. Mutual)	0.0	0.0	0.0	0.0	0.0
Spanish Fork	178.8	0.0	425.0	0.0	603.8
Spring Lake Water Works	30.6	0.0	0.0	0.0	30.6
Springdell Plat A&B	0.0	0.0	0.0	0.0	0.0
Springville	190.9	0.0	253.0	50.0	493.9
Utah State Hospital	0.0	0.0	0.0	0.0	0.0
White Hills Subdivision	0.0	0.0	0.0	0.0	0.0
Woodland Hills	0.0	0.0	0.0	0.0	0.0
TOTALS	15,340.7	2,992.1	1,870.1	565.6	20,768.5

Note: * Institutional and Industrial are included with the Commercial usage.

TABLE 8
UTAH COUNTY
Water Use For Public Non-Community and Private Domestic Systems

Non-Community System	POTABLE USAGE					SECONDARY USE (Ac-Ft/Yr)
	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Potable Use (Ac-Ft/Yr)	
TRANSIENT SYSTEMS						
Benjamin Ward	0.0	0.0	1.0	0.0	1.0	0.0
Bennion Creek Campground	0.0	0.0	0.1	0.0	0.1	0.0
Brickerhaven Subdivision	1.3	0.0	0.0	0.0	1.3	0.0
Deseret Feed Lot	0.0	0.0	0.0	5.0	5.0	0.0
Gladstone Golf Course	0.0	0.2	0.0	0.0	0.2	0.0
Jehovahs Witness Church	0.0	0.0	1.0	0.0	1.0	0.0
Jolly Park	1.8	0.0	0.0	0.0	1.8	0.0
Koholowo Camp	0.0	0.0	0.6	0.0	0.6	0.0
Lake Shore Ward	0.0	0.0	1.0	0.0	1.0	0.0
Payson West Stake 12/13 Wards	0.0	0.0	1.0	0.0	1.0	0.0
Loafer Water Users Association	13.0	0.0	0.0	0.0	13.0	0.0
Maple Dell Boy Scout Camp	0.0	0.0	1.0	0.0	1.0	0.0
Mutual Dell Recreation	0.0	0.0	2.4	0.0	2.4	0.0
Palmyra LDS Ward	0.0	0.0	1.0	0.0	1.0	0.0
Silver Lake Summer Homes	0.7	0.0	0.0	0.0	0.7	0.0
Sugarhouse Recreation Property	0.0	0.0	0.1	0.0	0.1	0.0
Tibble Fork Summer Homes	2.1	0.0	0.0	0.0	2.1	0.0
Trefoil Girl Scout Camp	0.0	0.0	1.0	0.0	1.0	0.0
Tucker Rest Area	0.0	0.0	0.8	0.0	0.8	0.0
Upper Whittemore Water Co.	0.7	0.0	0.0	0.0	0.7	0.0
Wildwood Subdivision	25.0	0.0	0.0	0.0	25.0	0.0
Willow Park	0.0	0.0	2.3	0.0	2.3	0.0
Forest Service Systems						
American Fork Recreation Site	0.0	0.0	5.4	0.0	5.4	0.0
Balsam Campground	0.0	0.0	0.7	0.0	0.7	0.0
Blackhawk Campground	0.0	0.0	1.1	0.0	1.1	0.0
Cherry Picnic Site	0.0	0.0	2.0	0.0	2.0	0.0
Granite Flat Campground	0.0	0.0	3.2	0.0	3.2	0.0
Hope Campground	0.0	0.0	0.5	0.0	0.5	0.0
Payson Lakes Campground	0.0	0.0	3.9	0.0	3.9	0.0
Maple Bench Campground	0.0	0.0	0.5	0.0	0.5	0.0
Rock Canyon Campground	0.0	0.0	0.5	0.0	0.5	0.0
Theater in Pines & Mount Timpinogos	0.0	0.0	5.2	0.0	5.2	0.0
Timpooneke Campground & GS	0.0	0.0	2.4	0.0	2.4	0.0
Whiting Campground	0.0	0.0	0.5	0.0	0.5	0.0
National Park Systems					0.0	
Timpanogos Visitor Center	0.0	0.0	2.0	0.0	2.0	
SUBTOTAL	44.6	0.2	41.2	5.0	91.0	0.0
NON TRANSIENT SYSTEMS*	0.0	0.0	0.0	26,621.0	26,621.0	0.0
PRIVATE DOMESTIC SYSTEMS	2,500.0	0.0	0.0	0.0	2,500.0	0.0
UTAH COUNTY TOTALS	2,544.6	0.2	41.2	26,626.0	29,212.0	0.0

* Public Non Community Non Transient Systems are self supplied industries which include Ensign-Bickford Co., Geneva Steel, and Micron Technology, Inc.

**TABLE 9
NORTHERN UTAH COUNTY
AVERAGE PER CAPITA M&I WATER USE
FOR ALL PUBLIC COMMUNITY WATER SYSTEMS**

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.160	143
Residential Potable Plus Secondary Use	0.207	184
Total Potable Use	0.243	217
Total Potable Plus Secondary Use	0.305	272

Note: Total Potable categories include residential, commercial, institutional and industrial uses.