Mammoth Community Water District

2005

URBAN WATER MANAGEMENT PLAN

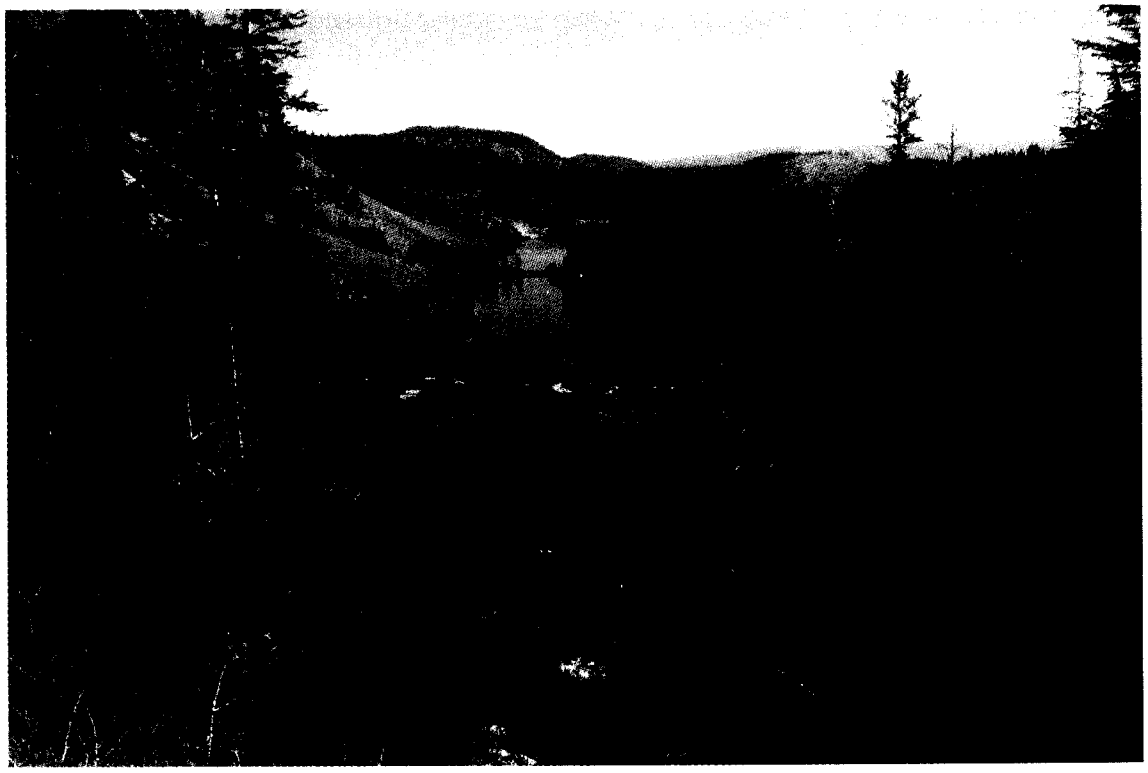

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TABLE OF CONTENTS

Title	Page
Introduction	1
Public Participation	2
Agency Coordination	2
District Service Area	3
Water Sources	6
Potential Source of Water	12
Transfer or Exchange Opportunities	14
Water Use	14
Reliability Comparison	17
Inconsistent Water Sources	20
Three-Year Minimum Water Supply	21
Water Supply Reliability	22
Water Recycling: Wastewater System Description	24
Water Recycling: Wastewater Generation, Collection & Treatment	25
Wastewater Disposal and Recycled Water Uses	25
Encouraging Recycled Water Use	26
Recycled Water Optimization Plan	27
Water Supply and Demand Comparison Provisions	27
Water Shortage Contingency Plan: Preparation for Catastrophic Water Supply Interruption	31

Title	Page
Water Shortage Contingency Ordinance / Resolution	32
Water Shortage Contingency Plan: Stages of Action	33
Water Shortage Contingency Plan: Prohibitions	34
Water Shortage Contingency Plan: Penalties	35
Water Shortage Contingency Plan: Consumption Reduction Methods	35
Water Shortage Contingency Plan: Revenue and Expenditure Impacts	36
Water Shortage Contingency Plan: Measures to Overcome Impacts	37
Water Shortage Contingency Plan: Reduction Measuring Mechanism	38
Demand Management Measures	39
References	43

LIST OF TABLES

Table Number and Title		Page
1	Population Projections	4
2	Customer Category Water Use (2004)	5
3	Groundwater Pumped 2000-2004	9
4	Groundwater Pumping Projections in Normal Water Year Conditions	11
5	Groundwater Pumping Projections for Multiple Dry Year Conditions	11
6	Current and Projected Water Supplies	13
7	Past, Current, and Projected Water Use	15
8	Number of Units by Customer Type	16
9	Existing Water Supply Reliability	17
10	Basis of Water Year Data for Table 9 and 11	18
11	Future Water Supply Reliability Including Future Wells	19
12	Impact of Reductions on Future Water Demand	20
13	Three-Year Estimated Minimum Water Supply	22
14	Existing Supply Reliability - Water Supply June though Sept.	23
15	Water Demand June though September	23
16	June Through September Water Supply After Development of Future Wells	24
17	Wastewater Generation and Collection	25
18	Wastewater Treatment	25
19	Water Supply Summary	28

Table Number and Title		Page
20	Water Demand Summary	27
21	Projected Supply and Demand Comparison	28
22	Supply Reliability and Demand Comparison	28
23	Supply Reliability and Demand Comparison (Includes Recycled Water Use)	29
24	Supply Reliability and Demand Comparison (Includes Recycled Water Use and Future Wells)	30
25	Supply Reliability and Demand Comparison (Includes Reduction in Water Loss or Level 1 Restrictions)	31
26	Preparation Actions for a Catastrophe	32
27	Water Supply Shortage Stages and Conditions	33
28	Mandatory Prohibitions	34
29	Residential Block Rate Fee Structure	35
30	Revenue Impacts From Water Restrictions	36
31	Increased Expenditures Due to Decreased Surface Water Availability	37
32	Demand Management Measure Implementation Schedule	42

LIST OF FIGURES

Figure Number and Title		Page
1	Historical April 1 Snowpack with Long Term Average	6
2	Annual Groundwater Pumped by District	9
3	Variability of Groundwater Levels on a District Production Well	10
4	Water Supply and Demand Comparison 25	

APPENDICES

Appendices	
A	Resolution and Proof of Public Hearing
B	Water Management Requirements Ordinance
C	Mammoth Basin and the Six Internal Drainage Basins
D	Location of District Groundwater Production Wells, Monitor Wells, and Surface Water Monitoring Sites

INTRODUCTION

This document has been prepared to update the Mammoth Community Water District's 2000 Urban Water Management Plan. The District's 2005 Urban Water Management Plan is intended to be a complete planning document, independent of previous versions or other documents.

Water management planning includes such items as 1) analysis of past, current, and projected future water demand; 2) past, current, and projected water supply and potential water shortages; 3) interagency coordination and public participation; and, 4) consideration of social, geographic, and economic factors of an area.

California Water Code 10610 (et seq.) requires that all urban water suppliers providing water for municipal purposes to more than 3,000 customers, or supplying more than 3,000 acre-feet of water annually, must prepare an urban water management plan. This plan must be updated at least every five years on or before December 31, in years ending in five and zero.

Every urban water supplier preparing an urban water management plan is required to follow specific guidelines listed in the Urban Water Management Planning Act. Prior to adoption of the plan, the urban water supplier is required to make the plan available for public inspection and to hold a public hearing. After adoption of the urban water management plan, a copy is filed with the Department of Water Resources (DWR) within 30 days. The DWR then prepares and submits to the State Legislature a report summarizing the status of the plans adopted. Not later than 30 days after filing a copy of its plan with the DWR, the urban water supplier and the department shall make the plan available for public review.

PUBLIC PARTICIPATION

PLAN ADOPTION

The Mammoth Community Water District prepared this update of its Urban Water Management Plan during the fall of 2005. In addition, updates to the Plan occurred in January 2004 to include an analysis of groundwater supplies and demand measurement measures. The updated plan will be adopted by the District Board of Directors in December 2005 (see Appendix A for copy of resolution and proof of public hearing) and will be submitted to the California Department of Water Resources within 30 days of Board approval. This plan includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning).

AGENCY COORDINATION

Due to the close linkage of this Urban Water Management Plan and the Town of Mammoth Lakes General Plan large portions of this document hinged on the completion of the General Plan, which was released in the fall of 2005. This limited the amount of time that the District could consult with other agencies. Although the preparation of previous drafts of the District's Urban Water Management Plan was coordinated with other agencies in the area, this 2005 Plan was prepared without such assistance. However, significant quantities of information from previous earlier drafts, which included inputs from local agencies such as the Town of Mammoth Lakes, U.S. Forest Service, and Mono County, assisted in the preparation of the 2005 Plan.

DISTRICT SERVICE AREA

THE DISTRICT AREA

The Mammoth Community Water District was formed in 1958 to provide water and wastewater service to the community of Mammoth Lakes. The District boundaries include 3,640 acres of land in the developed portion of the Town of Mammoth Lakes. The Town of Mammoth Lakes includes approximately 2,500 acres of privately owned land in the developed portion of the 24 square mile incorporated area. The remaining incorporated area is publicly owned and is managed by the Inyo National Forest.

The Mammoth Lakes area is located in Mono County on the eastern slope of the Sierra Nevada, about 44 miles northwest of Bishop, California.

Mammoth Lakes is a year-round destination resort whose economy is dependent on the skiing industry in the winter and camping, fishing, and other outdoor activities during the summer season.

DEMOGRAPHIC FACTORS

Population Density

During the span of time between the 1990 and 2000 U.S. Census, the population of Mammoth Lakes increased from 4,785 residents to 7,093 residents, which represents a population growth of 48% or 4.8% annual growth rate. As a comparison, the state of California as a whole grew by an average of 13.8% during the ten-year time between 1990 and 2000. The Town experienced its greatest growth during the decade of the 1970s with population growth rates averaging 21.2 percent per year. During the 1980s, annual growth rates fell to 2.6 percent.

According to the Mammoth Lakes 2005 General Plan Update DEIR (October 2005), the permanent resident population of the Town as of 2004 is estimated at 7,569. The 2005 General Plan projects an increase in peak population from 34,265 to 60,700, which equates to an increase in permanent population from 7,569 to 13,400 people by build-out of the Town.[1] The Plan projects build-out to occur within 20 years, or by 2024.

The Town of Mammoth Lakes population is composed of permanent year-round and seasonal residents. The seasonal population is comprised of both ski industry (winter) and non-winter visitation and activities (primarily occurring

[1] Town of Mammoth Lakes. October 2005. Revised Draft Program Environmental Impact Report: 2005 General Plan Update, page 4-217

during the months of July through September). During winter, the temporary population fluctuates depending on snowfall levels, which influence tourism and the availability of jobs. During a peak holiday period in winter or summer, the seasonal and tourist population has risen to as high as 35,000 people. At build-out, the maximum number of people at one time within the Town is projected to be 60,700.[2] Table 1 represents the population projections within the District's service area for a 20-year period with 5-year increments.

Table 1
Population Projections

	Year				
	2004	**2009**	**2014**	**2019**	**2024**
Permanent Population	7,569	9026	10484	11942	13,400
Maximum Daily	34,265	40874	47483	54091	60,700

Future permanent/average daily population data projected based on a 3.8% annual increase as projected from the 2005 General Plan Update DEIR.

Land Use

A wide range of land use type, intensities and ownership patterns characterizes land use activities in the Mammoth Lakes area. The urbanized portion of the community consists of less than 2,500 acres of privately owned land that is surrounded entirely by land administered by the U.S. Forest Service. These U.S. Forest Service lands are used for active and passive recreation purposes. The Mammoth Mountain Ski Area is the most important land use activity and employer in Mammoth Lakes.

A major characteristic of the community is the seasonality of land use activities. During the seven-month winter season when the ski area is available for skiing, activity is centered in the Town. During the summer months of July, August, and September, activity shifts to areas outside of the Town, and includes hiking, camping, fishing and other outdoor recreation activities. As a result, the Water District experiences large fluctuations in demand for water and wastewater service. The greatest demand for water service occurs during the summer months when irrigation of residential landscaping takes place. October and November represent the lowest period of demand for service from the District.

The majority of the water demand on the District's system comes from residential uses. The following table shows a breakdown of water use for 2004 for the various customer categories.

[2] Town of Mammoth Lakes. October 2005. Revised Draft Program Environmental Impact Report: 2005 General Plan Update, page 1-2

Table 2
Customer Category Water Use (2004)

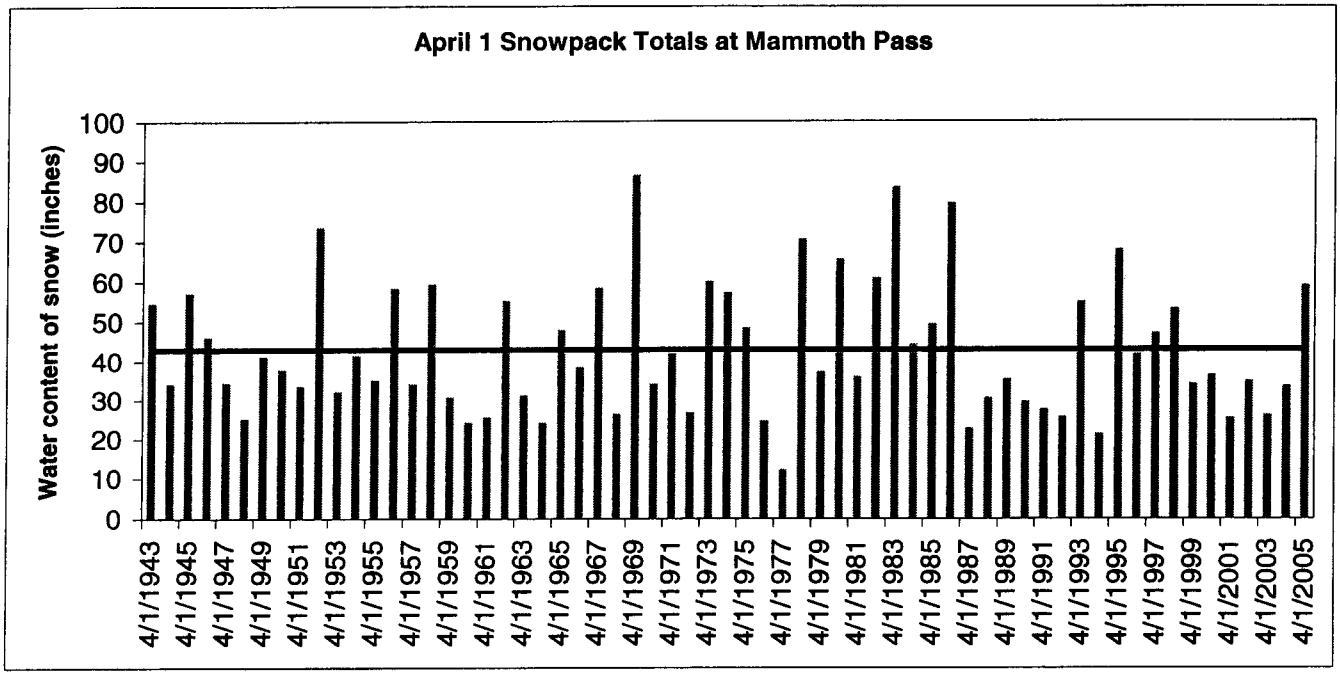
Customer Category	Percent of Total Water Use
Condominium	30%
Single-family	18%
Multi-family	4%
Commercial	11%
Public/Recreation/Irrigation	9%
Golf Course Irrigation	12%
System Use/Unaccounted-For	16%

CLIMATE

The climate of the Mammoth Lakes area is heavily influenced by its location with respect to the Mammoth Crest and Mammoth Pass. Mild summers are contrasted by harsh winters. In summer, temperatures average 75-80 degrees for a high and seldom dips below 40 for a low. Winter temperatures average 30-40 degrees for a high and 10-20 degrees for a low with mostly sunny skies. Precipitation occurs mainly in the form of snow, although rain showers may occur throughout the summer and fall. Annual precipitation varies considerably within the area, ranging from less than 10 inches in the northeastern extremities of the area to over 80 inches at Mammoth Mountain on the west. Average annual precipitation for Mammoth Pass is 43 inches and for the Town of Mammoth Lakes it is approximately 23 inches.

The amount of water available to the District in any given year is dependent on the precipitation (snowfall) received during the season of October through March as measured at Mammoth Pass. Surface water availability is directly impacted by the amount of precipitation received in a season whereas impacts to groundwater sources are more gradual over a period of years. The following figure depicts April 1 snowpack totals with the average water content of the snowpack of 43 inches for comparison.

Figure 1
Historical April 1 Snowpack with Long Term Average



WATER SOURCES

EXISTING SOURCES OF WATER

Existing sources of water available to the District include both surface water and groundwater. The District has established water rights from the State Water Resources Control Board for the storage and diversion of surface water from Lake Mary. The District also has developed eight groundwater production wells within the community.

Surface Water

The District currently is entitled to divert 2,760 acre-feet annually from Lake Mary at a maximum diversion rate of 5 cubic feet per second from November 2 to April 30. From May 1 to November 1 a maximum diversion rate of 5.039 is allowed. The State Water Resources Control Board has imposed several constraints and conditions on the water permit and licenses that have been issued to the District.

Surface water storage rights are limited to 660 acre-feet annually, of which 606 acre-feet may be collected between April 1 and June 30, and 54 acre-feet may be collected between September 1 and September 30 of each year. The District

is also limited to a maximum drawdown in Lake Mary of 3.0 feet during the period between June 1 and September 15, and a total maximum annual drawdown of 5.7 feet.

In 2004, the District completed modifications to the Lake Mary surface water treatment plant to meet new standards of the California Department of Health Services. As a result of these modifications, the production capacity of the plant is now rated at the 5 cfs diversion rate allowed for in the water rights permit. These improvements have enabled the District to utilize the full 2,760 acre-feet of water available from its state water right permits in normal and wet precipitation conditions.

Groundwater

The District recently completed the preparation of a comprehensive Groundwater Management Plan (GWMP). This Plan describes a monitoring and operation plan for the long-term use of local groundwater and surface water resources. The intent of the Plan is to ensure that groundwater resources are managed in a manner that ensures sufficient, high quality groundwater resources for the community of Mammoth Lakes while minimizing potential environmental impacts. The District adopted its GWMP in July 2005.

The District pumps groundwater from the Mammoth Basin watershed, which is located within the Long Valley Groundwater Basin identified by the Department of Water Resources as part of the South Lahontan Hydrologic Region. The Mammoth Basin is located on the eastern side of the Sierra Nevada Mountain Range. Surface elevations range from a high of about 12,000 feet at Mammoth Crest to 7,000 feet at the downstream easterly extremity. Mammoth Basin is the watershed of Mammoth Creek and is bounded on the south by the drainage divide of Convict Creek; on the west, by Mammoth Crest; on the north by the drainage divide of Dry Creek; and on the east extending along the watershed of Hot Creek. The area of the Mammoth Basin is about 71 square miles and extends approximately 13 miles west to east and 9 miles north to south.

Elevated areas on the north and west that are comprised largely of extrusive igneous rocks generally form the Mammoth Basin; a central trough filled with alluvial and glacial debris; and an abrupt southern flank of igneous intrusive and metamorphic rocks. The central trough area opens and drains to the east to the Owens River and Lake Crowley.

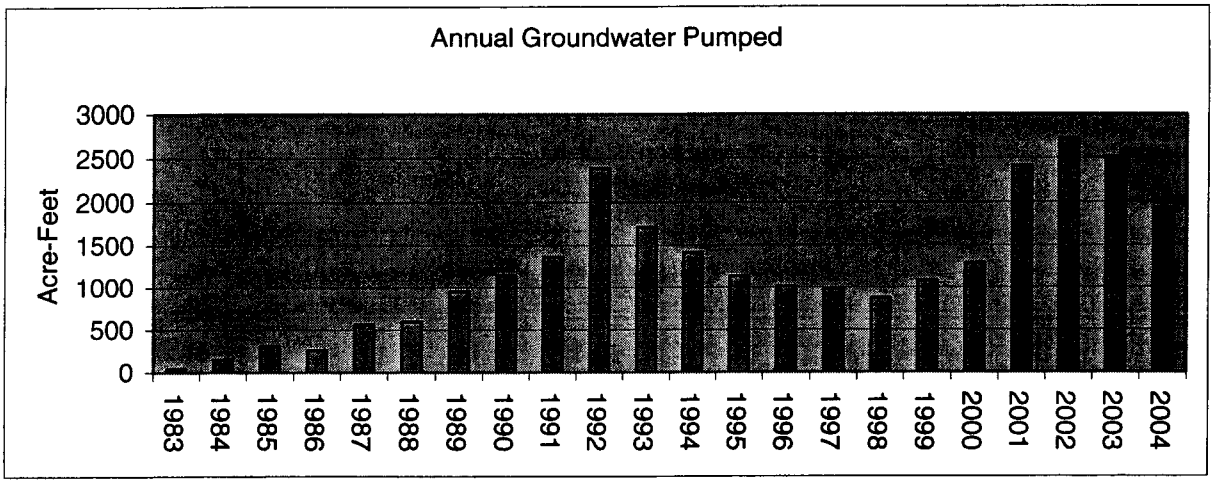
The California Department of Water Resources subdivided the Mammoth Basin into six internal drainage basins in its 1973 report for purposes of determining total water produced in the watershed. The area of the Mammoth Basin, together with the internal drainage basins, is shown in Appendix C.

The Mammoth Basin has not been adjudicated or identified by DWR as being over drafted. In order to prevent the basin from being over drafted, the District maintains an extensive groundwater and surface water monitoring system. Groundwater levels are monitored in eight production wells and in fifteen shallow and deep monitor wells. Surface water levels and flow rates are monitored at twelve locations throughout the basin watershed. Appendix D shows the location of District groundwater production wells, monitor wells, and surface water monitoring sites. The District prepares an annual groundwater monitoring report that provides an evaluation of groundwater level, surface flow, and water quality monitoring data accumulated throughout the year.

The District received a Local Groundwater Assistance grant from the California Department of Water Resources during the summer of 2004. This grant enabled the District to complete a comprehensive groundwater management plan, expand the groundwater and surface water monitoring program, and begin developing a groundwater model. Specifically, this grant funding has enabled the District to construct six additional groundwater monitoring wells, purchase mobile monitoring equipment, and install data loggers on all District production wells. During the winter of 2004-2005, District personnel installed water level sensors on all production wells. These devices were also connected to the District's supervisory control and data acquisition (SCADA) system to allow for automatic shutdown of production wells when targeted pumping groundwater levels are sensed.

During the past 5-year period, the District pumped 10,850 acre-feet of groundwater, averaging 2,170 acre-feet per year. The maximum volume pumped occurred in 2002 and amounted to 2,717 acre-feet. Groundwater was pumped from the District's eight production wells located within the boundaries of the District's service area serving the Town of Mammoth Lakes (see location map in Appendix D). Production volumes of groundwater in any one year are dependent on the type of precipitation year experienced and consequent availability of surface water. The following graph shows historical annual groundwater volumes pumped by the District.

Figure 2
Annual Groundwater Pumped by District



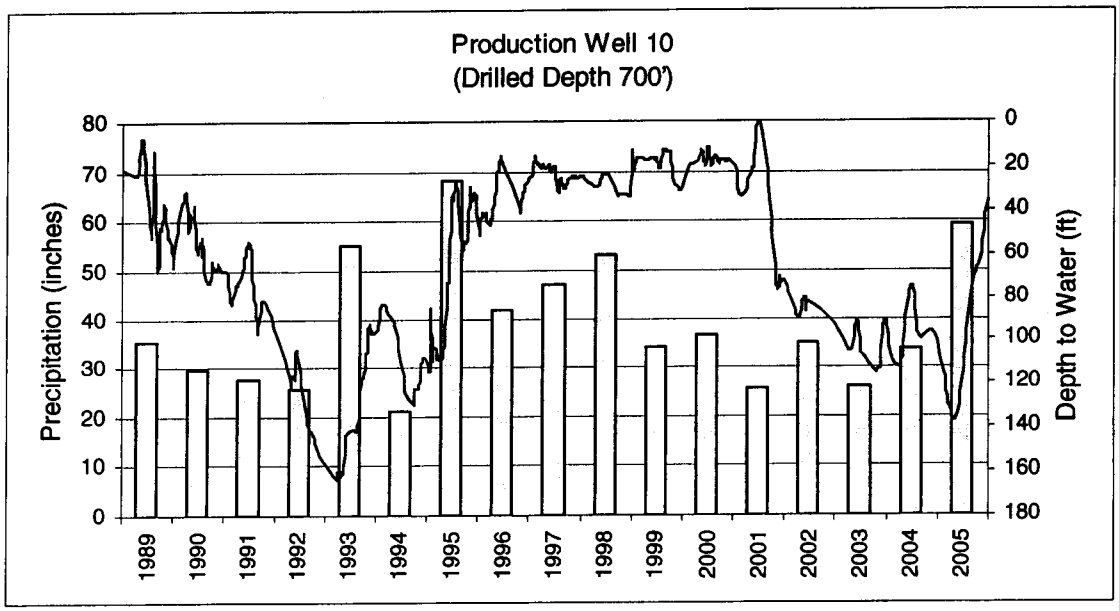
The following table shows volumes of groundwater pumped during the last five years.

Table 3
Groundwater Pumped 2000-2004

Year	Groundwater Pumped (acre-feet)
2000	1288
2001	2410
2002	2717
2003	2511
2004	1923

During dry-year periods, groundwater levels within the Mammoth Basin decrease due to increased pumping and less recharge. During normal and above-normal precipitation years, groundwater levels increase and tend to fully recover after two years of normal precipitation. The following graph depicts historical groundwater levels in one of the District's production wells and shows the variability of groundwater levels based on pumping and type of recharge year.

Figure 3
Variability of Groundwater Levels on a District Production Well



Future groundwater production rates have been projected based on community growth projections and on type of climatic conditions. The following tables describe projected volumes of groundwater that could be pumped under normal and multiple dry-year water year conditions. The volume of surface water in normal years is based on the maximum volume of water available through the District's surface water rights. The volume of surface water in multiple dry years is based on the actual surface water that could have been available in 1992, the last year of a six-year drought. The following tables represent volumes of water that would be pumped to meet the projected demand.

Table 4
Groundwater Pumping Projections (acre-feet)
To Meet Demands In Normal Year Conditions

Well No.	2010	2015	2020	2025
1	146	200	74	38
6	200	300	400	500
10	300	300	400	500
15	300	300	400	500
16	0	0	0	0
17	200	300	400	500
18	0	0	0	0
20	200	210	200	100
Future Well(s)	0	0	0	0
Total	1346	1610	1874	2138
Groundwater projections based on utilizing 2760 ac-ft of surface water in normal year to meet projected demand.				

Table 5
Groundwater Pumping Projections (acre-feet)
To Meet Demands In Multiple Dry Year Conditions

Well No.	2010	2015	2020	2025
1	161	256	325	356
6	311	415	475	506
10	500	726	960	991
15	336	440	500	531
16	135	139	199	230
17	231	335	395	426
18	28	41	92	123
20	150	154	214	245
Future Well(s)	**0**	**0**	**0**	**406**
Total	1852	2506	3160	3814
Groundwater projections based on utilizing 1084 ac-ft of surface water in multiple dry years to meet projected demand. The volume of 1084 ac-ft is derived from the actual available surface water that could have been available in 1992, the last year of a six-year drought.				

As indicated by groundwater pumping projections for the future, the volume of groundwater currently available from existing wells is insufficient to meet the total demand under multiple dry-year conditions as the town approaches build-out in the year 2025. Additional sources of supply will be required to meet future demand. The above estimates of groundwater pumping are based on current monitoring and will be modified as the District's monitoring is enhanced and more data is collected.

POTENTIAL SOURCES OF WATER

The District is in the process of reviewing the development of a third water supply source that is located in the Dry Creek drainage basin. This drainage basin is located north of the Town and outside of the Town's boundaries and District's service area and drains the area northeast of Mammoth Mountain extending to Big Springs. In 1988 and 1989 a series of test holes were drilled in the Dry Creek drainage to determine potential production capabilities. Pumping of the test holes resulted in the determination that four wells were capable of producing water at a consistent rate. The U.S. Forest Service prepared an Environmental Assessment (EA) for a potential Dry Creek well and pipeline project in 1992. This study recommended establishing monitoring stations in the Big Springs area in connection with well development. In 2000, a group of masters students from the University of California at Santa Barbara conducted a study that developed a detailed water budget for the Dry Creek watershed during various water year scenarios and analyzed issues and impacts associated with groundwater withdrawal in the basin. The study concluded that 3000 acre-feet in normal years and 2000 acre-feet in dry years could be extracted from the basin.[3] These values include a provision of intensive groundwater and geological investigation to evaluate potential impacts to the Big Springs area and the Upper Owens River.

These two studies show a potential for groundwater extraction in the Dry Creek Basin. Further studies will be conducted to verify the actual production capacities available. This additional source of supply is intended to provide redundancy for the existing groundwater system in the Mammoth Basin as well as a backup supply for drought years. The estimated additional demand required at build-out of the community during drought periods amounts to approximately 400 acre-feet.

Another potential source of water involves the modification of existing wells to improve capacity and drilling of new wells within the Mammoth Basin. In a 1996 report prepared by Mark J. Wildermuth for Dempsey Construction Corporation, it was estimated that a total useful storage in the Mammoth groundwater basin

[3] Breibart, A.D., Cathcart, R.E., Didriksen, K.A., and Everett, J.L. June 2001. Mammoth Groundwater Extraction: A Hydrological Analysis of Potential Recharge to an Eastern Sierra Nevada Watershed.

amounted to approximately 135,100 acre-feet[4]. This would indicate that additional groundwater within the Mammoth Basin may be available.

The District has previously identified other potential sources of water. In 1991, the District commissioned a feasibility study of alternative sources of water supply.[5] Alternative sources identified in the study included a Convict Creek wellfield, surface water diversion or wellfield in McGee Creek, and surface water diversion or wellfield in the Upper Owens River area. These potential sources of water may be further investigated if groundwater production in the Dry Creek and Mammoth Basin area is determined not to be feasible.

Use of recycled water has been identified as a potential source of water supply for golf course and park irrigation, as well as for geothermal power plant cooling purposes. Currently, the District is preparing an Environmental Impact Report analyzing the placement of recycled water pipelines and the discharge of recycled water at both golf courses and other large turf sites in town. A previous environmental study regarding impacts on the District's current wastewater treatment disposal area at Laurel Pond was certified in 1998. The estimated demand for recycled water for Sierra Star Golf Course and Snowcreek Golf Course is approximately 400 acre-feet per year.

Table 6 lists the current and projected water supply available to the District to meet demands from the community.

Table 6
Current and Projected Water Supplies

Water Supply Sources	**2005**	**2010**	**2015**	**2020**	**2025**
Lake Mary	2760	2760	2760	2760	2760
Well #1	500	500	500	500	500
GWTP #1	2000	2000	2000	2000	2000
GWTP #2	1500	1500	1500	1500	1500
Recycled Water	0	500	500	500	500
Future Wells	0	0	0	1000	1000
Total	**6760**	**7260**	**7260**	**8260**	**8260**
Units of Measure: acre-feet The above projections assume normal water year supplies					

[4] Hydrologic Impacts of the Snowcreek Golf Course Expansion on the AB and CD Headwater Springs, Mark J. Wildermuth, September 1996, page 22.
[5] Feasibility Study of Alternative Sources of Water Supply and Methods of Reducing Demand, January 1992.

TRANSFER OR EXCHANGE OPPORTUNITIES

As part of the District's 1992 feasibility study of alternative sources of water supply, several exchange or transfer opportunities were analyzed.

Surface water diversions from Convict Creek or McGee Creek or development of a wellfield in these areas may require offset supplies to replace water drawn from Los Angeles Department of Water and Power (LADWP) property. A possible offset supply was identified as acquiring irrigation lease rights to lower Mammoth Creek. Surface water diversion in the upper Owens River area and at Crowley Lake was also analyzed with an offsetting water supply for LADWP potentially required. Other transfer or exchange opportunities analyzed included use of reclaimed wastewater for irrigation in the Laurel Creek and lower Mammoth Creek areas, groundwater acquisition and exchange/transfer options, and Central Valley supply acquisition/transfer/exchange opportunities.

Through analysis of potential transfer or exchange opportunities, it was determined that no feasible opportunities existed.

WATER USE

The water demand for 2004 in the District averaged 3.1 million gallons per day. The total annual demand amounted to 3,427 acre-feet. This value includes golf course irrigation, system use, and unaccounted for water.

Seasonal population peaks drive water supply concerns. The Town of Mammoth Lakes General Plan suggests that only 35% of its housing is occupied by year round residences[6]. People visiting the area to enjoy the recreational opportunities occupy the remainder of housing units. Although peak populations generally occur during the winter season, the peak annual 30-day water demand occurs during the summer months due to landscape irrigation systems. Table 7 identifies past, current, and projected water uses among various water use sectors.

[6] Town of Mammoth Lakes. October 2005. Revised Draft Program Environmental Impact Report: 2005 General Plan Update. P. 4-221

Table 7
Past, Current, and Projected Water Use (acre-feet)

Water Use Sector	2000	2005	2010	2015	2020	2025
Single Family Residential	515	549	586	623	659	696
Condominium	961	948	960	973	985	997
Multi-Family Residential	144	140	211	282	353	424
Commercial/Industrial/ Public	217	278	374	469	565	660
Motel / Hotel	112	111	304	496	689	881
Public Sector	170	296	Included in commercial	Included in commercial	Included in commercial	Included in commercial
Golf Course**	297	255	400	400	400	400
Other*	53	103	80	80	80	80
Unaccounted	486	746	760	760	760	760
Total	**2955**	**3426**	**3674**	**4082**	**4490**	**4898**

Note: Existing hotel/motel water-use sector includes only those units that are separately metered and does not include units that share water meters with commercial. Commercial includes mixed uses such as restaurants, condo/hotel, retail, etc. Public sector is included in the commercial water-use sector for future projections for consistency with data from the Town of Mammoth Lakes General Plan EIR (2005).
*Other = treatment plant process water, fire fighting, line cleaning, etc.
** Golf course water use based on existing demand from Sierra Star and Snowcreek Golf Courses. This value would be reduced by recycled water use in the future.

Future volumes of water attributed to the "unaccounted" category have been estimated based on existing conditions. The District has been placing an emphasis on locating sources of water loss in the system through a leak detection program, main pipeline replacement program, and meter replacement and new meter-reading program. The District will continue to emphasize reducing unaccounted for water losses in the future. The District projects full implementation of the main pipeline replacement program in 2010. The District has established a goal of obtaining a 10 to 15% loss rate, which represents a well-managed system according to the American Water Works Association. As seen in Table 7, reducing the projected volumes of water allocated as "unaccounted" can result in a significant decrease in future water demand requirements.

The following Table 8 shows the number of units by type of customer.

Table 8
Number of Units by Customer Type

Customer Type	2000	2005	2010	2015	2020	2025
Single Family Residential	1869	2018	2133	2248	2363	2477
Condominium	4995	5494	5775	6056	6337	6617
Multi-Family Residential	559	964	1246	1528	1810	2091
Motel/Hotel	854	1779	2680	3581	4482	5381
Public Sector	1	1	Included in commercial	Included in commercial	Included in commercial	Included in commercial
Commercial (sq. ft.)	1000	1559559	1634307	1709055	1783803	1858549
Golf Course	1.5	1.5	1.5	1.5	1.5	1.5

Note: Existing hotel/motel includes only those units that are separately metered and does not include units that are linked to commercial.
Commercial includes mixed uses such as restaurants, condo/hotel, retail, etc. Golf course figures represent the number of golf courses.
Currently, the District provides water to an eighteen-hole course, Sierra Star, and a nine-hole course, Snowcreek, which will be expanding to eighteen holes in the next several years.
Public sector is included in the commercial water-use sector for future projections for consistency with data from the Town of Mammoth Lakes General Plan EIR (2005).

RELIABILITY COMPARISON

The Mammoth Community Water District's sources of water supply consist of surface water and groundwater. The area is susceptible to drought and both of these sources of supply are impacted to various degrees. Surface water supplies are immediately impacted following a drought season whereas groundwater supplies tend to be effected by an extended drought period of several years.

Over the past thirty years, below average precipitation have been experienced 60% of the years. In 33% of the years, seasons with less than 70% of average precipitation have been experienced.

Table 9 provides water supply volumes for average, single dry, and multiple dry water years based on current supplies.

Table 9
Existing Water Supply Reliability

			Multiple Dry Years			
Supply	**Normal Water Year**	**Single Dry Water Year**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Projected Surface	2760	0	1780	1500	1100	1084
Projected Wells	4000	3410	3410	3408	3408	3408
Projected Total	**6760**	**3410**	**5190**	**4908**	**4508**	**4492**
Units of Measure: acre-feet per year						

The following table (Table 10) describes how each water year type was derived.

Table 10
Basis of Water Year Data for Table 9 and 11

Water Year Type	Year(s) Data is Based Upon	Base Year(s)	Historical Sequence
Normal Water Year	Normal water year based upon 10% deviation from April 1 average snowpack of 43 inches, or 38.7 to 47.3 inches on April 1. Normal water years have historically occurred about every nine years, or seven times in the last 62 years. Surface water supplies are based upon the maximum quantity of surface water available through the District's surface water rights.	1997 1996 1984 1971 1954 1949 1946	Every nine years
Single Dry Water Year	Single dry years are generally considered the lowest annual runoff for a watershed since the water-year beginning in 1903. For the Mammoth watershed, the year with the lowest April 1 snowpack is 12.3 inches of snow water equivalent on April 1,1977. Groundwater data is based upon driest year that production wells were in use (1992 for wells #1, 6, 10, and 15 and 2001 for wells #16, 17, 18, and 20).	1977 1992 2001	
Multiple Dry Water Years	Multiple dry years are generally considered the lowest average runoff for a consecutive multiple year period (three years or more) for a watershed since 1903. The driest multiple year period in the Mammoth watershed was the six-year period from 1987 to 1992, which averaged 28.7 inches of snow water content at Mammoth, pass.	1987 through 1992	

In comparing projected future water use data with current supply reliability data, the third and fourth years of multiple dry years result in a supply deficiency as the community nears build-out. A deficiency would also occur in an extreme single dry year condition. Reductions in demand through water restrictions or through decreasing the percentage of unaccounted for water in the system would have beneficial impacts on supply deficiencies. Development of new groundwater sources such as in the Dry Creek and Mammoth Basin watersheds would increase supplies and resolve any potential deficiencies. Table 11 provides data

on future water supply reliability including development of new groundwater supplies in the Dry Creek watershed.

Table 11
Future Water Supply Reliability
Including Future Wells

			Multiple Dry Years			
Supply	**Normal Water Year**	**Single Dry Water Year**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Projected Surface	2760	0	1780	1500	1100	1084
Projected Existing Wells	4000	3410	3410	3408	3408	3408
Projected Future Wells	1000	1000	1000	1000	1000	1000
Projected Total	**7760**	**4410**	**6190**	**5908**	**5508**	**5492**
Units of measure: acre-feet per year						

With the exception of supplies in an extreme single dry year condition, current supplies supplemented by future wells would meet demands at buildout of the community. Deficiencies in an extreme single dry year would require restrictions on irrigation.

Table 12 provides data showing the impact on water demand from reducing unaccounted for water losses and instituting restrictions on water use during the landscape irrigation season.

Table 12
Impact of Reductions on Future Water Demand

Reduction	2005	2010	2015	2020	2025
No reduction	3426	3674	4082	4490	4898
Reduce water loss*	3116	3364	3772	4180	4588
Use Recycled Water	*N/A*	3004	3412	3820	4228
Level 1 Restriction @ 25%	*N/A*	2644	3003	3362	3721

Units of measurement: acre-feet per year
* Reduce water loss to 2004 level (450 ac-ft)
Note: Water savings from restricted use applied only during months of June, July, August, and September (these months represent 48% of annual demand). Level 1 restrictions historically reduce water use by 25% during summer irrigation periods.

INCONSISTENT WATER SOURCES

The District's surface water supply source, Lake Mary, is not available at a consistent level of use due to specific legal, environmental, and climatic factors.

The District holds three surface water appropriative rights. Two of those rights are licensed (Licenses 5715 and 12593). License 5715 authorizes the direct diversion of 25,000 gallons per day from May to November 1. License 12593 authorizes the District to directly divert 2 cubic feet per second (cfs) year round. This license also provides that the total quantity of water diverted under it and License 5715 shall not exceed 1,463 acre-feet per year. The District also holds one permit (Permit 17332). Pursuant to this permit, the District is authorized to divert 3 cfs year round and to store 606 acre-feet from April 1 to June 30 and 54 acre-feet from September 1 to September 30. Permit 17332 provides that the total amount of water diverted to use under all of the District's surface water rights shall not exceed 2,760 acre-feet annually.

The District also operates under a Master Operating Agreement (MOA) with the U.S. Forest Service. This agreement contains minimum streamflow requirements for the outlet of Lake Mary. The agreement also contains requirements for lake level management of Lake Mary. Drawdown of the water level of Lake Mary is limited to a maximum of 3 feet from June 1 to September 15 and then an additional 2.7 feet after that. The District has not been operating Lake Mamie or Twin Lakes that would cause any drawdown in these two lakes.

As part of the District's Draft Environmental Impact Report for Changes in Mammoth Creek Bypass Flow Requirements, Point of Measurement, Watershed Operation Constraints, and Place of Use, an analysis of certain changes to the MOA will be analyzed. In addition, the District and the USFS have agreed to eliminate the MOA, but the modified management constraints will be included as part of the District's state water right permits.

Included in the District water rights permit and Master Operating Agreement are daily minimum streamflow requirements for Mammoth Creek. The volume of water leaving Lake Mary primarily influences flow rates in Mammoth Creek.

During periods of drought, the available water supply from Lake Mary can be inconsistent due to the various constraints on lake level drawdown and Mammoth Creek streamflow requirements.

In order to replace lower volumes of water available from Lake Mary, the District has developed a network of wells to extract groundwater from the Mammoth Lakes Basin watershed. Water demand reduction through conservation measures (primarily landscape irrigation restrictions) can replace some water that is not available from Lake Mary. Future groundwater extraction from an adjacent groundwater basin (Dry Creek basin) and from the Mammoth Basin is being explored to also act as a partial replacement for lower surface water availability. Production capacity for District use from these additional wells is estimated at 1,000 acre-feet annually.

The District also maintains two standby wells that can be placed into service if necessary. These two wells are horizontal wells drilled in the 1960's and are located on the south edge of Lake Mary Road near the Bridges condominium development. Production from these wells is low however (approximately 80 gallons per minute) and it is anticipated that these wells would be used only under extreme conditions.

THREE-YEAR MINIMUM WATER SUPPLY

The District has prepared an estimate of the minimum water supply available during each of the next three water years based on a dry three-year historic period for the District's water supply (see Table 13). The three-year period includes the years 1991, 1992, and 2001. The water content measured at Mammoth Pass on April 1st for these three years amounted to 62%, 57%, and 64%, respectively. The impacts of a dry three-year sequence on groundwater pumping levels may extend for two years after receiving average precipitation.

Water supply conditions for the year 2001 are considered to be dry, as approximately 64% of average seasonal precipitation was received based on April 1st measurements at Mammoth Pass. In addition, mild weather conditions with minimal rain were experienced throughout the spring, summer, and fall seasons. This resulted in higher evaporation rates and increased water use for landscape irrigation.

Table 13
Three-Year Estimated Minimum Water Supply

Year 1	Year 2	Year 3
4908	4508	4492
Units of Measure: Acre-feet per year		

WATER SUPPLY RELIABILITY

As stated previously under "Inconsistent Water Sources", the District's surface water supply source is vulnerable to seasonal and climatic shortages. District groundwater supply sources are also vulnerable to climatic shortages but are not affected as quickly as surface water supplies.

The District's surface water supply is dependent on precipitation in the form of snow that occurs from October to April of each year. Supplies can be significantly impacted from a lack of precipitation during this period. These impacts continue to be seen during the following year (even with a normal snowfall) prior to the snowmelt season occurring.

Groundwater supplies are not impacted as quickly as surface water from the effects of drought. During the drought period from 1988 through 1992, when District wells were in operation, it took approximately 2 years before significant declines of groundwater levels were noticed.

The District experienced drought conditions from 1987 through 1992. During this period water restrictions were placed on the community with the most severe restrictions occurring in 1992. Regulation of landscape irrigation made the greatest impact on water conservation. These water restrictions resulted in reductions in total water demand ranging from 25% to 35%.

Due primarily to landscape irrigation, the greatest water demand period occurs during the months of June through September. Impacts on water supplies from climatic conditions during the previous winter snowfall season are greatest during

these two months. Table 14 describes projected water supply volumes and demand for normal, single year drought, and multi-year drought periods for the months of June through September.

Table 14
Existing Supply Reliability
Water Supply June through September

		Multiple Dry Years		
Normal Water Year	**Single Dry Water Year**	**Year 1**	**Year 2**	**Year 3 (1992)**
2872	1636	2223	2042	2035
Units of Measure: Acre-feet Year 1 & 2 estimated at 45.3% of total minimum supply for year (Table 14)				

Table 15
Water Demand June through September

Year	**Normal Water Year**
2005	1711
2010	1849
2015	1987
2020	2125
2025	2264
Demand is actual demand for Jun-Sep 2005, projected demand at build-out, and difference distributed throughout other years. Units of Measure: Acre-feet	

In a normal precipitation year, 969 acre-feet of surface water and 1902 acre-feet of groundwater supplies are projected to be available during the June through September period based on normal year supply projections. Single dry year estimates are projected using actual groundwater rates pumped during June through September during 1992 and 2001, with no surface water being available. Multiple dry year estimates are based on surface water availability during the 1992 drought year and actual groundwater pumped during 1992 and 2001.

As can be seen in Tables 14 and 15, estimated water demands are projected to exceed supplies during dry years for the June through September period as the community nears build-out. It should be noted that golf course irrigation demands are included in the estimate; therefore, use of recycled water will reduce any deficits in multiple dry years. Under any scenario, landscape irrigation controls would be required to meet demands in extreme dry year conditions.

Measures that would reduce water demand include the use of landscape irrigation watering restrictions, a reduction in the current rate of unaccounted for water, or increasing water supply capability through development of additional groundwater sources. Level 1 watering restrictions, which involve three-day per week watering, have been shown in the past to reduce demand by 25% when implemented.

The addition of a new source of supply such as projected in the Dry Creek and Mammoth Basin watersheds would add approximately 500 acre-feet to the existing available water supply during June through September in an average and single dry year. Table 16 shows water availability upon completion of future well development.

Table 16
June Through September Water Supply After Development of Future Wells

		Multiple Dry Years		
Average/Normal Water Year	**Single Dry Water Year**	**Year 1 (1990)**	**Year 2 (1991)**	**Year 3 (1992)**
3372	2136	2723	2542	2535
Units of Measure: Acre-feet				

WATER RECYCLING: WASTEWATER SYSTEM DESCRIPTION

The Mammoth Community Water District is also responsible for wastewater collection and treatment for the Town of Mammoth Lakes and some surrounding U.S. Forest Service lands.

Wastewater collection facilities consist of main pipelines ranging from six-inch to 18-inch in diameter, and thirteen wastewater lift stations located primarily in the Lakes Basin area to serve campgrounds.

The District's wastewater treatment facility provides what is termed "advanced secondary treatment". This includes biological treatment, filtration, and disinfection through utilization of chlorine. Treated wastewater is currently discharged to Laurel Pond, a pond located approximately 5½ miles southeast of Mammoth Lakes on U.S. Forest Service land. Disposal occurs at the pond through percolation into the ground and evaporation into the atmosphere.

Current daily wastewater flows average approximately 1.4 million gallons per day (mgd) with peak flows reaching 2.6 mgd on holiday weekends. Existing capacity of the facility is estimated to be 4.9 mgd.

WATER RECYCLING: WASTEWATER GENERATION, COLLECTION & TREATMENT

The Mammoth Community Water District collects and treats all wastewater generated in the Town of Mammoth Lakes as well as in surrounding U.S. Forest Service campground and permittee areas located in the Lakes Basin and Sherwin Creek area.

Tables 17 and 18 provide data related to current and future wastewater flows collected and treated by the District at its treatment facility.

Table 17
Wastewater Generation and Collection

	2005	2010	2015	2020	2025
Wastewater collected and treated in service area	1.65	1.89	2.13	2.37	2.60
Units of measure: Million Gallons Per Day					

Table 18
Wastewater Treatment

Average Daily (2005)	Maximum Daily (2005)	Year of Planned Build-out	Planned Maximum Daily Volume
1.6	2.6	2025	4.3
Units of measure: million gallons per day			

WASTEWATER DISPOSAL AND RECYCLED WATER USES

Treated wastewater is currently discharged to Laurel Pond, a pond located approximately 5½ miles southeast of Mammoth Lakes on U.S. Forest Service land. Disposal occurs at the pond through percolation into the ground and through evaporation into the atmosphere.

In 2001, the Mammoth Pacific Geothermal Power Plant utilized recycled water for cooling purposes as part of a pilot project. A temporary pipeline was installed and recycled water was delivered from the wastewater treatment plant to the power plant from June through October. The power plant was able to increase

efficiency and this use of recycled water looks promising. Additional recycled water users in the community include contractors for construction uses such as dust control and compaction purposes. Previously, temporary uses included highway landscape irrigation on Main Street and establishment of grass for ball fields at the Shady Rest Park.

As stated previously, use of recycled water has been identified as a potential source of water supply for golf course and park irrigation. Environmental studies have been completed regarding potential impacts on the District's current disposal area at Laurel Pond. Additional studies are underway to estimate potential impacts, if any, on surface water or groundwater from the use of recycled water for golf course irrigation at the Sierra Star golf course. Preliminary design work has been conducted to determine necessary treatment plant modifications required to meet standards for golf course irrigation water. In addition to the Sierra Star golf course site, expansion of the Snowcreek golf course and Shady Rest Park are potential candidates for use of recycled water.

Estimated demand for future recycled water needs amounts to approximately 500 acre-feet per year for irrigation purposes and approximately 600 acre-feet per year for cooling purposes at the power plant.

ENCOURAGING RECYCLED WATER USE

The Mammoth Community Water District has taken various steps to encourage the use of recycled water.

As a result of District comments to the proposed construction of the Sierra Star golf course, the Town of Mammoth Lakes included a mitigation measure for the project requiring that golf course water bodies and irrigation shall use recycled water to the fullest extent possible.[7] This requirement was reinforced in the conditions of approval for the master plan, which required that the golf course use recycled water or other non-potable water supplies for irrigation purposes.[8] An agreement was signed in 1996 between the District and developer of the Sierra Star golf course regarding an interim supply of untreated water for irrigation purposes. As part of this agreement, increasing surcharges on the water being supplied to the golf course were instituted to assist and promote the development of the District's proposed recycled water project.[9]

Total irrigation demand for recycled water within the District's service area is estimated to reach 500 acre-feet per year.

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[7] Environmental Impact Report, Lodestar Golf Course, February 1991, page 4.5-7.

[8] Lodestar Master Plan, 1991, page 7.

[9] Agreement Between Mammoth Community Water District and Lodestar Concerning An Interim Supply of Untreated Water to the Lodestar Golf Course, July 1996, page 4.

RECYCLED WATER OPTIMIZATION PLAN

In 1987 a Water Reclamation Feasibility Study was conducted for the Mammoth Community Water District.[10] The objective of the analysis was to determine the feasibility of recycling wastewater and/or sub-potable groundwater sources. Issues regarding economic feasibility and financial viability were analyzed. Uses of recycled water analyzed included landscape and agricultural irrigation, industrial process water, and water used for recreational purposes. As a result of this study, it was determined that the only feasible use of recycled water was for restricted landscape irrigation. Water reclamation and reuse was again analyzed in the 1991 Feasibility Study of Alternative Sources of Water Supply and Methods of Reducing Demand conducted for the District[11]. It was reaffirmed that restricted landscape irrigation uses, such as golf course irrigation, was the most feasible use of recycled water.

The District has established an operations plan for recycled water use on Sierra Star Golf Course, the expanded nine holes at Snowcreek Golf Course, and Shady Rest Park. An environmental impact report is scheduled for completion in the spring of 2006.

WATER SUPPLY AND DEMAND COMPARISON PROVISIONS

As part of the Urban Water Management Plan, it is required that the water supplier include a water supply and demand assessment of the reliability of water service to its customers during normal, dry, and multiple dry water years. The District Board has been evaluating the development of a contingency factor for these supply and demand assessments. Such a contingency would include either a percentage figure or specific volume of water that would be included in the following projections. This contingency factor is not included in any of the following tables.

The following Table 20 identifies forecasted supply production volumes over the next 20 years in 5-year increments. This table does not include new future supplies.

Table 19
Water Supply Summary

	2005	2010	2015	2020	2025
Supply	6760	6760	6760	6760	6760
Units of Measure: acre-feet per year					

[10] Mammoth County Water District Water Reclamation Feasibility Study, July 8, 1987
[11] Feasibility Study of Alternative Sources of Water Supply and Methods of Reducing Demand, Mammoth County Water District, January 1992.

The following Table 20 identifies forecasted demand volumes.

Table 20
Water Demand Summary

	2005	2010	2015	2020	2025
Demand	3426	3674	4082	4490	4898
Units of Measure: acre-feet per year					

The following Table 21 combines Tables 20 and 21 to establish a supply and demand comparison.

Table 21
Projected Supply and Demand Comparison

	2005	2010	2015	2020	2025
Supply Totals	6760	6760	6760	6760	6760
Demand Totals	3426	3674	4082	4490	4898
Difference	**+3334**	**+3086**	**+2678**	**+2270**	**+1862**
Units of Measure: acre-feet per year					

Does not include contingency factor

The following supply and demand comparison in Table 22 is presented under three scenarios; 1) for a normal water year, 2) for a single dry water year, and 3) for multiple dry water years.

Table 22
Supply Reliability and Demand Comparison

			Multiple Dry Water Years			
	Average/ Normal Water Year	**Single Dry Water Year**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Supply Totals	6760	3410	5190	4908	4508	4492
Demand Totals	4898	4898	4898	4898	4898	4898
Difference	**1862**	**-1488**	**292**	**10**	**-390**	**-406**
Units of Measure: Acre-feet per year						

Note: Supply figures based on current available water supply conditions.
Demand figures are for projected build-out of community
Does not include contingency factor

Based on the supply reliability and demand comparison it can be seen that as the community approaches build-out water shortages may result under multiple dry water year scenarios and single dry year scenarios. Table 23 shows the impacts on the supply and demand comparison of utilizing 400 acre-feet of recycled water on Sierra Star and Snowcreek Golf Courses. In the Urban Water Management Plan, a single dry year is estimated to be the year in which the lowest historical runoff occurred. For this analysis, the year of 1977 was used, as it had the lowest April 1 snowpack on record of 12.3 inches.

Table 23
Supply Reliability and Demand Comparison
(Includes Recycled Water Use)

			Multiple Dry Water Years			
	Average/ Normal Water Year	**Single Dry Water Year**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Supply Totals	7120	3770	5550	5268	4868	4852
Demand Totals	4898	4898	4898	4898	4898	4898
Difference	**2222**	**-1128**	**652**	**370**	**-30**	**-46**
Units of Measure: Acre-feet per year						

Recycled water use by Sierra Star Golf Course and Shady Rest Park
Does not include contingency factor

Table 24 shows the impacts of groundwater development in the Dry Creek basin in addition to the recycled water use. With the availability of these two additional water sources, shortages are anticipated to occur only in extreme single dry year conditions.

Table 24
Supply Reliability and Demand Comparison
(Includes Recycled Water Use and Future Wells)

			Multiple Dry Water Years			
	Average/ Normal Water Year	**Single Dry Water Year**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Supply Totals	8120	4770	6550	6268	5868	5852
Demand Totals	4898	4898	4898	4898	4898	4898
Difference	**3222**	**-128**	**1652**	**1370**	**970**	**954**
Units of Measure: Acre-feet per year						

Does not include contingency factor

Water demands can be reduced through a reduction in the water system loss rate and through implementation of water restrictions. Table 25 shows the impacts from these two efforts on the water supply reliability and demand comparison. Level 1 water restrictions involve landscape watering for single and multi-family residences allowed only on Tuesdays, Thursdays, and Saturdays from 6:00 p.m. to 10:00 p.m., and condominiums and commercial being restricted to the same days with times including 6:00 a.m. to 10:00 a.m. and 6:00 p.m. to 10:00 p.m. The evaluation in Table 25 does not include recycled water use or the development of future wells.

Table 25
Supply Reliability and Demand Comparison
(Includes Reduction in Water Loss or Level 1 Water Restrictions)

			Multiple Dry Water Years			
	Average/ Normal Water Year	**Single Dry Water Year**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Supply Totals (existing)	6760	3410	5190	4908	4508	4492
Demand (Reduce Water Loss)	4588	4588	4588	4588	4588	4588
Difference	**2172**	**-1178**	**602**	**320**	**-80**	**-96**
Demand (Level 1 Water Restrictions)	4037	4037	4037	4037	4037	4037
Difference	**2723**	**-627**	**1153**	**871**	**471**	**455**
Units of Measure: Acre-feet per year						

Units of measurement: acre-feet per year
Note: Reduce water loss to 2004 level (450 ac-ft)
Does not include contingency factor
Water savings from restricted use applied only during months of June, July, August, and September (these months represent 48% of annual demand). Level 1 restrictions historically reduce water use by 25% during summer irrigation periods.

WATER SHORTAGE CONTINGENCY PLAN: PREPARATION FOR CATASTROPHIC WATER SUPPLY INTERRUPTION

The Mammoth Community Water District has developed an emergency response plan[12] to respond to events that could impact water supplies such as civil disturbance, floods, snowstorms, explosions or industrial hazards, hazardous substance releases, earthquake, and volcanic eruption. The following Table 26 lists some of the actions taken by the District to prepare for emergencies.

[12] Mammoth Community Water District Emergency Response Plan, April 20, 2000

Table 26
Preparation Actions for a Catastrophe

Actions	Check if Discussed
Determine what constitutes a proclamation of a water shortage.	X
Stretch existing water storage.	X
Obtain additional water supplies.	
Develop alternative water supplies.	X
Determine where the funding will come from.	
Contact and coordinate with other agencies.	X
Create an Emergency Response Team/Coordinator.	X
Create a catastrophe preparedness plan.	X
Put employees/contractors on-call.	X
Develop methods to communicate with public.	X
Develop methods to prepare for water quality interruptions.	X

WATER SHORTAGE CONTINGENCY ORDINANCE/RESOLUTION

The Board of Directors of the Mammoth Community Water District has adopted an ordinance[13] regarding water management requirements and responses to various trigger points that may signal a potential water shortage. A copy of the ordinance is included as Attachment C.

Based on snow volume and water content data measured by the Los Angeles Department of Water and Power at Mammoth Pass on April 1st, the District can make reasonable forecasts of the water supply available for the upcoming season. The Board of Directors by resolution may declare the existence or threatened existence of a drought, or other threatened or existing water shortage based upon forecasts for the upcoming water supply season. The Board of Directors may then implement any level of restriction, as it deems necessary.

As part of the water management requirements ordinance, "trigger points" have been set for the level of Lake Mary. Depending on the level of Lake Mary at specified dates, increasing levels of water restrictions are required to conserve additional water.

[13] Mammoth Community Water District Water and Water Service Code, Section 3.33 Water Management Requirements

WATER SHORTAGE CONTINGENCY PLAN: STAGES OF ACTION

As stated above, the District in response to potential water shortages can take various levels or stages of action. Table 27 shows the various levels of restriction and anticipated savings from each.

Table 27
Water Supply Shortage Stages and Conditions

Rationing Stages				
Level 1	Level 2	Level 3	Level 4	Level 5
Percent Total Reduction of Water Demand				
25%	28%	30%	35%	50%

There are several events that could trigger the District to institute particular levels of water restrictions.

The most significant event that may trigger the institution of water restrictions would involve a sustained drought period where both surface water and groundwater supplies are impacted. Immediate impacts on surface water availability are seen after one season of drought whereas groundwater supplies tend to be impacted after several successive drought years. During the most recent drought period from 1987 through 1992, drawdown of groundwater levels began to impact pumping by 1992.

The District's ordinance on water management requirements includes "trigger points" where if the level of Lake Mary is at or below a specific level at a specific date, customers are required to conserve additional water. Methods for additional conservation may vary, but will include implementation of the next higher level of restrictions, until level 5 is reached. The Lake Mary surface level "trigger points" have been established as follows:

- August 1 0.30 feet below the measuring point
- August 15 1.15 feet below the measuring point
- September 1 2.25 feet below the measuring point
- September 15 3.00 feet below the measuring point

The purposes of implementing any or all restrictions are to achieve savings in each customer's water use, and provide sufficient water for human consumption, sanitation, and fire protection.

WATER SHORTAGE CONTINGENCY PLAN: PROHIBITIONS

The District has certain mandatory prohibitions that require the public to become water conscious and to conserve water. The following water conservation measures are required for all District customers at all times.

1. Water from the District's potable water system allowed to pool, pond, or run-off of applied areas is considered a waste of water and as such is not permitted.
2. Leaks occurring on the customer side of each meter in the District's potable water system are considered a waste of water and as such are not permitted.
3. Any hose, including those used to wash vehicles, used in conjunction with the District customer's water service shall be equipped with an automatic shut-off device, except that no such shut-off device shall be required for irrigation purposes.
4. District water supplied through the District's potable water system, which is used for watering vegetation outside of any building, shall not be permitted between the hours of 10:00 a.m. and 5:00 p.m.

The following Table 28 lists the mandatory prohibitions by the District against specific water use practices during water shortages.

Table 28
Mandatory Prohibitions

Type of Prohibition	**Stage When Prohibition Is Mandatory**
No water served by restaurants	Board declaration of drought conditions
Motels/Condos post announcements	Board declaration of drought conditions
High water users audit by District	Board declaration of drought conditions
No use for general maintenance and construction activities	Level 1
No cleaning of hard surfaces with water	Level 1
Restricted watering of lawns/landscapes	Level 1
Limit replacement of sod	Level 1
Increased restrictions on watering of lawns/landscapes	Level 2
No new lawn areas	Level 2
Increased restrictions on watering of lawns/landscapes	Level 3
Increased restrictions on watering of lawns/landscapes	Level 4
No vehicle washing allowed	Level 5
No watering of lawns/landscaping allowed	Level 5

WATER CONTINGENCY PLAN: PENALTIES

The Mammoth Community Water District has adopted an ordinance regarding the enforcement of District water restrictions (Section 3.35 of Water and Water Service Code).

Upon the first violation of water restrictions, a verbal warning is issued together with written confirmation of the verbal warning. For a second violation of a water restriction, the District issues a written warning. Upon a third violation, the District may disconnect the customers' irrigation meter, or install a flow restriction device if there is no separate irrigation meter. Installation of each flow restrictor requires a payment of $100 in addition to a $20 monthly fee while it is in place. Restoration of service or removal of a flow restrictor requires a payment of $200. When a fourth violation occurs, the District may disconnect the customers' irrigation meter or install a flow restrictor that reduces flow to essential uses only. After a fourth violation the disconnected service is not restored or flow restriction device removed until the District Board of Directors declares that the existing/threatened drought or other water shortage is over.

WATER SHORTAGE CONTINGENCY PLAN: CONSUMPTION REDUCTION METHODS

Meters to monitor usage measure water service to each customer in the District. In order to encourage conservation, residential customer water usage is billed on the following increasing block rate fee structure.

Table 29
Residential Block-Rate Fee Structure

Single Family unit usage per month (gallons)	Multi-family / condominium unit usage per month (gallons)	Rate per 1,000 gallons
First 4000	First 3000	$1.05
4001 – 8000	3001 – 6000	$1.30
8001 – 12000	6001 – 9000	$1.70
12001 – 16000	9001 – 12000	$2.35
16001 – 20000	12001 – 15000	$3.20
20001 – 24000	15001 – 18000	$4.45
24001 – 28000	18001 – 21000	$6.45
28001 and up	21001 and up	$7.40

The reduction of water use in the most restrictive stages may include restrictions of water use for consumptive purposes or primarily indoor use.

In order to accomplish consumptive use water savings of at least 50%, the District would utilize voluntary rationing measures, an education program on conserving water, and tracking of percentage reductions by customer type. These measures would be in addition to the mandatory prohibitions listed in Table 28.

WATER SHORTAGE CONTINGENCY PLAN: REVENUE AND EXPENDITURE IMPACTS

Imposing water restrictions on customers would have an impact on District revenues during the months of June, July, August, and September. The following Table 30 shows the estimated impacts on revenues resulting from implementing various levels of restrictions.

Table 30
Revenue Impacts From Water Restrictions

Rationing Stage	Revenue Reduction	Percent of Total Annual Revenue
Level 1 (25%)	$313,902	11.0%
Level 2 (28%)	$351,571	12.3%
Level 3 (30%)	$376,683	13.2%
Level 4 (35%)	$439,463	15.4%
Level 5 (50%)	$627,805	22.0%

Revenue reduction = decrease in gallons at build-out for usage in June, July, August and September @ $1,83/1,000 gallons for residential and $1.34/1,000 gallons for golf course irrigation

The District currently maintains an operating reserve amounting to $120,020 in its water operations budget. The most likely scenario involving the institution of water restrictions would involve implementation of level 1. The District has established a goal of achieving an operating reserve of approximately $700,000. At this level, operating reserves would be depleted after two years resulting in a potential increase in water rates required during a third year of restrictions.

Conditions of drought and the implementation of water restrictions would also impact expenditures. Reduced availability of surface water and the resulting necessity to rely more on groundwater pumping results in increased costs to the District. The following Table 31 shows the difference in power costs when placing more reliance on groundwater.

Table 31
Increased Expenditures Due to Decreased Surface Water Availability

	Surface Water Availability	Additional Groundwater Required	Additional Expense	Total Increased Cost
1 Dry Year	1500 ac-ft	1260	$84.00/ac-ft	$105,840
2 Dry Years	1100 ac-ft	1526	$84.00/ac-ft	$128,184
3 Dry Years	1084 ac-ft	1676	$84.00/ac-ft	$140,784

Based on current surface water availability (2760 acre-feet)
Groundwater power expenses @ $104 per acre-foot
Surface water power expenses @ $20 per acre-foot

WATER SHORTAGE CONTINGENCY PLAN: MEASURES TO OVERCOME IMPACTS

In order to overcome impacts to revenues and expenditures from potential water shortages, the District has instituted several measures.

Revenue requirements for the District's operating fund include operation and maintenance expense, routine capital expenditures, and transfers to a replacement fund. Transfers to a replacement fund could be utilized for operating expenses in case of emergency.

A portion of the District's operating budget is allocated to a "reserve fund" to cover operating expenses in case of emergency. In the 2004-2005 budget, $120,020 was budgeted for operating reserves. As stated above, the District's goal is to achieve a total water operating reserve account of approximately $700,000.

Under long-term drought conditions, it may be necessary to institute temporary increases to rates to cover increased operating expenses. One option the District could utilize would be to adopt a surcharge or flat rate increase over a specific time period to cover increased operating expenses while under water shortage conditions. This measure would be similar to the District's water management ordinance and would allow the Board of Directors to implement various levels of rate increases after the Board, by resolution, has declared a threatened shortage of funds due to water shortage or other emergency.

WATER SHORTAGE CONTINGENCY PLAN: REDUCTION MEASURING MECHANISM

In order to determine actual reductions in water usage there must be some mechanism to perform this function. The District has the ability to monitor reductions in water usage in several ways.

The District monitors water usage on a daily basis through source meters located at each of the three water treatment facilities and one well that pumps water directly into the system. This daily record of water usage allows the District to accurately gage water demands and establish baseline data for various seasons, peak tourist periods, and irrigation periods. Through a supervisory control and data acquisition system (SCADA) the District has the ability to monitor water demand on an hourly basis using computers and can track demands from individual sections of the community through monitoring of storage tank levels.

Water meters are installed to monitor all residential and commercial water usage in the community. Historical data is available to establish monthly baseline water use information for single family, multi-family, condominium, and various commercial uses.

The District is has installed a new "radio read" water meter reading system, which allows for the reading of all meters in the community over a one-day period. With the radio read system, individual residences, condominium projects, and commercial establishments can be monitored on a day-to-day basis if necessary to determine if excessive water usage is occurring.

Detection of underground water pipeline leaks has been an on-going program that the District has undertaken. District staff in inspecting the water distribution system piping for leakage utilizes the most current technology. This program would be intensified through increased inspection frequency during times of water shortage to ensure minimal volumes of water being lost through leakage.

DEMAND MANAGEMENT MEASURES

Interior/Exterior Water Audits

The District is budgeting additional money to allow the conservation coordinator to provide a service to conduct interior and exterior water audits for residential customers. These audits would include a checklist to review such items as inspection of interior showerheads, fixtures, and toilets for leakage and efficiency. Replacement of inefficient devices with updated conservation devices would be offered. Water irrigation systems would also be inspected for use of efficient irrigation equipment and also watering practices would be reviewed. A written report would be prepared and advice would be offered to assist the customer in reducing water consumption.

Large Landscape Audits

The District will also be offering water audits of large landscape areas including condominium projects, parks, ball fields, and school landscape areas. A checklist would be utilized for inspection of irrigation system sprinkling and control equipment, calculation of water usage per 1,000 square feet of landscaping, use of evapotranspiration data, type of vegetation, and general review of watering practices. A written recommendation would be provided to increase water use efficiency.

Since many landscaped areas, both residential and large landscape areas, are maintained by private landscape companies, representatives of these companies would be contacted and included in the audits and recommendations prepared by the District.

Plumbing Standards and Retrofits

The District's Water Service Code requires the installation of water conservation devices in new buildings and those that require permits for remodeling. These devices include showerheads, faucet aerators for sinks, and water conservation toilets. The percentage of residences with such devices is unavailable at this time, but could be evaluated as part of the interior water audit program.

Distribution System

An ongoing leak-detection project has been implemented to reduce water losses in the water distribution system. The District's Board has committed to reduce unaccounted-for losses through replacement of leaking and aging water lines in the community. Replacement of approximately 10,000 lineal feet per year of main water pipeline has been budgeted over the next several years. The District has also invested in underground pipeline leak detection equipment and performs routine leak detection surveys to locate leaks for repair before they appear on the surface.

Commodity Rates
Each District customer pays a monthly water fee, which consists of a minimum service charge and a quantity rate charge. All residential customers pay a minimum service charge of $11.46 per month, while commercial customers pay a minimum service charge that is based on the size of water meter serving their property. Quantity rate charges are imposed in addition to the minimum service charge. The quantity rate charge ranges from a minimum of $1.05 per 1,000 gallons of water used to $7.40 per 1,000 gallons depending on the volume of water used per month.

Landscape Requirements
The Mammoth Lakes Municipal Code contains detailed water-efficient landscape requirements. Homeowners, developers, and landscapers must submit a landscape documentation package to the Town of Mammoth Lakes, which includes a water conservation statement, irrigation plan and schedules, soil analysis, and calculation of the maximum applied water allowance (MAWA). In addition, no more than fifteen percent of the gross area of a lot may be lawn.

Large Landscapes
Portions of landscaped areas in public and private projects such as parks, playgrounds, sport fields, golf courses or school yards where turf provides a playing surface or serves other recreational purposes may require water in addition to the maximum applied water allowance. A statement must be included with the landscape design plan, designating areas to be used for such purposes and specifying any needed amount of additional water above the MAWA.

Public Information
As part of the District's Water Service Code, a public relations officer has been empowered to provide the public with information in an effort to promote knowledge and understanding of the area's water situation in general and methods to conserve the water supply. Information about all District Board meetings and all other important District activities are promptly routed to the appropriate sources for local news and information.

School Education
Local school education programs have been enacted in the past and will continue to be considered for the future to teach local students about the importance of conserving water. An annual budget of $1,500 has been approved for water conservation/education purposes.

Commercial and Industrial
For commercial users of water, the District charges a monthly service charge based on the size of the meter. The larger the meter, the more the customer pays for water. Such users also pay a flat rate for every 1000 gallons of water used. To encourage conservation, commercial irrigation sites that exceed the

MAWA (maximum applied water allowance calculated for each site) are charge $2.45 for each 1,000 gallons instead of the $1.83 per 1000 gallons charged for commercial irrigation sites that are within the MAWA.

Conservation Pricing
The District's water rates are designed to encourage water conservation through an increasing block rate structure. The more water residential customers use, the higher their bills will be. This system is further described in Figure 27 of this document.

Single-Family Landscapes
Single-family landscapes fall under the same set of provisions as all other public and private projects with the Mammoth Lakes Municipal Code. However, such structures are exempt the requirements to have automated irrigation systems and to undergo landscape irrigation audits.

Water Waste Prohibitions
The District has certain mandatory prohibitions that require the public to become water conscious and to conserve water. These water conservation measures, required for all District customers at all times, are described on page 30 of this document.
Furthermore, the District's Water Service Code prohibits the wasteful flow of District water in any gutter. The District may, after two warnings, disconnect the service to any property and/or consumer for failure to comply with this rule. Such disconnected service may be restored only upon payment of the turn-on charge set by the Board of Directors and by payment of the wasted water at the rate set by the Board of Directors.

Conservation Coordinator
The District has currently and, in the past, regularly filled the position of conservation coordinator. Future activities of the conservation coordinator will include focusing on providing water audits for large landscape customers and the establishment of several xeriscape demonstration gardens within the community.

Financial Incentives
Each District customer has been outfitted with a water meter to monitor usage in order to encourage conservation. Residential customer water usage is billed on an increasing block-rate fee structure, detailed in Figure 27 of this document. As mentioned above, the implementation of an increasing block-rate fee structure for commercial users is currently being evaluated for implementation. Further information on consumption reduction methods through financial incentives is described on page 31 of this document.

Ultra-Low-Flush Toilets
In the past, this District has conducted a toilet rebate program in which customers may receive a cash rebate for installing an ultra-low-flush toilet in

place of older model water-wasting toilets. This program was successful and will be reinstated in the future. All new construction in the community is required to meet current plumbing code standards, which mandate low-flush toilets.

Water Audits and Incentives

Through its water meter radio read system and computer monitoring of pressure zones and water storage tanks, the District performs water audits to determine the locations of leaking pipes in the distribution system.

Efficient Washing Machine Rebate Program

The District will be evaluating the potential benefits of establishing an efficient washing machine rebate program. Water use records will be evaluated to estimate water savings from replacement of older washing machines. A standard of 40% reduction in water usage, and 50% reduction in energy consumption using a high-efficiency washer would be used in estimating projected savings. The District will also evaluate adding a new policy to its water code that would require efficient washing machines for new construction. The power supply company (Southern California Edison) would be contacted to see if they would be interested in partnering with the District in providing rebates to customers.

Schedule of Implementation

Demand management measures proposed or described above are included in the following implementation schedule.

Table 32
Demand Management Measure Implementation Schedule

Demand Management Measure	Schedule for Implementation
Interior / Exterior Water Audits	Implement in 2006
Large Landscape Audits	Implement in 2006
Plumbing Standards and Retrofits	Implemented
Distribution System	Implemented
Commodity Rates	Implemented re-evaluated in 2005)
Large Landscapes	Implemented
Landscape Requirements	Implemented
Public Information	Implemented
School Education	Implemented
Commercial and Industrial	Implemented (improved in 2005)
Conservation Pricing	Implemented (re-evaluated in 2005)
Single-Family Landscapes	Implemented
Water Waste Prohibitions	Implemented
Conservation Coordinator	Implemented
Financial Incentives	Implemented (evaluated in 2004)
Ultra-Low-Flush Toilets	Evaluated for action in 2005
Water Audits and Incentives	Implement in 2006
Efficient Washing Machine Rebate Program	Evaluated for action in 2005

REFERENCES

Agreement Between Mammoth Community Water District and Lodestar Concerning An Interim Supply of Untreated Water to the Lodestar Golf Course, July 1996.

Breibart, A.D., Cathcart, R.E., Didriksen, K.A., and Everett, J.L., Mammoth Groundwater Extraction: A Hydrological Analysis of Potential Recharge to an Eastern Sierra Nevada Watershed, June 2001.

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EIP Associates, Final Environmental Impact Report for the Lodestar Golf Course, February 1991. Prepared for the Town of Mammoth Lakes.

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APPENDIX A

URBAN WATER MANAGEMENT PLAN 2005

COPY

RESOLUTION NO. 12-15-05-20

A RESOLUTION OF THE BOARD OF DIRECTORS

OF THE MAMMOTH COMMUNITY WATER DISTRICT

ADOPTING THE 2005 URBAN WATER MANAGEMNT PLAN

WHEREAS, The California Urban Water Management Planning Act requires every urban water supplier to prepare and adopt an urban water management plan; and

WHEREAS, the California Urban Water Management Planning Act requires each urban water supplier to update the plan at least once every five years on or before December 31, in years ending in five and zero; and

WHEREAS, the California Urban Water Management Planning Act requires the amendments to, or changes in, the plan to be adopted and filed with the Department of Water Resources no later than 30 days after adoption; and

WHEREAS, the Mammoth Community Water District has reviewed its Urban Water Management Plan and, as a result of the review, has prepared an updated plan that reflects necessary changes or amendments; and

WHEREAS, the Mammoth Community Water District has made the plan available for public inspection and has held a public hearing to receive comment.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors of the Mammoth Community Water District approves and adopts the 2005 Urban Water Management Plan

PASSED AND ADOPTED by the Board of Directors of the Mammoth Community Water District at a regular meeting held on the 15th day of December 2005, by the following vote of the Board:

COPY

AYES: Directors Cage, Henderson and Smith

NOES: None

ABSENT: Directors Alper and Domaille

ABSTAIN: None

MAMMOTH COMMUNITY WATER DISTRICT

Thomas Smith, President

Board of Directors

ATTEST:

Gary Sisson, Secretary

Board of Directors

Proof of Publication

#05-484

COPY

This space is for the County Clerk's Filing Stamp

STATE OF CALIFORNIA
COUNTY OF MONO

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the

MAMMOTH TIMES

a newspaper of general circulation, published in

County of Mono.

The Mammoth Times was adjudicated on March 24, 1992, as a newspaper of general circulation for the Town of Mammoth Lakes and Mono County, CA.

The notice, of which the annexed is a printed copy (set in type not smaller that nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dated, to wit:

12/08 12/15
all in the year **2005**
I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Mammoth Lakes, California,
the **15th** day of **December, 2005**

Signature

Proof of Publication Of

PUBLIC NOTICE

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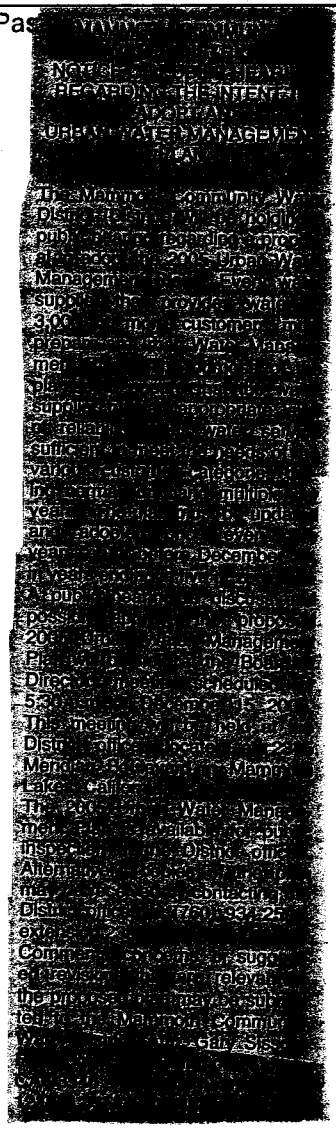

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APPENDIX B

URBAN WATER MANAGEMENT PLAN 2005

Section 3.32. Operation and Maintenance of Distribution System

A. The owner of the property serviced and the customer serviced by the District's distribution system shall be responsible for the operation and maintenance of the private water line, and all devices or safeguards required by this Chapter, which are located upon the property owned by the property owner or occupied by the customer and which are outside the District's right-of-way line.

B. The District shall be responsible for the operation and maintenance of that portion of the distribution system, which is in the District's right-of-way, which has been dedicated to the District, or which is not located upon the property of the person served by the District's distribution system.

C. The property owner served and the customer served by the District's distribution system shall be responsible and liable for all costs involved in the repair of all damage caused by the property owner, the customer, or agents thereof, to any portion of the distribution system, wherever located.

[Added by Ord. No. 04-15-82-12]

Section 3.33 Water Management Requirements

A. In order to preserve our natural resources, water conservation must be practiced on a regular, year round basis. California and the Mammoth Lakes area have recently experienced severe drought periods and are experiencing substantial growth while water supplies are limited. Therefore, it is mandatory that the public become water conscious and conserve water. The following measures shall be implemented by all District customers at all times.

1. Water from the District's potable water system allowed to pool, pond, or run-off of applied areas is considered a waste of water and as such is not permitted.

2. Leaks occurring on the customer side of each meter in the District's potable water system are considered a waste of water and as such are not permitted.

3. Any hose, including those used to wash vehicles, used in conjunction with the District customer's water service shall be equipped with an automatic shut-off

device; except that no such shut-off device shall be required for irrigation purposes.

4. District water supplied through the District's potable water system which is used for watering vegetation outside of any building shall not be permitted between the hours of 10:00 a.m. and 5:00 p.m.

B. There shall be five levels of water restrictions which may be implemented after the District Board of Directors by resolution has declared the existence or threatened existence of a drought, or other threatened or existing water shortage. The five levels are appended to Chapter 12 of the District Code as Appendix A and are incorporated herein by this reference. Whenever the Board has made such a declaration, and during the course of such drought, threatened drought, or other threatened or existing water shortage, the Board by motion may implement any level of restrictions as it deems necessary, and shall authorize the General Manager and District staff to enforce it. Any level of restrictions so implemented by the Board shall remain in effect until the Board by motion determines otherwise.

The purposes of implementing any or all of the restrictions are to achieve a savings in each customer's water use, and to provide sufficient water for human consumption, sanitation and fire protection.

C. Any customer may apply to the District for relief from the restrictions pertaining to the hours for outside watering if the customer can prove to the satisfaction of the Board that the requested relief will achieve comparable savings in water use as if the customer had complied with the outside watering restriction, that such relief is necessary to alleviate water pressure problems within the District's water system which would occur but for such relief, and that the customer has an automatic sprinkler system.

If such application is approved, the Board may, by appropriate action, suspend or modify the restriction from which the relief is requested as to the applying customer. Such Board decision shall be effective as of the date of the decision to approve the application and continue in effect until the restriction is removed. Any costs to the District to ensure that the customer complies with the Board decision shall be borne by that customer.

D. Whenever the Board has implemented restrictions, it may, if in the public interest, permit the irrigation of the Mammoth High School and Mammoth Elementary School playing fields and the Town's Shady Rest Park on days and during times fixed by motion of the Board.

E. Whenever the Board declares the existence or threatened existence of a drought, or other threatened or existing water shortage, the following water savings programs shall be in effect and shall be implemented by the General Manager and District staff:

1. Restaurants are requested not to serve water to a customer unless the customer specifically requests it.

2. Managers of motel units and condominium units used for temporary occupancy are requested to post announcements encouraging their guests not to waste water.

3. Water users exhibiting a high demand are to be contacted and assisted in developing methods for reducing their usage.

F. The Lake Mary surface level "trigger points" are established as follows:

August 1 -	0.3 Feet below the measuring point
August 15 -	1.15 Feet below the measuring point
September 1 -	2.25 Feet below the measuring point
September 15 -	3.0 Feet below the measuring point

If the level of Lake Mary, after June 1 but before the date listed, is at or below an established Trigger Point, District customers will be required to conserve additional water especially during the critical summer months. The methods for additional conservation may vary, but will include implementation of the next higher level of restrictions, until level 5 is reached.

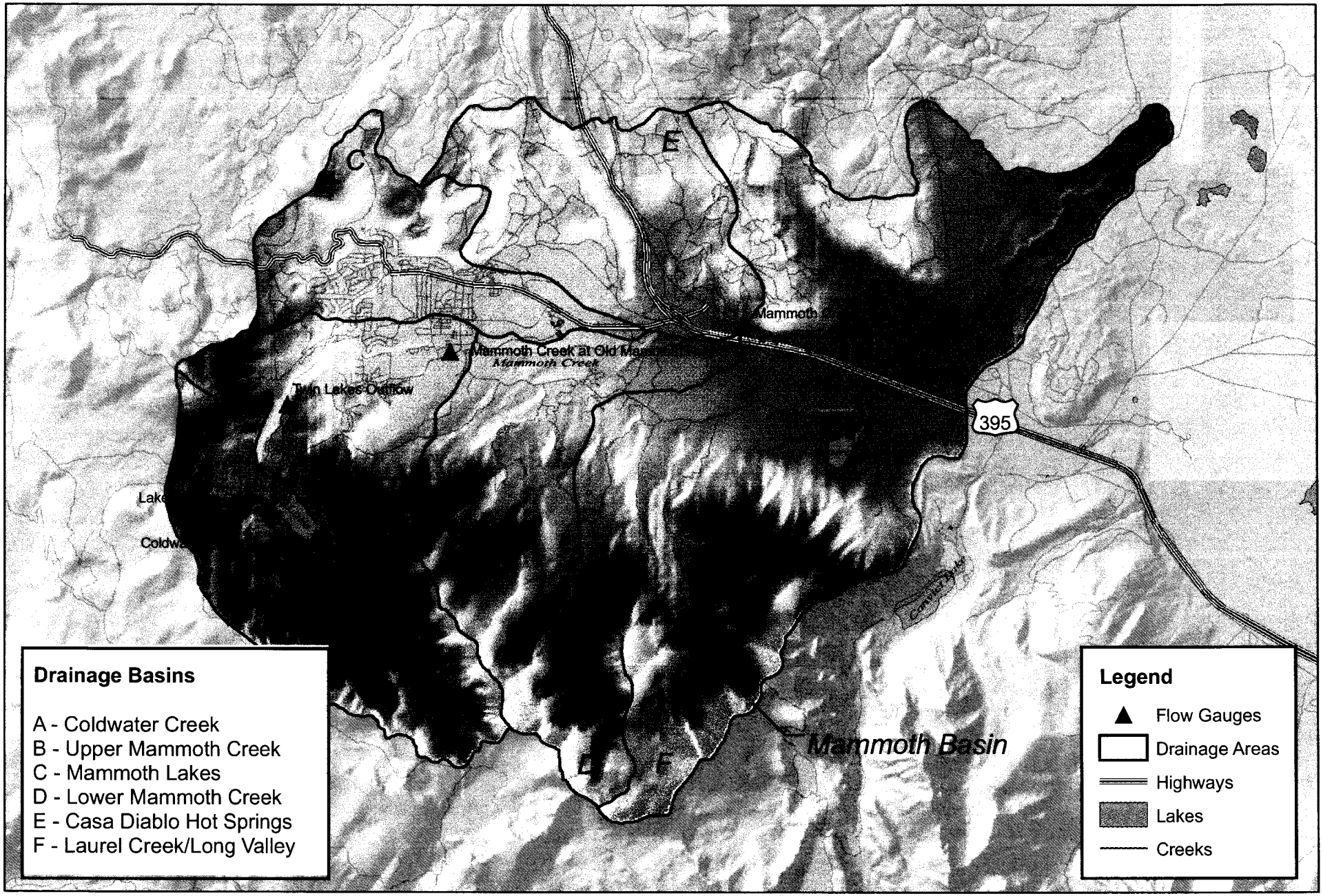
(Added by Ord. No. 08-07-85-09; amended by Ord. Nos. 09-05-85-10, 04-16-87-13, 05-21-87-14, 07-16-87-18, 08-24-87-22, 10-29-87-28, 03-15-90-05, 09-27-90-17, 03-21-91-09, and 03-30-92-04)

Section 3.34 Control of Backflow and Cross-Connections

A. No water service connection to any premises shall be installed or maintained by the District unless the water supply is protected as required by State laws and regulations and this ordinance. Service of water to any

APPENDIX C

URBAN WATER MANAGEMENT PLAN 2005



Mammoth Community Water District
P.O. Box 597, Mammoth Lakes, CA 93546
(760) 934-2596 FAX: (760) 934-2143

Appendix C

Mammoth Basin and the Six Internal Drainage Basins

0 3,000 6,000 9,000 12,000 Feet

Mammoth Community Water District Disclaimer

These maps and datasets have not been approved by the Mammoth Community Water District (the District) and do not constitute an official map or dataset of the District. The District provides this information on an "as is" basis. No warranty, expressed or implied, is made regarding accuracy, adequacy, completeness, legality, reliability or usefulness of the information for any purpose. This disclaimer applies to both isolated and aggregate uses of the information.

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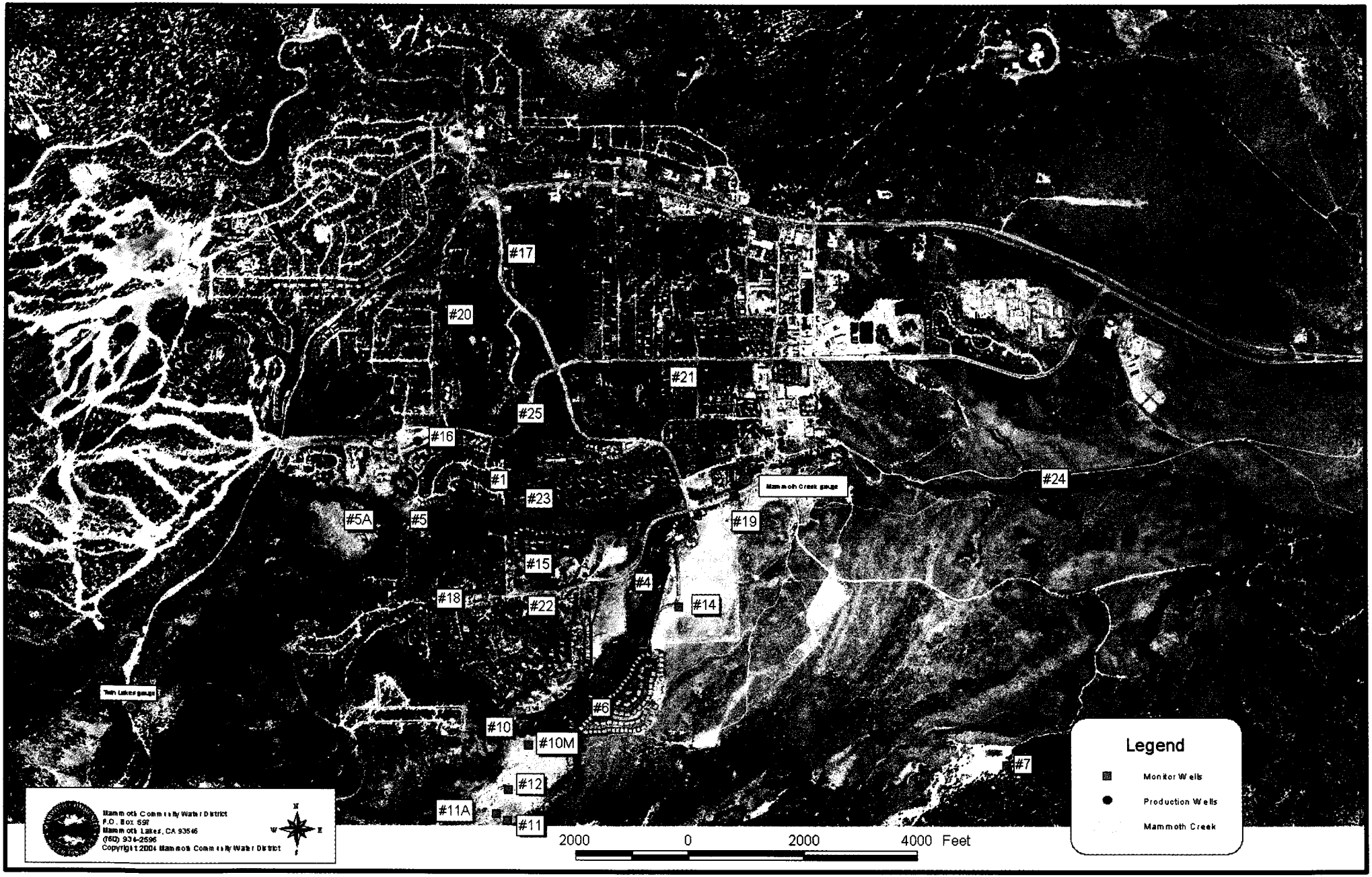
APPENDIX D

URBAN WATER MANAGEMENT PLAN 2005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Mammoth Creek gauge
Twin Lakes gauge
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Legend
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Production Wells
Mammoth Creek