June Lake Public Utility District

2007 Master Water Plan Update

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Section 1
Introduction

The June Lake Public Utility District is located in Mono County, California approximately 300 miles northeast of Los Angeles, California, 145 miles south of Reno, Nevada and 15 miles north of Mammoth Lakes. The District is situated in the June Lake Loop, which is just south of Highway 395 at Highway 158. The June Lake Loop is an area of great natural beauty lying immediately east of the main divide of the Sierra Nevada at an average elevation of approximately 7,600 feet. The area consists of a string of lakes of which Silver Lake, Gull Lake and a portion of June Lake are located within the District's boundaries. June Mountain is located southeast of June Lake and reaches a height of 10,125 feet. The key elements of the Loop area are the surrounding mountains, and the system of creeks and lakes, which form a unique natural environment within the Sierras. This environment provides an ideal setting for both summer and winter vacationers.

High summer temperatures generally vary between 60°F. and 80°F. Winter temperatures may drop as low as -30°F. Precipitation occurs mainly during the later part of winter and generally increases with altitude. Summer showers occur infrequently and are usually of short duration. Winter storms are commonly regional in nature, whereas summer storms occur as localized thunderstorms in the mountains.

The June Lake Public Utility District's boundaries include an area of approximately 1,720 acres of unincorporated residential, commercial and undeveloped land. (See Figure 1.) The District provides water to distinct areas within the District's boundaries; the Village, West Village and Down Canyon. In addition, the District provides water to areas outside the District; Pine Cliff, Oh! Ridge, and June Lake Junction.

The District's economy is based almost entirely on personal services, recreational facilities and transient accommodations. June Lake Village functions as a shopping and service center to permanent residents, ski enthusiasts and other visitors to the June Lake area. Down Canyon facilities are oriented towards permanent residences and resort vacationers.

The initial development of the June Lake Loop, known as The Village, occurred in the 1930's and grew slowly and without any specific plan or goal until the implementation of the June Lake Loop General Plan in 1974.

The June Mountain ski area was completed in 1960 and until that time all development within the community centered around summer recreational uses and consisted primarily of Forest Service summer home tracts, campgrounds, permanent and semi-permanent residences and commercial resort facilities. The conversion of the area to a summer/winter resort increased the number of recreational visitors to the area and created additional pressure on the natural and man-made environment of the area.

In April of 1990, the June Lake Public Utility District acquired the Down Canyon water system from the Williams Tract County Water District. This area is primarily oriented to seasonal and year-round homes and to support commercial and recreational uses for the June Lake Loop.

The 27 homes located along the east side of Silver Lake connected to the Down Canyon water system in 1991. Silver Lake Meadow, south of Silver Lake, is significantly limited in development potential due to its protected wetlands.

There are two separate water systems in the District. The Village system is the older of the two. The Down Canyon system is the second water system. There is no pipeline connection between the two systems and the two systems rely on different water sources.

Water for the Village system is provided from a diversion dam at Snow Creek and the intake facility in June Lake. The original construction of the Village water system was in the 1940's, including the Snow Creek diversion facility. In 1978, the existing Snow Creek facilities were upgraded, including the construction of a treatment building with filters, chlorinator and turbidimeter. The June Lake treatment facilities, including a filtration plant, lake intake and storage tank, were constructed in 1972. The June Lake treatment facilities were replaced with a membrane filtration system in 2004. In 1983, a sedimentation basin was added to the Snow Creek diversion facility and two years later an 8-inch ductile iron transmission line was installed between the diversion facility and the Snow Creek plant. A new Snow Creek treatment plant, including a storage tank, was constructed in 1989. Sections of the distribution system throughout the Village system have been upgraded over the years including 1,200 feet of 10-inch water line in Hwy 158 (Main Street Village proper). An Assessment District was formed for the West Village area in 2001

with the construction of approximately 1,800 feet of pipeline, a booster pump station and storage tank in 2002.

The Down Canyon system is provided with water from diversions in Fern Creek and Yost Creek and has two water treatment plants; Peterson water treatment plant and Clark water treatment plant. Each have their own storage tanks. The Peterson facility was built in 1986 and the Clark facility was built in 1988. The June Lake Public Utility District annexed the system in 1990.

The District initiated a water meter installation program in 2002. All new construction is required to install a water meter per District specifications as part of their permit to connect to the public water system. The District is currently installing meters for their existing users and plans to have all users metered by 2008.

The following is an outline of the items discussed in the Report.

- Description of present and projected land use in the District's service area.
- Outline of present and past District water usage and estimates of future water usage based on the land use projections.
- Description of the existing District facilities.
- Proposed system improvements needed to meet future demands along with estimated capital costs.

Section 2
Land Use

Private development of land within the District's boundaries are centered around key areas; June Lake Village, West Village, June Mountain Base, Upper Gull Lake, Down Canyon, and Silver Lake Meadows.

The District provides water to approximately 74 developed acres within the Village system, which includes June Lake Village, West Village, Oh! Ridge, Pine Cliff and June Lake Junction. The District also provides service to approximately 113 developed acres in the Down Canyon System, which includes Down Canyon and Silver Lake Meadow.

The existing land use in June Lake Village consists of commercial and residential developments. The total land available for development within June Lake Village is about 70 acres, the majority of which is subdivided into 50 x 100 foot parcels. Potential for June Lake Village development is limited by small lot sizes and fragmented ownership along with steep slopes and avalanche zones. Approximately 14 acres of the 70 acres within June Lake Village are still available for development.

The West Village/Rodeo Grounds area is mainly undeveloped with planned future development for resident and second homeowner housing, recreational facilities, open areas, and commercial nodes providing hotels, convention facilities, restaurants, etc. This area currently has approximately 18 acres of developed land while 127 acres remain undeveloped. Forty acres front an 11-acre central open-space corridor, which is under laid by a fault zone. This area can be used for residential development, but must have a minimum setback of 100 feet from the fault trace and development may not exceed one story. Approximately 9 acres are limited by overhead power transmission line easements and designated for open area or recreational uses. With the re-routing of the power lines, this designation could be changed. Other land in the West Village is designated for commercial uses.

Pine Cliff/Oh! Ridge is presently used for recreational camping, gravel mining and processing operations. Future development of the available 20 acres will require obtaining National Forest lands or special use permits.

Down Canyon, which is comprised of single-family year-round and seasonal homes, covers 163 acres. Of the 163 acres, 65 acres are still

available for development. The development in the Down Canyon area is hindered by steep slopes, protected wetlands, and high groundwaters.

Silver Lake Meadow provides tourists the opportunity to enjoy mountain resorts and spas. This rustic area has a developable area of approximately 90 acres, of which 75 acres are not yet developed. Development in Silver Lake Meadows is limited by strict federal wetland development guidelines. Current owners of this private property are working with the USFS to exchange the 75 acres for other property in June Lake. Therefore, the 75 acres is not included in Table 1 below.

The presently developed and potential future developable acreage within each of the five "neighborhoods" in the District are indicated in Table 1.

Table 1
Developable Areas

Development	Present Development (Acres)	Future Development (Acres)	Total (Acres)
The Village System			
Village	56	14	70
West Village/Rodeo Grounds	18	127	145
Pine Cliff/Oh! Ridge	-	20	20
Totals – Village	**74**	**161**	**235**
The Down Canyon System			
Down Canyon	98	65	163
Silver Lake Meadows	15	0	15
Totals – Down Canyon	**113**	**65**	**178**
GRAND TOTALS	**187**	**226**	**413**

Section 3
Water Demands

Historical Water Demands

June Lake Public Utility District is supplied by four sources; the Snow Creek water treatment plant, the June Lake Water Treatment Plant, the Peterson Water Treatment Plant, and the Clark Water Treatment Plant. The Village System utilizes the Snow Creek and June Lake Plants while the Down Canyon system utilizes the Peterson and Clark Plants. Table 2 indicates the total water supplied to the system by each plant for years 1990 through 2006.

Table 2
June Lake Public Utility District
Annual Water Production
Million Gallons (MG)

Year	Peterson	Clark	Total Down Canyon	June Lake	Snow Creek	Total Village	Grand Total
1990	15.2	15.1	30.3	6.1	65	71.1	101.4
1991	17.7	20.2	37.9	10.2	59.8	70	107.9
1992	20.5	19.8	40.3	8.8	43.1	51.9	92.2
1993	23.8	31.9	55.7	12.4	42.6	55	110.7
1994	25.5	42.6	68.1	8.7	44.8	53.5	121.6
1995	23.6	35.9	59.5	8.1	41.7	49.8	109.3
1996	22.7	39.1	61.8	9.5	48	57.5	119.3
1997	30.1	33.5	63.6	4.3	48.9	53.2	116.8
1998	26.1	33.1	59.2	1.6	48.6	50.2	109.4
1999	32.2	37.7	69.9	4.0	48.5	52.5	122.4
2000	29.6	50.5	80.1	4.2	49.8	54	134.1
2001	36	51	87.0	2.9	56.1	59	146.0
2002	33.5	58	91.5	3.8	60.1	63.9	155.4
2003	28.4	47.9	76.3	5.7	49.8	55.5	131.8
2004	34.5	38.7	73.2	6.0	40.6	46.6	119.8
2005	21.2	39.8	61.0	16.0	50.0	66.0	127.0
2006	22.8	36.4	59.2	10.3	54.7	65.0	124.2

Tables 3 and 4 show the average day demand in gallons per day for each month for the years 1992-2006 in the Village System and Down Canyon System.

Table 3
Village Water System
Average Day Water Demand by Month
Gallons Per Day (gpd)

Year	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVG
1992	125,885	122,236	93,471	134,520	194,158	210,200	291,436	239,306	174,150	111,337	81,365	91,702	155,814
1993	110,918	102,205	89,260	195,249	222,397	199,657	242,032	266,906	191,737	111,190	105,802	106,146	161,958
1994	98,268	113,922	100,981	108,907	136,210	199,470	242,394	254,571	178,587	140,202	142,017	136,244	154,314
1995	66,871	91,282	83,995	113,256	149,155	184,363	186,509	225,389	206,683	127,584	89,035	111,096	136,268
1996	107,194	111,499	102,802	101,275	181,454	194,933	257,256	280,757	224,136	166,997	81,101	77,774	157,265
1997	113,299	97,891	90,936	112,766	195,221	193,075	233,611	263,923	168,366	107,712	77,861	90,677	145,445
1998	88,877	99,029	94,550	96,840	104,400	150,365	231,422	269,323	186,163	129,032	89,689	108,000	137,308
1999	99,129	105,107	80,194	102,100	144,889	197,877	283,277	219,942	180,867	129,935	80,567	95,388	143,273
2000	97,645	104,379	99,419	110,400	166,926	194,140	265,229	245,781	185,837	136,190	80,033	85,903	147,657
2001	109,161	117,214	101,000	107,800	162,709	220,650	244,435	272,290	201,243	187,683	100,233	110,032	161,204
2002	115,967	135,357	151,967	150,467	182,422	226,083	267,141	294,609	209,593	157,516	98,677	105,387	174,599
2003	109,677	107,143	103,226	110,000	168,065	233,000	248,065	237,742	182,333	155,290	77,333	87,165	151,587
2004	84,677	68,179	75,226	93,667	130,548	197,333	197,548	179,323	159,000	107,065	89,533	144,677	127,231
2005	118,356	104,612	88,650	107,761	177,770	290,699	356,094	311,462	253,750	175,032	100,843	117,842	183,573
2006	125,444	116,919	101,121	99,267	189,910	270,423	282,765	303,496	256,385	164,648	99,803	116,397	177,215
AVG	104,758	106,465	97,120	116,285	167,082	210,818	255,281	257,655	197,255	140,494	92,926	105,629	154,314

As noted in the 1983 Master Water Plan, the Village System's average water demand was approximately 230,000 gpd for the years between 1975 and 1982. In 1992, the average water demand dropped to approximately 156,000 gpd and has consistently remained in this region for the years following up to 2004. The drop off can be attributed to the replacement of 600 feet of very old, severely corroded 4-inch diameter pipeline off Lyle Terrace in June 1991. This line serves the lower Gull Lake campground and cabins and ties into the 8-inch main from the Snow Creek Plant. The increase in the average water demand for 2005 is thought to be attributed to the replacement of both production meters at the June Lake and Snow Creek Water Treatment Plants.

As shown in Table 3, the Village water demands vary substantially not only from month to month, but from year to year. The average demand for the Village area over the 15 year period was 154,000 gpd. The maximum month (August) average demand varied considerably also, but 258,000 gpd is a reasonable value for purposes of this report.

Table 4
Down Canyon Water System
Average Day Water Demand by Month
Gallons Per Day (gpd)

Year	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVG
1992	99,360	93,600	72,000	84,960	116,677	150,517	158,400	169,920	129,600	87,901	82,080	95,040	111,671
1993	102,240	93,600	86,400	128,160	129,600	171,360	216,000	334,080	190,080	123,840	115,200	110,880	150,120
1994	119,520	133,920	129,600	126,720	172,800	311,040	309,600	319,680	292,320	123,840	110,880	128,160	189,840
1995	115,574	110,995	101,203	170,280	157,435	194,213	261,763	278,496	221,918	152,568	96,106	92,376	162,744
1996	99,288	112,075	101,347	118,656	156,240	222,948	281,261	298,843	233,568	159,235	126,101	117,432	168,916
1997	116,770	118,210	121,320	153,144	218,203	212,515	275,818	304,718	218,707	140,659	95,400	109,627	173,758
1998	105,163	108,551	118,699	180,317	134,395	169,315	285,494	306,677	183,974	125,681	97,830	123,929	161,669
1999	128,526	117,311	123,006	174,940	194,723	272,907	356,948	317,242	221,453	145,610	112,330	125,223	190,852
2000	130,839	122,183	115,345	140,930	216,109	311,863	399,138	403,658	308,476	209,851	132,103	131,332	218,486
2001	140,896	141,846	129,764	218,553	293,074	353,256	350,016	389,706	285,306	261,316	150,136	141,329	237,933
2002	145,003	235,139	198,987	147,247	298,600	360,103	427,087	426,003	333,063	165,448	120,936	147,716	250,444
2003	159,678	139,286	124,516	139,000	179,355	314,333	386,452	352,258	291,000	208,387	97,667	110,577	208,542
2004	109,432	108,343	100,616	123,453	258,210	286,370	301,910	315,232	284,790	234,494	171,067	107,223	200,095
2005	116,935	115,046	108,723	112,267	144,742	243,867	292,445	284,919	222,703	151,577	97,810	106,958	166,499
2006	112,168	110,664	100,026	112,350	162,990	243,417	275,852	274,952	228,683	146,168	82,420	89,935	161,635
AVG	120,093	124,051	115,437	142,065	188,877	254,535	305,212	318,426	243,043	162,438	112,538	115,849	183,547

The Down Canyon water demands (Table 4) vary substantially also. For purposes of this report, the present average day demand for the Down Canyon area appears to be on the order of 184,000 gpd. The maximum month (August) average day appears to be about 318,000 gpd.

The data in Tables 3 and 4 show that (1) the demand for any one month is subject to a wide variation, and (2) the total annual water demand varies from year to year.

Water demand in the Village and Down Canyon Systems are greatly affected by the number of visitors to the area. The water demands of the permanent population constitute a relatively small portion of the total water demand.

June Lake Loop's popularity as recreation and vacation areas directly affects its water demands. The average daily demand peaks during the summer and winter seasons and tapers off between summer camping and winter skiing. Figures 2 and 3 show graphically the monthly water demand variations for years 1992 through 2006 for both the Village and the Down Canyon Systems. The range in demand for each month (shaded area) was taken from the values in Tables 3 and 4. The "average water demand per month" indicated on Figures 2 and 3 is the arithmetic average of the years of record for each particular month. Large variations over these years in water consumption has occurred in both the Village and Down Canyon Systems. Several factors key into this. First, weather conditions affect the livelihood of the recreational area. During dry years, less snow and water are available. Second, the number of tourists that vacation in the District varies from year to year. Travel is based on the nation's economy. When the economy is good, June Lake will receive more tourists. Last, the Down Canyon System has been expanding since its annexation in 1990. In 1993, the Silver Lake Resort began receiving water from the June Lake Public Utility District. In 1999, the Double Eagle Resort and Spa was built and began receiving water from the District.

Besides serving the Village and Down Canyon Systems, the June Lake Public Utility District has agreements with the U.S. Forest Service (USFS) to provide water to several campgrounds, residences and businesses. These campgrounds include June Lake, Upper Gull Lake, Lower Gull Lake and Silver Lake Campgrounds, which are all within the District's boundaries. In addition, the District provides water to the Oh! Ridge Campground and Pine Cliff Resort (USFS lease), which are north of June Lake and outside of the District. These campgrounds, Silver Lake and Pine Cliff Resorts, and businesses are normally open from about May 1 through November 1 of each year.

The volume of water consumed by each campground is unknown. District recently received approval from the USFS to install meters at each of the campgrounds. Meters will be operational for the 2007 season. Therefore, the water used at all of the USFS properties are included in the Village and Down Canyon consumption figures.

In 2002, the District started a meter installation program. This is a 5 to 7 year in house project and currently approximately 300 meters have been installed.

Approach to Estimating Future Water Demands

The June Lake Public Utility District's water consumption is difficult to predict accurately. The variation in tourist population on a week-to-week basis and the small permanent population along with weather conditions and the economy all contribute significantly to the oscillating water consumption of the two systems. Tables 3 and 4 and Figures 2 and 3 demonstrate the variability of the water demand by month and year. Therefore, rather than correlate the water demands with population (and/or visitors), a more reasonable approach may be to estimate water demands on an area basis.

Based on the data in Tables 3 and 4, the Village System's Average Day Demand over the fifteen years is approximately 154,000 gpd and Down Canyon System's Average Day Demand is approximately 184,000 gpd. The Maximum Month Average Day Demand for the Village and Down Canyon Systems are approximately 258,000 gpd and 318,000 gpd, respectively. Using the estimated developed land from Table 1; the estimated demand per acre can be determined for the Village System and Down Canyon System as shown in Table 5. The Village System also includes the allotment to the USFS. The District's precise consumption cannot be calculated since the USFS water is not metered.

Table 5
Estimated Present Water Demands
The Village System/Down Canyon System

	Total		Per Acre	
	gpd	gpm	gpd	gpm
The Village System (74 acres)				
Average Day	124,000	86	1,676	1.2
Maximum Month Average Day	208,000	144	2,811	1.9
Down Canyon System (113 acres)				
Average Day	171,000	119	1,513	1.1
Maximum Month Average Day	295,000	205	2,611	1.8

Estimated USFS water usage reduced Village by 19.28% and Down Canyon by 7.15%

Estimating Future Domestic Water Demands

Forecasts of the future water demands can be based on the consumption per acre figures in Table 5 and the projected buildout acreage. Inherent in this method of predicting future water demand is the assumption that the type of future development will be like that of the present development. Table 6 shows the estimated future demands for both the Village system and the Down Canyon system. Buildout excludes Pine Cliff/Oh! Ridge. This location is a campground site that will not consume a significant amount of water.

In previous Master Water Plan (MWP) updates it was thought that the proposed Rodeo Grounds development merited special discussion, except that the proposed land uses for the Rodeo Grounds (90 acres) has changed several times since 1999 (first MWP update since 1983). In 2006, ECO:LOGIC Consulting Engineers prepared for Mono County, Community Development Department a June Lake P.U.D. Water Resource Assessment and updated projection of water demands to assist with the analysis of the Rodeo Grounds Development. This report projected water demand for the Rodeo Grounds Development to be 33.37 million gallons per year (MGY) based upon current proposed land uses (499 mixed density units). Thus, for the purposes of this update, the Rodeo Grounds 90-acre parcel will be included in Table 6, the Village System data based on 215 acres (125 acres plus 90 acres).

Even though estimated water demands are expected to peak only for a few days per year, all the water systems (sources, treatment, distribution, and reservoirs) are still required to meet the demands.

Table 6
Estimated Buildout Water Demands
The Village System/Down Canyon System

	Total		Per Acre	
	gpd	gpm	gpd	gpm
The Village (215 acres)*				
Average Day	360,340	250	1,676	1.2
Maximum Month Average Day	604,365	420	2,811	1.9
Down Canyon (178 acres)				
Average Day	269,314	187	1,513	1.1
Maximum Month Average Day	464,758	323	2,611	1.8

*Excludes Pine Cliff/Oh!Ridge

Fire Flows

The "design" fire flow demands for the Village System and Down Canyon System are shown on Figures 4 and 5. Table A-III – A-I "Minimum Required Fire Flow and Flow Duration for Buildings" in the 2001 California Fire Code (CFC) lists the minimum fire flow requirements. Both water systems service Type V building types, which is the type of construction typically found in residences and small commercial buildings. The recommended fire flows for a Type V building are between 1,500 gpm and 2,750 gpm for a duration of 2 hours for structures up to 11,300 square feet (sf). However, Section 4.1 of the CFC provides a fire flow of 1,000 gpm for one- and two-family dwellings up to 3,600 sf.

The Village System, shown on Figure 4, is proposed to have a design fire flow demand of 1,500 gpm for 2 hours in the commercial area along Boulder Drive, the corridor between Bruce Street and Alderman Street, and the Interlaken Condo area in West Village. The June Lake and Gull Lake campgrounds design fire flow demand is proposed to be 500 gpm for 2 hours and the remainder of the developed area is proposed to have a design fire flow of 1,000 gpm for 2 hours.

The Down Canyon System, shown on Figure 5, is proposed to have a 1,500 gpm design fire flow demand for 2 hours for the commercial

area along Boulder Drive and for the resort area adjacent to Dream Mountain Drive. The remainder of the Down Canyon area is proposed to have a 1,000 gpm design fire flow demand for 2 hours.

Conclusion

Table 7 shows that the estimated future normal water demands for the June Lake Public Utility District are less than the proposed design fire flows for both the Village and Down Canyon Systems.

Therefore, the distribution system pipe sizes needed are governed by the need to meet fire flow demands rather than normal domestic demands.

Table 7
Estimated Future Water Demands

	Normal Demand		Fire Flow	
	Avg. Day gpm	Max. Day gpm	Commercial gpm	Residential gpm
Village	249	420	1,500	1000
Down Canyon	187	323	1,500	1000

Section 4
Present Water System

The following description of the existing facilities is divided among four main components; water sources, treatment facilities, reservoirs and distribution systems.

Water Source

Surface water from creeks and June Lake are the current sources of water. The Village System is supplied by June Lake and Snow Creek (Twin Springs). The Down Canyon System is supplied by Yost Creek and Fern Creek. Tables 8 and 9 indicate the existing diversion rights for June Lake Public Utility District and the U.S. Forest Service.

Table 8
Diversion Rights
The Village System

A=Application P=Permit L=License	Applicant	Source	Diversion Right Flows			
			cfs	gpd	MGY	Ac-Ft
Riparian 10963	USFS (Inyo Nat'l Forest)	June Lake	0.0062	4,000	1.46	2
A27239; P19656	JLPUD	June Lake	0.4	259,000	94.36	290
A14059; L5355	U.S. Inyo National Forest	June Lake, Twin Springs Creek	0.01	6,500	2.37	7.3
A6242; L2056 (5/1 thru 10/31)	U.S. Inyo National Forest	June Lake, Twin Springs Creek	0.013	8,615	1.58	4.9
A28124; P19658	JLPUD	June Lake	0.293	189,000	69.12	212
Total – June Lake			**0.7222**	**467,115**	**168.89**	**516.2**
A16687; L6020	June Lake Public Utility District	Twin Springs Creek, June Lake	0.047	30,400	11.09	34
A27220; P19655	June Lake Public Utility District	Twin Springs Creek (Snow Cr)	0.4	259,000	94.36	290
A9907; L5354	U.S. Inyo National Forest	Twin Springs Creek, June Lake	0.163	105,400	38.44	118
A28123; P19657	June Lake Public Utility District	Snow Creek (Twin Springs)	0.293	189,000	69.12	212
Total – Snow Creek			**0.903**	**583,800**	**213.01**	**654**
*** GRAND TOTAL**			**1.6252**	**1,050,915**	**381.9**	**1,170.2**
*** ADJUSTED TOTAL**			**0.93**	**594,566**	**217.02**	**666.0**

cfs = cubic feet per second gpd = gallons per day MGY = million gallons per year Ac-Ft = Acre-Feet per year

* The total amount of water that can be diverted under Applications 16687, 27220, 27239, 28123 and 28124 shall not exceed 0.74 cfs for a total of 536 acre-feet/annum. Plus 130 acre-feet of appropriative rights held by the USFS-Inyo National Forest for a grand total 666 acre-feet per year.

Table 9
Diversion Rights
Down Canyon System

A=Appliction P=Permit P=Permit L=License	Applicant	Source	Diversion Right Flows			
			cfs	gpd	MGY	Ac-Ft/Yr
A017120; L010837	June Lake Public Utility District	Fern Creek (Clark)	0.02	13,000	4.74	4.2
A020349; L010838	June Lake Public Utility District	Fern Creek (Clark)	0.023	15,000	5.48	4.9
A028609; P021185	June Lake Public Utility District	Fern Creek (WTCWD)	0.3	194,000	70.81	150
		Total – Fern Creek	**0.343**	**222,000**	**81.03**	159.1
A011892; P007350	June Lake Public Utility District	Yost	0.096	62,000	22.63	69
A012060; P007352	June Lake Public Utility District	Yost	0.13	84,000	30.66	94
		Total - Yost	**0.226**	**146,000**	**53.29**	163
A005425; L002039	June Lake Public Utility District	Williams	0.005	3,000	1.1	3.4
A09432; L004358	June Lake Public Utility District	Williams	0.025	16,000	5.84	18
A026192; P018199	June Lake Public Utility District	Williams	0.03	19,000	6.94	21.7
		Total - Williams	**0.059**	**38,000**	**13.87**	43.1
		TOTAL	**0.628**	**406,000**	**148.19**	365.2

The average water use from January 1 to December 31 under Applications 5425, 9432, 11892, 12060, 17120, 20349, 26192 and 28609 cannot exceed 65 gpd/capita based on agreement with Los Angeles DWP.

Although each source is separated in Table 9, the "place of use" for application numbers 17120, 20349, 28609, 11892, 12060, 5425, 9432 and 26192 in the Down Canyon System were amended to read the "Down Canyon Water Service Area". This allows all diversion rights to be included into the entire Down Canyon system. The permits can be found under the State of California, State Water Resources Control Board, Division of Water Rights Order. The Village System's

diversion rights shown in Table 8 list the "place of use" to be within the entire June Lake Public Utility District boundaries (the entire Village System). These permits can be found under the State of California, State Water Resources Control Board, Division of Water Rights, Permit for Division and Use of Water for applications 16687, 27220, 27239, 28123, 28124, 6242, 9907 and 14059.

Potential Water Source

In September of 1988, a groundwater test well was drilled at the Snow Creek plant to a depth of 440 feet. Based upon pump tests, Kenneth D. Schmidt and Associates estimated a potential yield of a completed well between 100 and 150 gpm. Inorganic water analysis conducted by BC Laboratories indicated a very soft water meeting current water quality standards. The well was not completed.

Water Quality

The water quality tests of the sources in the June Lake Public Utility District indicate that the water is low in hardness and alkalinity, averaging 35-54 mg/L for all four sources. The water could be corrosive because it is low in dissolved minerals. However, lead and copper concentrations measured in conformance with the Lead and Copper Rule were within allowable concentrations. In general, the water is of very good quality from a mineral standpoint with no measured constituents approaching the maximum contaminant level (MCL).

Organic chemical analyses were performed on the June Lake, Snow Creek, Clark, and Peterson systems in 2005 along with Trihalo-methane (THM) and MTBE. Organic chemical contaminants include synthetic and volatile organic chemicals that are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban runoff, and septic systems. All test results resulted in nothing being detected in the Village or Down Canyon systems.

Water Treatment Facilities

June Lake Public Utility District currently utilizes four surface water treatment plants to provide drinking water to their residents. Water is supplied to these facilities from local creeks and June Lake, which, in turn, are fed from mountain glaciers, surface runoff and springs. All

four treatment plants were retrofitted with remote access control system. In 2005, SCADA (Supervisory Control And Data Acquisition) systems were set up at all four water plants. District staff can now access and remotely make changes to the treatment processes at each of the water plants from the District office.

Village System

The Village System receives water from the June Lake Treatment Plant and Snow Creek Treatment Plant. While the Snow Creek Treatment Plant supplies water year round, the June Lake Treatment Plant is used in the summer to meet peak demands and is on standby in the winter. Both plants are a redundant source for each other should either plant fail to meet the system demands.

June Lake Plant

The June Lake Treatment Plant (JLTP) is supplied by raw surface water obtained from June Lake. The intake pipeline is submerged approximately 70 feet below the lake high water level. Water must be pumped up to the treatment plant. Water is then treated and pumped to the 225,000 gallon June Lake tank located above the treatment plant at a base elevation of 7,896 feet. (See Figure 6.)

The June Lake plant is currently rated at 200 gpm (288,000 gpd) and utilizes membrane filtration. This facility was upgraded from its original direct filtration to a membrane filtration system in 2004. This new plant may be expanded to 400 gpm (576,000 gpd).

Disinfection is provided with a liquid chlorination system. The chlorination facility feeds chlorine into the water in order to maintain a 1 mg/L residual.

The June Lake plant does not have standby power capability.

Snow Creek Plant

The Snow Creek Treatment Plant, the Village System's main source, is supplied by raw surface water obtained from Snow Creek via a diversion pipe approximately one mile long. Pressure in the raw water pipe is sufficient to operate the treatment plant by gravity and deliver the water to a 376,000 gallon treated water storage reservoir located adjacent to the Snow Creek plant.

The Snow Creek plant is a Culligan direct filtration plant and has a rated capacity of 230 gpm (331,000 gpd). The facility incorporates two pressure flocculators and two dual media pressure filters. Each filter is 7 feet in diameter. These units are plumbed as two parallel trains with a flocculator and filter operated in series within each train. When a filter is taken off line for backwashing, the companion flocculator must also be taken off line. The capacity of the plant is limited to 230 gpm because the filtration rate for treating surface water is limited to 3 gpm/sq. ft. with pressure units.

Disinfection is provided with a gas chlorination facility located adjacent to the treatment plant. The chlorination facility normally feeds 1.0 mg/L of chlorine into the water, which results in 2-3 pounds of chlorine per day being consumed.

Backwash supply water is pumped from the 376,000 gallon treated water reservoir to the treatment plant at a rate between 400 and 550 gpm.

Snow Creek plant has a standby generator with automatic startup capability to start on loss of power from the local utility. The generator can operate the water treatment plant systems and keep the plant operational for up to one week or longer if refueled.

Down Canyon

The Down Canyon system receives water from the Peterson Treatment Plant and Clark Treatment Plant. Both plants operate year round supplying water to their respective service areas and are a redundant source for each other should either plant fail to meet it's system demands.

Peterson Plant

The Peterson Treatment Plant provides water to its' respective service area year round. The Peterson plant is supplied with surface water from Yost Creek. The pressure in the raw water pipe is sufficient to operate the treatment plant by gravity and deliver the water to the distribution system via a 225,000 gallon treated water storage reservoir.

The Peterson Treatment Plant incorporates a two-stage horizontal pressure flocculator and four dual media pressure filter chambers. The capacity of the plant is limited to 100 gpm (144,000 gpd) with all four filters on line. Surface water treated with direct filtration utilizing dual media pressure filters is limited to 3 gpm/sq. ft.

Backwash is provided by treated water from the other three filters, which remain in operation during backwash cycles. The backwash rate is approximately 300 gpm.

Disinfection is provided with a gas chlorination facility located adjacent to the treatment plant. The chlorination facility normally feeds 1.0 mg/L of chlorine into the water, which results in 1-2 pounds of chlorine consumption per day.

The Peterson Treatment Pant has a standby generator with manual startup capability. The generator can keep the plant operational for up to one week or longer if refueled.

Clark Plant

The Clark Plant is supplied with raw water obtained from Fern Creek via a diversion structure. The diversion structure is located high enough above the treatment plant to deliver, by gravity, treated water to the 426,000 gallon reservoir.

The Clark Plant is a direct filtration plant with a rated capacity of 210 gpm (302,000 gpd). The facility incorporates a two-stage horizontal pressure flocculator. The flocculator has a chamber baffle, but no rock media. There are also four dual media pressure filter chambers.

Backwash supply is provided by treated water from the other three filters, which remain in operation during backwash cycles.

Disinfection is provided with a gas chlorination facility that is located adjacent to the treatment plant. The chlorination facility normally feeds 1.0 mg/L of chlorine into the water, which results in 2 pounds of chlorine consumption per day at peak flow.

The Clark Plant has a standby generator with manual startup capability. The generator can keep the plant operational for up to one week or longer if refueled.

Reservoirs

June Lake Public Utility District operates five storage facilities. The June Lake Tank, West Village Tank, and Snow Creek Tank are reservoirs for the Village System and the Clark Tank and the Peterson Tank are reservoirs for the Down Canyon System.

Village Reservoirs

June Lake Tank

The June Lake Tank, constructed in 1972, is the backup storage facility for the Village System and the primary provider for the Oh! Ridge campground. The tank is located south of Hwy. 158 and Hillside Drive and has a base elevation of 7,896 feet. The welded steel reservoir has a height of 24 feet and a diameter of 40 feet. The nominal capacity is 225,000 gallons and is supplied by the June Lake Water Treatment Plant. The treated water is pumped by two booster pumps through a 6-inch pipeline to Hwy. 158, then valved into the 4-inch drain line to feed the reservoir. The reservoir achieves the needed disinfection contact time to meet CT (disinfectant chemical [chlorine] concentration [C] times "contact time" [t]) requirements. Water is then fed to the distribution system via the 6-inch line from the reservoir to Hwy. 158. Water can also flow directly into the distribution system from the June Lake plant through approximately 1,200 ft of 6-inch pipe that bypasses the reservoir if the 6-inch valve to the system is open, but it is normally closed. Water that flows through this line bypasses the June Lake reservoir and does not appear to have sufficient disinfection contact time necessary for the 1.0 log giardia inactivation required with membrane filtration.

West Village Tank

The West Village Tank was constructed in 2002 and is the West Village's main storage facility. The reservoir, located northeast of North Shore Drive has a base elevation of 7,920 feet. The bolted steel tank is 16 feet in height and 60 feet in diameter. The nominal capacity is 300,000 gallons and receives treated water from a 10-inch water main and pump station located on Leonard Avenue.

Snow Creek Tank

The Snow Creek Tank, constructed in 1989, is the Village System's main storage facility. The reservoir, located adjacent to the Snow Creek Water Treatment Plant, has a base elevation of 7,780 feet. The bolted steel tank is 40 feet in height and 40 feet in diameter. The nominal capacity is 376,000 gallons and receives treated water from the Snow Creek Water Treatment Plant by gravity flow. The treated water receives sufficient contact time in the Snow Creek Tank and 3,000 feet of treated water pipeline (before the first service) to meet CT requirements.

Down Canyon

Peterson Tank

The Peterson Tank, constructed in 1986, is located off Mono Drive. The tank has a base elevation of 7,750 feet, a height of 24 feet and a diameter of 40 feet. This 225,000 gallon steel tank is supplied by the Peterson Water Treatment Plant, located 1,000 feet away, through gravity flow. The chlorine dosage recorded for the Peterson Plant allows the plant to meet CT requirements.

Clark Tank

The Clark Tank, constructed in 1988, is located near Boulder Drive and Iowa Street. The welded steel tank has a base elevation of 7,630 feet, a height of 24 feet and a diameter of 55 feet. This 426,000 gallon steel tank is supplied by treated water from the Clark Water Treatment Plant through gravity flow. The pipe configuration and treated reservoir appear to have sufficient disinfection contact time necessary for 1.0 log giardia inactivation.

Distribution Systems

Village

The Village Distribution System is a fairly old system. Much of the pipes date back to the late 1930's. It is comprised of approximately 47,000 feet of pipeline ranging in size from 1-inch to 10-inches in diameter (See Figure 6). The system infrastructure is made up of ductile iron and steel pipeline. A major improvement was made to the Village distribution system in 2001 with the construction of 1,100 feet of 10-inch water main in Boulder Drive from Knoll Avenue to Gull Lake Road along with several minor pipeline repairs, replacements and pipeline additions to keep up with growth demands.

Down Canyon

The Down Canyon System is a relatively new system. It is comprised of approximately 42,000 feet of pipeline ranging in size from 1-inch to 10-inches in diameter (See Figure 7). The system infrastructure is made up of ductile iron and steel pipelines. No major improvements have been made to the Down Canyon distribution system; however, minor pipeline repairs and pipeline additions have been made to keep up with growth demands.

Section 5
Water System Evaluation

Section 3 of this report presented data on historic and projected water demands. Section 4 discussed the present water system including water rights, treatment plant capacities, etc. This section of the report is an evaluation of the existing water system's capabilities to meet the estimated present and future water demands. Each of the four major components of a water system is discussed; water source, treatment, storage, and distribution.

Present Water Demands

Water Source

June Lake Public Utility District has four water sources; June Lake, Snow Creek (Twin Springs), Yost Creek, and Fern Creek. The existing water rights for each of these sources were shown in Table 8 and Table 9. The diversion rights for the Village System total approximately 594,566 gpd. Of the 594,566 gpd, the U.S. Forest Service has "lent" 116,057 gpd to supply the campgrounds and owned/leased by individuals on U.S. Forest Service land. The Down Canyon System has acquired a total of approximately 406,000 gpd in diversion rights.

A comparison of the Village System and Down Canyon System Present Diversion Rights (Tables 8 and 9), Maximum Month Average Day Demand (Table 5) and Average Yearly Demand (Tables 3 and 4), are shown in Table 10.

Table 10
Present Demand vs. Diversion Rights

	Maximum Month Average Day Demand (gpd)	Average Yearly Demand		Diversion Water Rights	
		gpd	MGY	gpd	MGY
The Village System	208,000	124,000	45.3	594,566	217.02
Down Canyon System	295,000	171,000	62.4	406,000	148.19

The Village and Down Canyon systems have sufficient diversion rights to meet the Maximum Month Average Day Demand and Yearly Demand.

Treatment Facilities

Table 11 compares the current Maximum Month Average Day Water Demand with the capacity of the treatment facilities.

Table 11
Present Maximum Month Average Day Demand
vs. Treatment Facility Capacity

	Maximum Month Average Day Demand (gpd)	Treatment Facility Capacity (gpd)
The Village System	208,000	
June Lake treatment plant		288,000
Snow Creek treatment plant		331,000
TOTAL	**208,000**	**619,000**
The Down Canyon System	295,000	
Peterson treatment plant		144,000
Clark treatment plant		302,000
TOTAL	**295,000**	**446,000**

The Village System and Down Canyon System have sufficient water treatment facility capabilities to meet the present maximum month average day demand.

Reservoir

Table 12 compares the present capacity of existing storage to that needed. For purposes of determining needed reservoir volume, it was assumed that storage needed equals a single maximum day's demand plus fire flow.

The tank volumes given previously are the gross volumes. In operation, reservoirs are not filled completely full nor completely emptied. To account for this, a "usable" volume of 80% of the gross volume has been assumed in Table 12.

Table 12

Present Reservoir Capacity Needed

vs. Existing Reservoir Capacity

	Storage Needed (gal)	Gross Capacity (gal)	Usable Capacity (gal)	Additional Storage Needed (gal)
The Village System				
June Lake tank		225,000	180,000	
Snow Creek tank		376,000	301,000	
West Village tank		300,000	240,000	
Maximum Month Average Day Demand (gal)	208,000			
Fire Flow*	180,000			
TOTAL	**388,000**	**901,000**	**721,000**	**0**
The Down Canyon System				
Peterson tank		225,000	180,000	
Clark tank		426,000	341,000	
Maximum Month Average Day Demand (gal)	295,000			
Fire Flow*	180,000			
TOTAL	**475,000**	**651,000**	**521,000**	**0**

* The required flow is based on the maximum fire flow of 1,500 gpm for a duration of 2 hours.

As Table 12 shows, the Village System and Down Canyon System have sufficient reservoir capacity for present water demands.

Distribution System

The present distribution system was calibrated and modeled through a water analysis program called WaterCAD. WaterCAD models a system's pipes, reservoirs, pressure reducing valves (PRVs), etc. to determine the velocity and flow through the system. It can determine the maximum fire flow through the pipelines and also where the

pressure is at a minimum when a fire flow is occurring. Since the fire flow demand is much greater than any demand put on the system at one time, this is where the focus of the analysis lies. It should be noted that the WaterCAD system models were updated using the calibrated models from the 1999 Master Water Update.

After modeling the Village System using WaterCAD, the following conclusions were reached:

1. The present system is capable of supplying water to most areas of the system with adequate pressure (above 20 psi) during the maximum month average day demand (142 gpm). It should be noted that the Rodeo Grounds development was not included in the analysis because the proposed Rodeo Grounds storage tank would be located adjacent to the development site with no users in between the tank and the development site. Therefore, the Rodeo Grounds development would most likely not affect the function of the rest of the system.

2. The system includes approximately 16,600 feet of 1 to 3 inch diameter pipelines, which are unable to handle more than 100 gpm.

Pipe Diameter (inches)	Cumulative Length (ft)
1	1,034
2	13,352
3	2,211
4	10,147
6	7,963
8	7,157
10	5,070

3. The volume of the reservoirs is adequate.

4. Improvements are needed to the distribution system in order to meet the design fire flows as shown in Figure 4.

After modeling the Down Canyon System using WaterCAD, the following conclusions were reached:

1. The present system is capable of supplying water to all areas of the system with adequate pressure (above 20 psi) during the maximum month average day demand (210gpm).

2. The system pressure has a tendency to be on the high side (above 100 psi).

3. The system contains very few 1 to 4 inch diameter pipelines, which are unable to maintain flows greater than 100 gpm.

Pipe Diameter (inches)	Cumulative Length (ft)
2	178
4	1,099
6	23,157
8	10,047
10	7,037

4. The existing system is capable of maintaining the recommended fire flows shown on Figure 5 and listed in Section 3.

5. The reservoirs are adequate to meet supply throughout the existing system.

Included as separately bound Appendices to this report, to better illustrate the District's present system, are the following:

- The present pipe and node maps illustrating both the Village and Down Canyon System infrastructure (Figures 6 and 7).
- A fire flow contour map depicting each system's weak points (Figures 8 and 9).
- The hydraulic water analysis results produced by the WaterCAD software (Appendix).

Future Water Demands

Water Sources

Table 13 shows that June Lake Public Utility District's diversion rights available to the Village System may not be adequate to meet maximum month average day demand at buildout (estimate short by 9,800 gpd) . The District is capable of meeting the average yearly demand with their current diversion rights.

Table 13 also shows that the diversion rights available to the Down Canyon System may not be adequate to meet maximum month average

day demand (estimate short by 59,000 gpd) but will be capable of meeting the average yearly demand with their current diversion rights at buildout.

Table 13
Buildout Demand vs. Diversion Rights

	Maximum Month Average Day Demand (gpd)	Average Yearly Demand		Diversion Water Rights	
		gpd	MGY	gpd	MGY
Village System	604,365	360,340	132	594,566	217
Down Canyon System	464,758	269,314	98	406,000	148
Totals	1,069,123	629,654	230	1,000,566	365

In conclusion, the District is capable of meeting the projected average yearly water demands at buildout with their existing diversion rights for both the Village and Down Canyon systems. However, the District will need to monitor the maximum month average demand (gpd) as future development progresses in both the Village and Down Canyon systems.

A potential water demand for snow making at June Mountain has been proposed, however, this will not create a significant demand on the future demands. It is assumed the water demand used in the snow making process will be pumped from a nearby well and be recharged back into the existing water sources. Therefore, the snow making facility is not a factor for future demands.

Treatment Facilities

Table 14 shows the June Lake Public Utility District is able to meet the build out demands of the Village System, however, it is not able to meet the build out demands of Down Canyon.

The deficiency in the Down Canyon System is approximately 19,000 gpd.

Table 14
Buildout Maximum Month Average Day Demand
vs. Treatment Facility Capacity

	Maximum Month Average Day Demand (gpd)	Treatment Facility Capacity (gpd)	Additional Treatment Capacity Needed (gpd)
The Village System	604,000		
June Lake treatment plant		288,000	
Snow Creek treatment plant		331,000	
TOTAL	**604,000**	**619,000**	**0**
Down Canyon System	465,000		
Peterson treatment plant		144,000	
Clark treatment plant		302,000	
TOTAL	**465,000**	**446,000**	**19,000**

Reservoirs

To determine how much additional storage will be needed to meet buildout demands, it was assumed that the total storage volume needed is the sum of the one day's required treatment plant capacity plus fire flow. It was also assumed that the usable volume of a reservoir is 80% of the gross volume.

Table 15 summarizes the results of the calculations. For the Village System an additional gross storage volume of 100,000 gallons (78,000 gallons net) will be needed at buildout. For Down Canyon, an additional gross volume of 200,000 gallons (134,260 gallons net) will be needed.

Table 15
Buildout Maximum Month Average Day Demand
vs. Reservoir

	Storage Needed (gal)	Gross (gal)	Usable Capacity (gal)	Gross Additional Storage Needed (gal)
The Village System				
June Lake tank		225,000	180,000	
Snow Creek tank		376,000	301,000	
West Village tank		300,000	240,000	
Treatment Plant Capacity	619,000			
Fire Flow*	180,000			
TOTAL	**799,000**	**901,000**	**721,000**	**100,000**
The Down Canyon System				
Peterson tank		225,000	180,000	
Clark tank		426,000	341,000	
Treatment Plant Capacity	465,000			
Fire Flow*	180,000			
TOTAL	**645,000**	**651,000**	**521,000**	**200,000**

* The required flow is based on the maximum fire flow of 1,500 gpm for duration of 2 hours.

Distribution System

The Village and Down Canyon distribution systems are generally adequate to meet estimated present demands, but are inadequate to meet the increasing demands as both the Village and Down Canyon develops.

Section 6
Recommended Improvements

Section 5 evaluated the four major components of the District's water system considering the estimated present and future water demands. This section of the report presents recommendations for improvements to both the Village and Down Canyon systems to meet the present as well as the projected future water demands.

Water Source

As shown in Tables 10, theVillage and Down Canyon systems have sufficient diversion rights to meet present demands. However, Table 13 shows that both the Village and Down Canyon systems diversion rights may not be adequate to meet maximum month average day demand at buildout. The Village system may be short 9,800 gpd and the Down Canyon system may be short 59,000 gpd. Both systems are capable of meeting the average yearly demand with their current diversion rights at buildout. The District should monitor their future maximum month average day demands and if necessary acquire more diversion rights.

Treatment Facilities

As shown in Table 14, the Village System water treatment plants are able to meet build out demands. However, the Down Canyon water treatment plants will not be able to meet buildout demands. Down Canyon requires approximately 19,000 gpd (13 gpm). The District should monitor the Down Canyon system's future maximum month average day demands.

To supply the projected maximum day water demand at buildout, the District's water sources (treatment plants) would have to provide:

	Max Day	Capacity	Surplus/(Deficit)
Village	0.604 MGD	0.619 MGD	0.015 MGD
DownCanyon	0.465 MGD	0.446 MGD	(0.019) MGD
Total	1.069 MGD	1.065 MGD	(0.004) MGD

The Village plants would have to operate at 96% of their combined capacity to meet maximum day demand at buildout. However, the Down Canyon plants do not have sufficient capacity to meet the projected day demand at buildout even with both plants operating at

their design capacity. And there are times when Snow Creek water is very turbid, or limited due to low flow, and the District would use just June Lake water. The June Lake plant's capacity is only about 50% of the projected maximum day demand at buildout. Therefore, it is recommended that the District add the 200 gpm expansion membrane filtration skid to the June Lake plant in order to meet the maximum day demand projection.

Specific Recommendations for Existing Water Treatment Plants

In preparing this report, an inspection was made of each of the four existing water treatment plants. Following are recommendations applicable to these plants. There are several "General Recommendations" that apply to all four plants. There are also recommendations presented that apply to specific plants.

General Recommendations

1. Implement a California Accidental Release Prevention (CalARP) Program for the gas chlorine feed system at the treatment plant when the pending requirement is promulgated by the Office of Environmental Health Hazard Assessment (OEHHA). This regulation is not yet in place but is anticipated to be in force sometime in the next 1-2 years.

2. It is recommended to keep all plants operationally ready at all times and periodically run the filters even during the winter when some plants are not used.

3. If corrosion protection is ever required in the future, pH adjustment can be provided utilizing chemical injection of sodium hydroxide (caustic soda). This can be implemented with addition of a chemical metering pump, controls and chemical storage.

4. Because of the low alkalinity and general indication that the surface water from all of the District sources may be corrosive, consider inspecting the interior coating of the water system reservoirs including those at each water treatment plant. This could be accomplished by draining individual tanks one at a time and inspecting while dry. Alternatively, a tank diving specialist could inspect the tanks while on line.

June Lake Plant

1. A standby generator should be installed to operate the treatment plant, distribution pumps, controls, and chlorination system.

2. Continue discharging spent backwash to the sanitary sewers to avoid cost of recycle treatment system and storage facilities.

Peterson Plant

1. An automatic switchover from an empty gas chlorine bottle to a full bottle should be implemented to improve reliability and prevent possible interruption of disinfection feed when the Peterson Plant is operating.

1. Consider Particle analysis of raw water from Yost Creek and treated water from the Peterson Plant to evaluate performance for removing *Giardia* and *Cryptosporidium* sized particles.

Clark Plant

1. An automatic switchover from an empty gas chlorine bottle to a full bottle should be implemented with the chlorine feed system to improve reliability and prevent possible interruption of disinfection feed when the Clark Plant is operating.

2. Consider adding a raw water flow meter to measure water coming into the plant.

3. Consider implementing a corrosion protection feed system utilizing caustic soda to raise the pH if red water problems persist to protect the ferrous piping and tank materials in the water distribution system.

4. Consider Particle analysis of raw water from Fern Creek and treated water from the Clark Plant to evaluate performance for removing *Giardia* and *Cryptosporidium* sized particles.

Reservoirs

Both the Village System and Down Canyon System have sufficient capacity to meet existing plus fire flow demands with their current reservoir capacity; however, at buildout both systems will have deficits. The Village System will have a deficit of approximately 100,000 gallons to facilitate the maximum day plus fire flow demands. Down Canyon will have a deficit of approximately 200,000 gallons.

It is recommended that both theVillage and Down Canyon systems build 500,000 gallon reservoirs to meet future needs. This additional storage for both systems would be used to meet the deficits referenced above in water sources (rights) and treatment at buildout maximum month average day demand. Village tank should be located on or near Rodeo Grounds property (90-acre parcel).

Distribution Systems

The Village System is capable of meeting their current and fire flow demands in most areas with their present system. Improvements will be required to meet fire flows and buildout demands.

Down Canyon System is capable of meeting their current and fire flow demands in most areas with their present system. It is also capable of meeting its buildout demands and fire flows.

Following are recommendations for each system.

The Village System

Most of the pipe replacement priority list from the 1999 Master Water Plan for the Village System has been completed. In the spring of 2001, approximately 1,087-feet of 10-inch ductile iron pipe was installed in the Village Proper along Hwy. 158 between Knoll Avenue and Gull Lake Road. In the summer of 2002, the West Village booster pump station, pipeline, and reservoir were constructed.

Improvements to the Village System have been ranked according to priority of replacement/installation (see Figure 10). First priority improvements involve the Rodeo Grounds Development that is a potential growth area and in need of improved services. Second priority items are intended to improve the availability of fire flows

throughout major residential and commercial regions within the Village System. Finally, the third priority improvements are those that would improve the fire flow availability to the area campgrounds and other lower developments. The above priority ranking is recommended based on a preliminary evaluation of growth areas and WaterCAD fire flow analysis results, however, District knowledge of the Village System performance should always govern when scheduling system improvements.

The following is a summary of the proposed improvements to the Village Water System storage and distribution system:

First Priority

- Install 0.5 MG Rodeo Grounds reservoir.
- Install approximately 5,540 feet of 10-inch main line from the Snow Creek reservoir to the proposed Rodeo Grounds reservoir site.
- Install 2,850 feet of 8-inch mainline and pressure reducing valve with flow control to loop the proposed Rodeo Grounds tank to the West Village Tank.
- Construct/replace approximately 1,440 feet of piping (270 ft. of 8-inch diameter pipe on District land, and 1,170 ft. of 8-inch diameter pipe on USFS land).

Second Priority

- Install a fire pump for residential homes southeast of Highway 158 along Lakeview Drive. These houses are currently being supplied by 1-inch and 2-inch pipelines that cannot meet the demand requirements at adequate pressure; however, even if the pipe diameters are increased the pressure will still be too low to meet fire flow requirements. Thus, a standby fire pump capable of providing 1,000 gpm should be installed.
- Install approximately 7,761 feet of piping (7,156 ft. of 6-inch diameter pipe on District land, and 605 ft. of 6-inch diameter pipe on USFS land).

Third Priority

- Replace approximately 7,453 feet of existing piping with 6-inch diameter pipe (2,673 ft. on District land, and 4,780 ft. on USFS land).

Figure 11 shows the fire flow contours with the recommended upgrades to the Village System. After upgrades, the Village System will comply with fireflow standards in 88% of the system (if fire pump is installed on Lakeview Drive, this value will increase to close to 90%). Note that the 6-inch diameter pipelines are recommended, but the installation of pipelines greater than 6-inch diameter may be desired, in commercial areas, to increase fire flows.

The Down Canyon System

The Down Canyon System is a fairly new system and meets most fire flow demands with the existing demand. At buildout, the system is still capable of meeting the daily demands and most fire flow.

Improvements to the Down Canyon System have been ranked according to priority of replacement/installation (see Figure 12). First priority items are minor upgrades that are intended to improve system performance throughout the Down Canyon service area. Second priority items are site specific upgrades intended to improve service to specific locations within the system. As stated previously, the priority listing is only a recommendation based on preliminary system evaluation and WaterCAD fire flow analysis results. The District's knowledge of the Down Canyon System performance should always govern when scheduling system improvements.

The following is a summary of the proposed improvements to the Down Canyon water distribution system.

First Priority

- 175 ft. of pipe replacement (175 ft. of 6-inch diameter pipe)

Second Priority

- 1,181 ft. of pipe replacement (all 6-inch diameter pipe).
- 0.5 MG Tank (location to be determined)

Figure 13 shows the fire flow contours with upgrades to the Down Canyon System at buildout.

Estimated Costs of Recommended Improvements

Tables 16 through 19 present the estimated costs for the recommended improvements mentioned previously in this section. The cost estimates are based on 2007 dollars and are intended only as preliminary budget figures. These estimates will need to be revised to the current construction date of each individual project.

Table 16
Estimated 2007 Costs of Recommended Improvements
Treatment Plants

Treatment Plants	Cost	
June Lake Plant 200 gpm expansion	Construction Engineering & Contingencies Total	$1,350,000 $540,000 $1,890,000
Peterson Plant	Construction Engineering & Contingencies Total	$139,000 $56,000 $195,000
Clark Plant	Construction Engineering & Contingencies Total	$185,000 $74,000 $259,000
GRAND TOTAL		**$2,344,000**

Table 17
Estimated 2007 Costs of Recommended Improvements

Reservoirs

Proposed Reservoirs	Description	Cost
0.5 mg Village Reservoir	Construction	$765,000
	Engr./Contingencies	306,000
	Total	$1,071,000
0.5 mg Down Canyon Reservoir	Construction	$765,000
	Engr./Contingencies	306,000
	Total	$1,071,000
	TOTAL	**$2,142,000**

Table 18
Estimated 2007 Costs of Recommended Improvements
Distribution System

System	Item to be Installed	Cost
The Village		
6" dia. pipe (15,214 ft)		$1,841,000
8" dia. pipe (4,290 ft)		$885,000
10" dia. pipe (5,540 ft)		1,109,000
Fire pump w/building		$98,000
	Construction	**$3,933,000**
	Engineering & Contingencies	1,573,000
	TOTAL	**$5,506,000**
Down Canyon		
6" dia. pipe (1,356 ft)		$164,000
	Construction	**$164,000**
	Engineering & Contingencies	$66,000
	TOTAL	**$230,000**
	GRAND TOTAL	**$5,736,000**

Note: Construction costs are based on the ENR's California Construction Index

Table 19
Summary of
Estimated 2007 Costs of Recommended Improvements

Facility	Cost
Treatment Plants:	
The Village	$1,890,000
Down Canyon	454,000
-Total	$2,344,000
Reservoirs:	
Proposed Village Reservoir	$1,071,000
Proposed Down Canyon Reservoir	1,071,000
-Total	$2,142,000
Distribution System:	
The Village	$5,506,000
Down Canyon	230,000
-Total	$5,736,000
GRAND TOTAL	**$10,222,000**

Note: All costs include engineering and contingencies.

As shown in Table 19, water system improvements totaling $10,222,000 is proposed to meet the projected water demands at buildout. This cost should be considered a "ballpark" estimate subject to refinement pending selection of pipeline routes, reservoir locations, and treatment plant improvements/sites.

The total cost shown is heavily impacted by the assumptions made regarding the proposed Rodeo Grounds development. As a preliminary figure, the following cost may be attributable to the Rodeo Grounds development.

Treatment Plant

Additional treatment facility capacity is required for buildout of the Village System; however, this is mainly do to the buildout of the Rodeo Grounds (90-acre parcel) project. The full cost of the additional treatment facility capacity including engineering and contingencies is attributed to Rodeo Grounds.

Additional Capacity = $1,890,000

Reservoir

Additional storage capacity is required for buildout of the Village System; however, this is mainly do to the buildout of the Rodeo Grounds (90-acres parcel). The full cost of the additional storage capacity including engineering and contingencies is attributed to Rodeo Grounds.

Additional Capacity = $1,071,000

Pipelines

Approximately 5,540 ft of 10-inch pipeline is required from Highway 158 to the Rodeo Grounds Tank and 2,850 ft of 8-inch from the Rodeo Grounds Tank to the West Village Tank.

Highway 158 to Rodeo Grounds Tank
Construction + 40% Engineering & Contingencies = $1,553,000

Main Line From Rodeo Grounds Tank to West Village Tank
Construction + 40% Engineering & Contingencies = $823,000

Approximate Rodeo Grounds' Share = $5,337,000