

Golden State
Water Company
A Subsidiary of American States Water Company

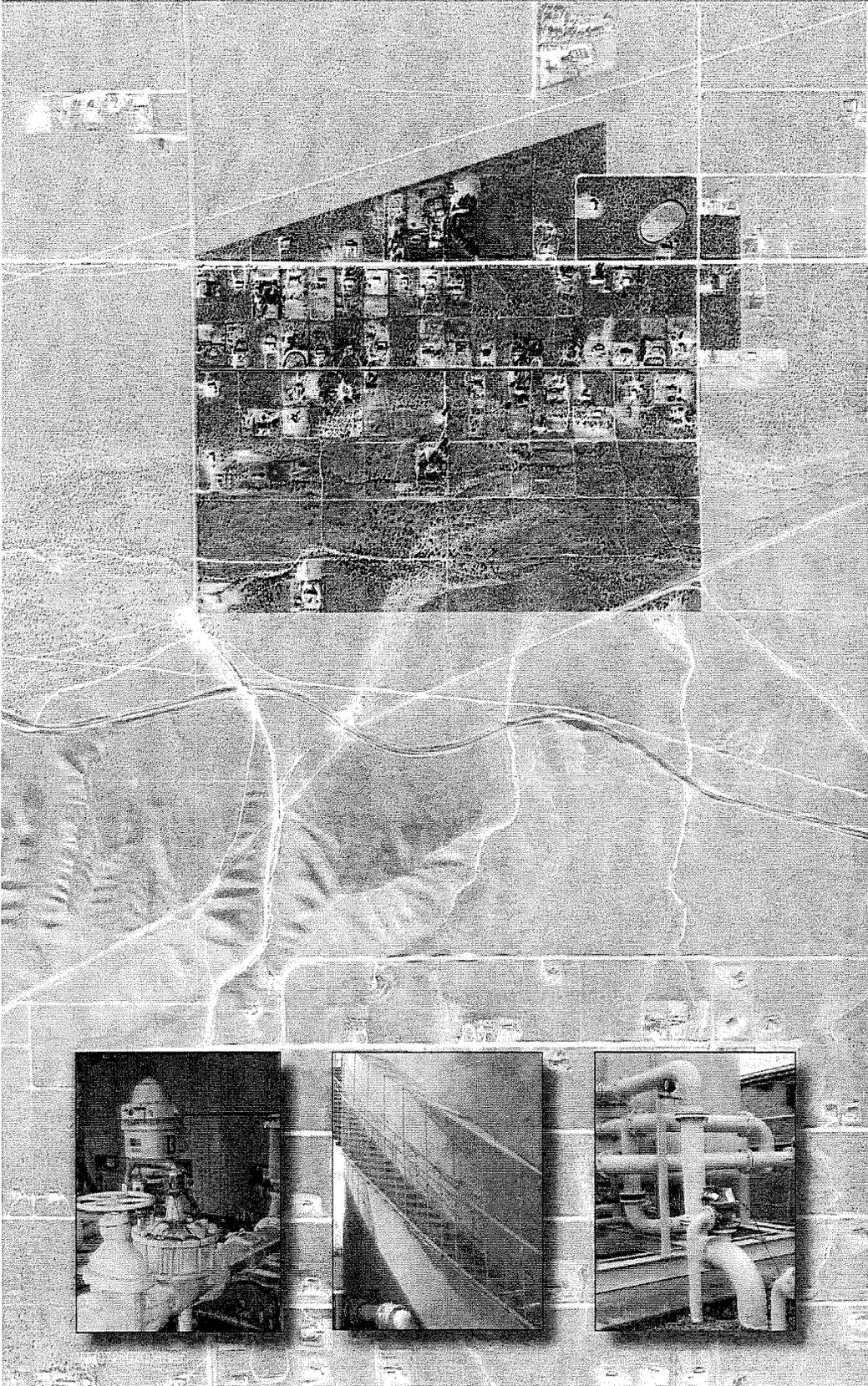
region III

*Desert View
System*

**WATER
MASTER
PLAN**

PREPARED BY
CH2MHILL

APRIL 2008



SECTION 3

Existing and Future Water Demands

This section documents existing and future water demands for the system and contains the following information:

- Demand definitions and periods
- Existing demands
- Future demand projections

3.1 Demand Definitions and Periods

Demand is classified in two basic ways:

- Demand: The total quantity of water required for a given period of time to meet the water system's various uses. These uses may include residential, commercial, industrial, and other revenue and non-revenue demands.
- Non-revenue water: The difference between the total amount of water produced from water supply sources and the total amount of water delivered to customers. This includes water used for fire fighting and flushing and water lost due to system leaks and illegal connections. For systems without customer meters, this demand classification may not be quantifiable.

The water industry commonly uses several demand periods for developing water distribution system master plans. These demand periods are designated as average day demand (ADD), maximum day demand (MDD), peak hour demand (PHD), and maximum day demand plus fire flow (MDD+FF), and were applied as necessary to evaluate the system. The American Water Works Association (AWWA, 2005) defines these common steady-state demand periods as follows:

- ADD: Total amount of water delivered to the system in 1 year divided by 365 days
- MDD: Maximum amount of water delivered to the system in any single day of the year
- PHD: Amount of water supplied to the system during the hour of MDD with the largest demand
- MDD+FF: Amount of water required to fight a fire during MDD

3.2 Existing Demands

The existing demands represent a baseline for evaluating the existing system and to project future demands. The data used to develop the existing demands was based on historical water production data provided by GSWC.

3.2.1 Historical Water Use

For this master plan, it was assumed that the historical water production equaled the historical water demand (including non-revenue water). Table 3-1 summarizes historical annual water production from 1997 to 2006. The average water demand per connection for this period was 0.556 acre-feet per year per connection (AFY/conn.).

TABLE 3-1
Historical Annual Water Production
GSWC Region III Water Master Plan—Desert View System

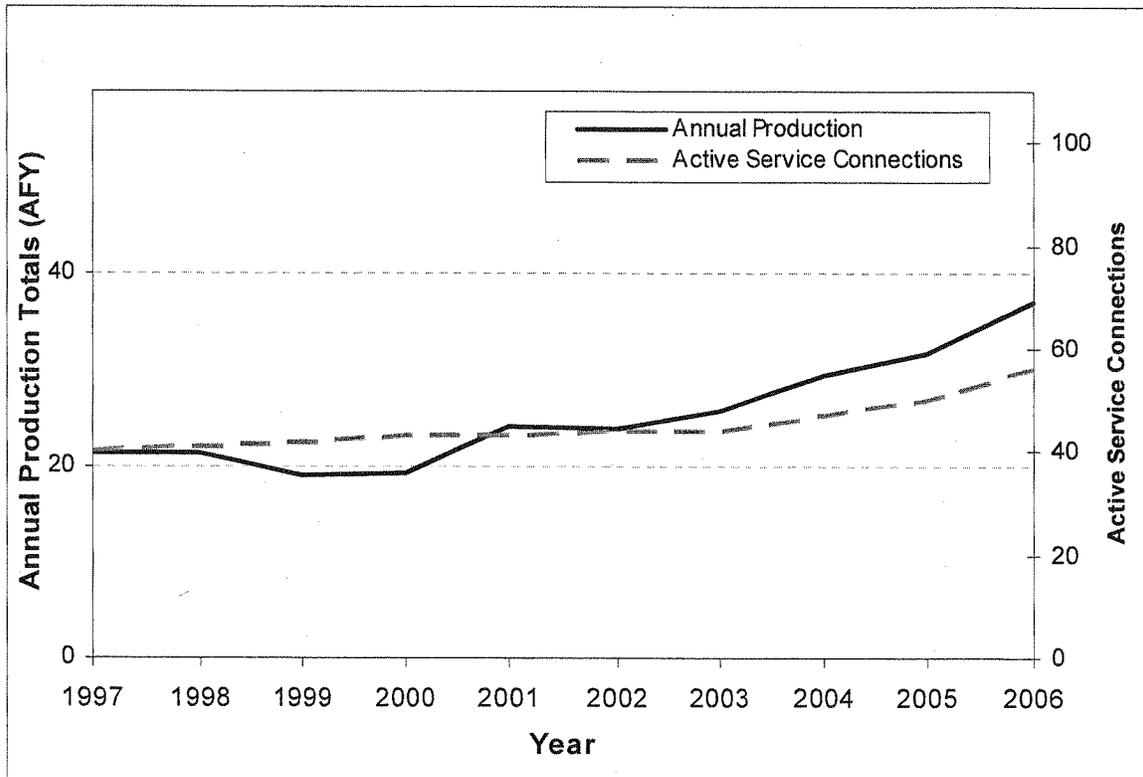
Year	Active Service Connections	Average Demand* (AFY)	Average Demand per Connection* (AFY/conn.)
1997	40	21	0.532
1998	41	21	0.519
1999	42	19	0.453
2000	43	19	0.447
2001	43	24	0.562
2002	44	24	0.542
2003	44	26	0.583
2004	47	29	0.628
2005	50	32	0.634
2006	56	37	0.660
10-year avg.			0.556

* Includes non-revenue water

Figure 3-1 summarizes the historical annual water production and number of active service connections. The figure demonstrates a correlation between the number of active service connections and the amount of water consumed.

Existing water demands for this system have been estimated by multiplying the number of 2006 active service connections by the 10-year average demand per connection. The existing demand for the Desert View System is 31 AFY.

FIGURE 3-1
 Historical Annual Production Totals and Active Service Connections for the Last 10 Years
 GSWC Region III Water Master Plan—Desert View System



3.2.2 Non-revenue Water

Non-revenue water equals the amount of water production less the metered water use. For this master plan, GSWC provided monthly and annual water production and sales totals from January 2003 through November 2007. Based on this information, the average non-revenue water was 41.83 percent. Table 3-2 presents the breakdown of the existing water demand estimated from the average combined non-revenue water use rate.

TABLE 3-2
 Existing Water Demands with and without Non-revenue Water
 GSWC Region III Water Master Plan—Desert View System

Demand Description	Demand (AFY)
Existing metered water use	18
Non-revenue water (41.83%*)	13
Total existing demands	31

* Based on percentage of unaccounted-for water from GSWC production and billing records from January 2003 through November 2007

3.2.3 Peaking Factors

To evaluate the system's performance during various demand periods, existing historical demand data were used to develop peaking factors as a function of ADD to facilitate these calculations. This approach allows the calculation of ADD for various planning years, and then allows a direct calculation for other demand periods using the appropriate peaking factor.

Peaking factors are typically calculated as a ratio of the demand period to ADD. For example, to determine the demands for MDD, the MDD peaking factor is multiplied by ADD.

Based on the historical average day and maximum day demands provided by GSWC (see Table 3-3), the peaking factors from 1997 to 2006 ranged from 2.73 to 7.50 (see Figure 3-2). A peaking factor of 4.2 was established based on the third-highest MDD:ADD ratio over the 10-year period.

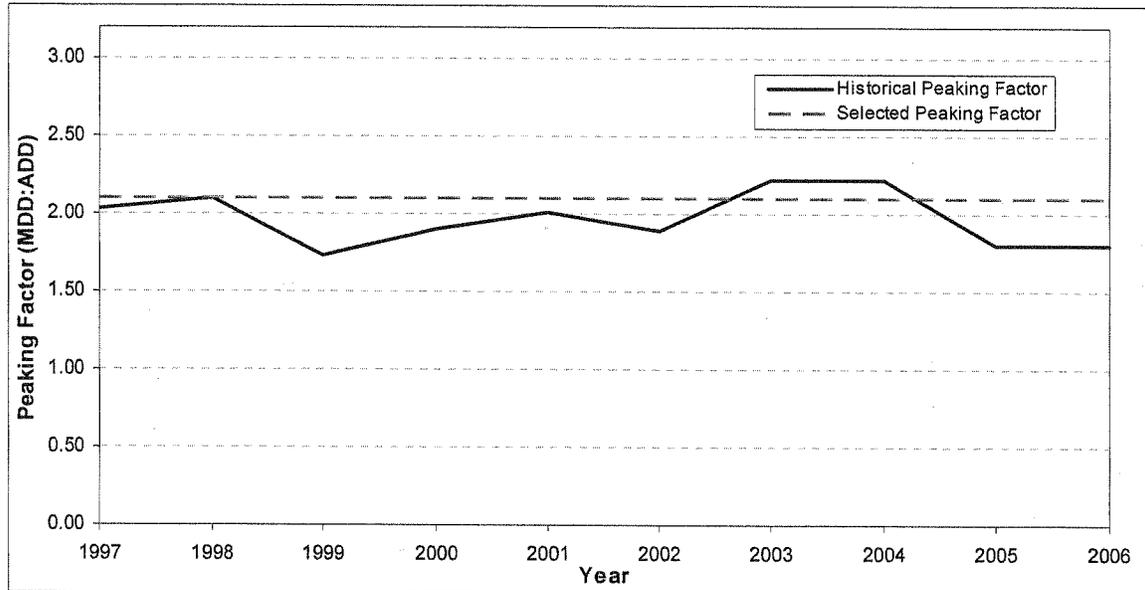
TABLE 3-3
Historical Demands and MDD Peaking Factors
GSWC Region III Water Master Plan—Desert View System

Year	ADD*		MDD* (gpm)	MDD Peaking Factor (MDD:ADD)
	AFY	gpm		
1997	21	13	52	3.95
1998	21	13	52	3.95
1999	19	12	35	3.00
2000	19	12	89	7.50
2001	24	15	78	5.20
2002	24	15	58	3.93
2003	26	16	67	4.18
2004	29	18	51	2.78
2005	32	20	73	3.73
2006	37	23	63	2.73

* Includes non-revenue water use

Historical MDD peaking factors are presented in Figure 3-2, which shows that the selected peaking factor determined for this master plan (4.2) would not have been exceeded in 8 of the last 10 years. The peaking factor of 7.50 in 2000 was considered probably erroneous and was therefore not considered in determining the MDD peaking factor.

FIGURE 3-2
Historical MDD Peaking Factors
GSWC Region III Water Master Plan—Desert View System



GSWC established the peaking factor for PHD as 1.7 (times MDD) for the most recent 10-year period. To keep the peaking factors consistent, the peaking factor for PHD was converted to a factor relative to ADD instead of MDD. Based on operational experience with the system, GSWC staff considered these peaking factors to be appropriate for this system. Table 3-4 summarizes the peaking factors used in this master plan.

TABLE 3-4
Summary of Peaking Factors by Demand Period
GSWC Region III Water Master Plan—Desert View System

Demand Period	Peaking Factor
MDD	4.2 x ADD
PHD	7.1 x ADD

3.3 Future Demand Projections

Future demands were projected first to estimate ADD, and then peaking factors were applied to estimate MDD and PHD. The following approaches were used:

- Growth rate projections
- Water demand projections

3.3.1 Growth Rate Projections

Growth rate projections for the service area were developed based on the assumption that the existing service area would reach build-out by the year 2030. To estimate the amount of growth that would occur between now and 2030, it was necessary to identify the amount of development that exists in the system today. Several sources of information were used to estimate the growth rate within the current service area:

- GIS parcel overlays for San Bernardino County
- GIS land-use overlays obtained from the County of San Bernardino (Typical information from this overlay denoted areas such as single-family land use, commercial areas, and open space areas. Figure I-1 in Appendix I shows a summary of the land-use zones for this system. Note that GIS land-use data for the Los Angeles County portion of the system could not be obtained.)
- GIS aerial imagery circa 2004 ~ 2006
- Established service area boundary as provided by GSWC

The service area was subdivided into planning areas to simplify the data managed in this task. These planning areas were created by isolating unique areas based on land use type, current development density levels, and system pressure zones. Because the Desert View System is relatively small and uniform in land use, only one planning area was created. Figure I-2 in Appendix I depicts the planning areas overlaid on an aerial image. Although some development may have occurred in some areas of the system since the aerial was created, the potential changes were not considered significant.

From this information, the current density and percent developed were determined for each planning area. The current density, measured as dwelling units per acre (du/ac), was obtained by counting the number of parcels and dividing by the calculated area. It was assumed that one dwelling unit would occupy one parcel for average-sized and smaller parcels. Large parcels were assumed to be subdivided in the future at a density consistent with either the future land use or current density levels in neighboring areas. The current percent developed area was obtained by reviewing the aerial imagery to determine the parcels that are currently developed (showing evidence such as buildings or landscaping) compared to empty, undeveloped parcels. These factors were adjusted for the planning areas until the number of dwelling units nearly matched the existing number of connections in each pressure zone and systemwide.

Based on the current density and percentage of developed area, future development was assumed to increase linearly from the current percent developed to 100 percent developed by 2030. For the Desert View System, the current density (in du/ac) for developed areas was assumed to remain the same in the future. Table 3-5 presents a summary of the growth rate projections for this system. Table I-1 in Appendix I shows detailed information for each planning area.

TABLE 3-5
Growth Projections
GSWC Region III Water Master Plan—Desert View System

Planning Year	Area (acres)	% Developed	Connections or Dwelling Units
2007	298	73%	56
2015	298	82%	64
2030	298	100%	77

* For planning year 2007, the value listed is the current number of connections. For planning years 2015 and 2030, values listed are the number of projected dwelling units.

3.3.2 Water Demand Projections

Water demand projections were based on a current water demand factor (WDF) expressed in gallons per capita (or person) per day (gpcd). The water use factor is obtained from the following formula:

$$WDF (gpcd) = \frac{Annual\ Water\ User\ (AFY) \times 892.8\ (gpd/AFY)}{Area\ (ac) \times Percent\ Developed\ (\%) \times Density\ (du/ac) \times Occupancy\ (people/du)}$$

Where:

WDF (gpcd) is the water demand factor expressed in gallons per capita (or person) per day rounded to the nearest 5 gpcd. For the water demand projections, this value is estimated within a reasonable range until the total yearly water use is similar to the water production records GSWC provided.

Area (ac) is the total area of each individual planning area, expressed in acres. This value was obtained from GIS.

Percent Developed (%) measures how much of the planning area has been developed. This was obtained by reviewing the aerial imagery to determine the parcels that have been developed compared to the parcels that are undeveloped.

Density (du/ac) is an average measure of how many dwelling units occupy a single acre of land for the planning area. This number was obtained by counting the total number of parcels in each planning area and dividing by the total area of the planning area. The density times the area and percent developed would produce the number of dwelling units. The total dwelling units calculated were compared to the total number of active service connections provided by GSWC (see Table 3-1) to cross check the results.

Occupancy (people/du) is an estimated number of people for each dwelling unit. This number was developed (within a reasonable range) to estimate the total population for the CSA.

Annual Water Use (AFY) is the calculated total water use in acre-feet per year shown in Table 3-2.

Table I-1 in Appendix I summarizes the water demand projection factors used to estimate the existing and future water demands for the Desert View System. Using the existing demand, the current WDF and occupancy levels were adjusted until the water demand was calibrated systemwide. These calculations assumed the current WDF, area, density, and occupancy remained the same as the current conditions. The future water use was directly proportional to the increase in percent developed for each area. Future water use was calculated using the following formula:

$$\text{Future Yearly Water Use (AFY)} = \frac{\text{WDF (gpcd)} \times 0.00112 \text{ (AFY/gpd)}}{\text{Area (ac)} \times \text{Percent Developed (\%)} \times \text{Density (du/ac)} \times \text{Occupancy (people/du)}}$$

Table 3-6 summarizes water demand projections for each planning year as calculated in Appendix I. Note that the water demand factor for each year is a calculated value based on the total demand and percent of area developed. These values will vary for each planning year based on the mix of low-density and high-density residential, commercial, and industrial development.

TABLE 3-6
Projected Water Demands
GSWC Region III Water Master Plan—Desert View System

Planning Year	Connections or DUs ^a	Water Demand Factor ^b (gpd/ac)	Average Annual Demand (AFY)
2007	56	130	31
2015	64	129	35
2030	77	128	43

^a For planning year 2007, the value listed is the current number of connections. For planning years 2015 and 2030, values listed are the number of projected dwelling units.

^b Water demand factor is a calculated value based on total demand and percent of area developed.

Figure 3-3 presents the historical and projected annual water demands starting from the most recent 10-year period through 2030. Table 3-7 summarizes the projected demands for ADD, MDD, and PHD periods using the peaking factors shown in Table 3-4.

FIGURE 3-3
 Historical Water Demand and Future Water Demand Projections
 GSWC Region III Water Master Plan—Desert View System

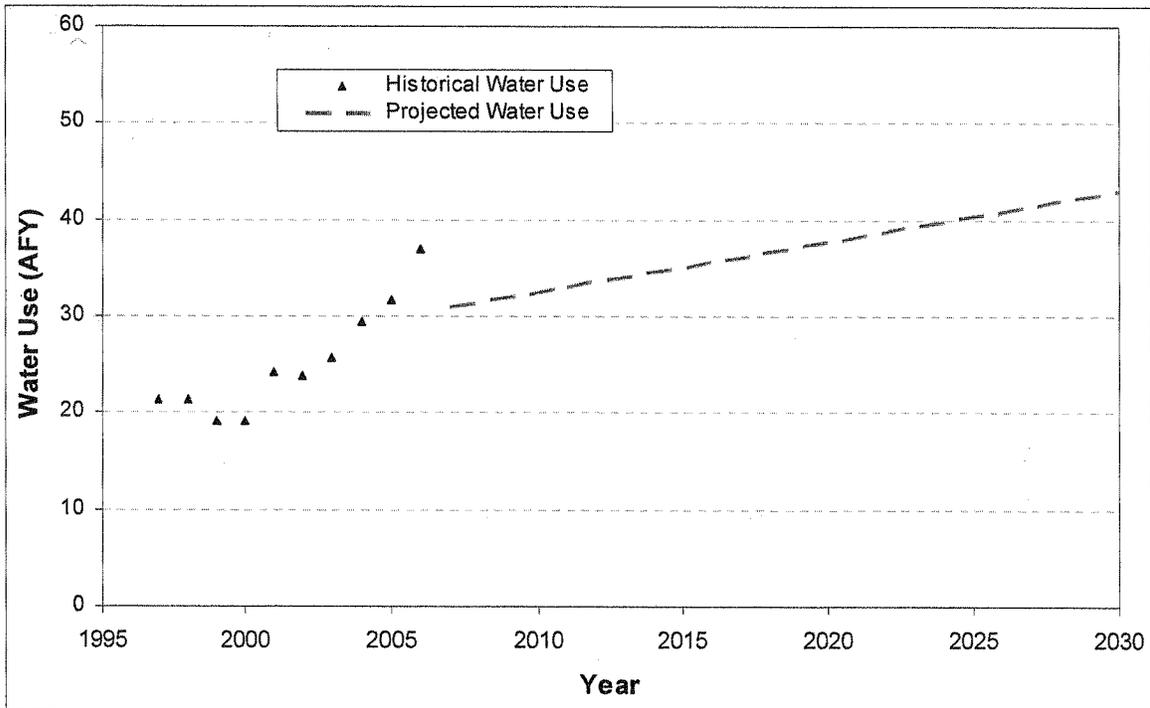
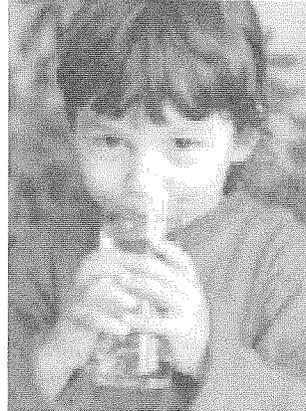


TABLE 3-7
 Water System Demands by Demand Period
 GSWC Region III Water Master Plan—Desert View System

Planning Year	Demand Period and Peaking Factor ^a			
	Annual Avg. (AFY)	ADD (1.0 × Avg.) (gpm)	MDD (4.2 × ADD) (gpm)	PHD (7.1 × ADD) (gpm)
2007 ^b	31	19	81	136
2015	35	22	91	154
2030	43	27	112	189

^a Values are rounded.

^b The annual average demands represent a baseline for the existing demands to analyze the existing system. This value may not match the historical data in Table 3-1 because it was calculated using the average water demand per customer.



Source Water Assessment

A source water assessment was conducted for each of the groundwater wells serving the customers of GSWC – Desert View System in April 2001

Both of the groundwater wells are considered most vulnerable to the following activities, which have been associated with contaminants that have been detected in the water supply:

- Septic systems – low density

A copy of the assessment may be viewed at:
Governmental Center 4th Floor or
464 West 4th St. Suite 437
San Bernardino, CA 92401



Golden State Water Company
13608 Hitt Rd
Apple Valley CA 92308

You may request a summary of the assessment be sent to you by contacting:
CDPH San Bernardino District Office
At (909) 383-4320

For more details or information contact:
Jeffrey Long at (800) 999-4033

Existing and Future Water Demands – Apple Valley North Water System

PREPARED FOR: Golden State Water Company
PREPARED BY: CH2M HILL
DATE: April 6, 2007

Purpose

The purpose of this technical memorandum is to provide documentation for the existing and future demands for the Master Plan for Golden State Water Company's (GSWC) Apple Valley North Water Distribution System (Apple Valley North System). This consists of the presentation of 2005 demands and the development of future demands. Demands are first projected to represent average day demand (ADD), and then are peaked to estimate maximum day demand (MDD) and peak hour demand (PHD). This technical memorandum is organized in the following manner:

- Existing Water Demands
- Future System Projections

Existing Water Demands

The data used to develop the current demand and future demand projections includes the historical water production provided by GSWC. Data was also obtained from the Southern California Association of Governments (SCAG) for population, household and employment estimates.

Historical Water Use

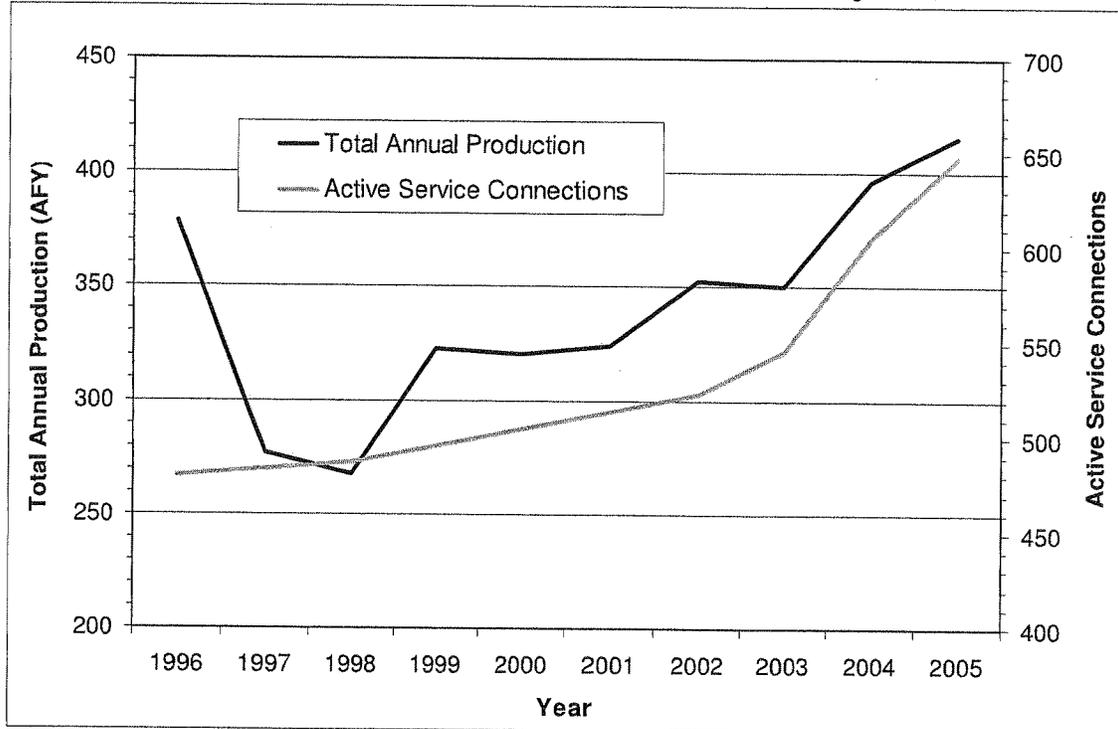
It was assumed that the historical water production equaled the historical water demand including the non-revenue water. Table 1 is a summary of the historical annual water productions for the years 1996 to 2005. The average water demand per connection for this period was 0.6440 acre feet per year per connection (AFY/conn). Figure 1 presents the historical annual water productions and number of active service connections graphically.

TABLE 1
 Historical Annual Water Productions
Existing and Future Water Demands-Apple Valley North System

Year	Active Service Connections	Average Demand (ac-ft/yr)	Average Demand per Connection (AFY/conn)
1996	480	379	0.7896
1997	484	277	0.5723
1998	487	268	0.5503
1999	496	323	0.6512
2000	505	320	0.6337
2001	514	324	0.6304
2002	523	353	0.6750
2003	546	350	0.6410
2004	605	396	0.6545
2005	648	416	0.6420

Note: Demands shown include non-revenue water use.

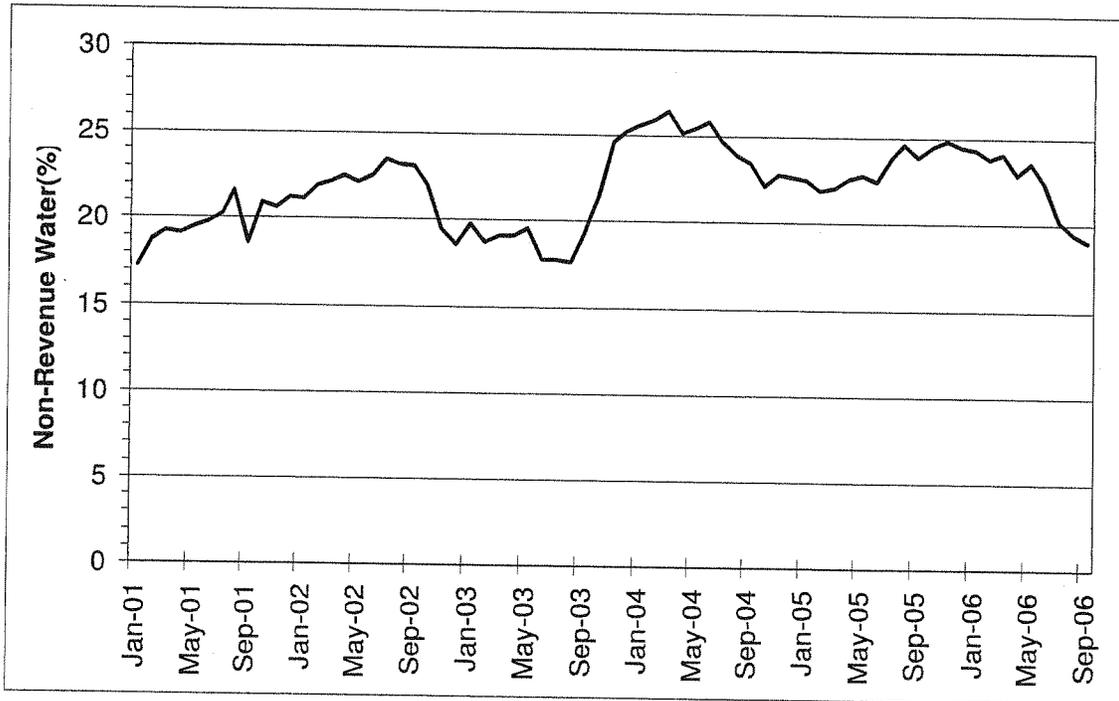
FIGURE 1
 Historical Annual Production Totals and Active Service Connections for the Years 1996 through 2005



Non-Revenue Water

No-revenue water equals the water production less the water sale, which accounts for all the water loss during operations and distribution. For this study, GSWC provided historical water loss totals by year as a combination of four water systems: Apple Valley North, Apple Valley South, Desert View and Lucerne Valley. The combined non-revenue water for the four systems ranges from 17.3 percent to 26.4 percent over the last 6 years. The average for this period is 22 percent. Figure 2 presents the combined non-revenue water graphically.

FIGURE 2
Historical Non-Revenue Water



System specific non-revenue water use was not available for this study. Since the Desert View and Lucerne Valley systems are very small (about 10% of the total) and are of the same age as the Apple Valley North and South systems, the combined non-revenue water was assumed to be a reasonable approximation for the Apple Valley North and South systems. Table 2 presents the breakdown of the existing water demand in the Apple Valley North System estimated from the average combined non-revenue water use rate.

TABLE 2
Existing Water Demands
Existing and Future Water Demands—Apple Valley North Water System

Demand Description	Demand (gpm)
Existing Water Sales	201
Non-Revenue Water (22%)	57
Total Existing Water Demand	258

Peaking Factors

To evaluate the performance of the Apple Valley North System under conditions such as MDD and PHD, peaking factors were developed to facilitate the calculation of MDD and PHD using ADD. This approach promotes the calculation of ADD for various planning years and then allows a direct calculation for other demand periods using the appropriate peaking factor.

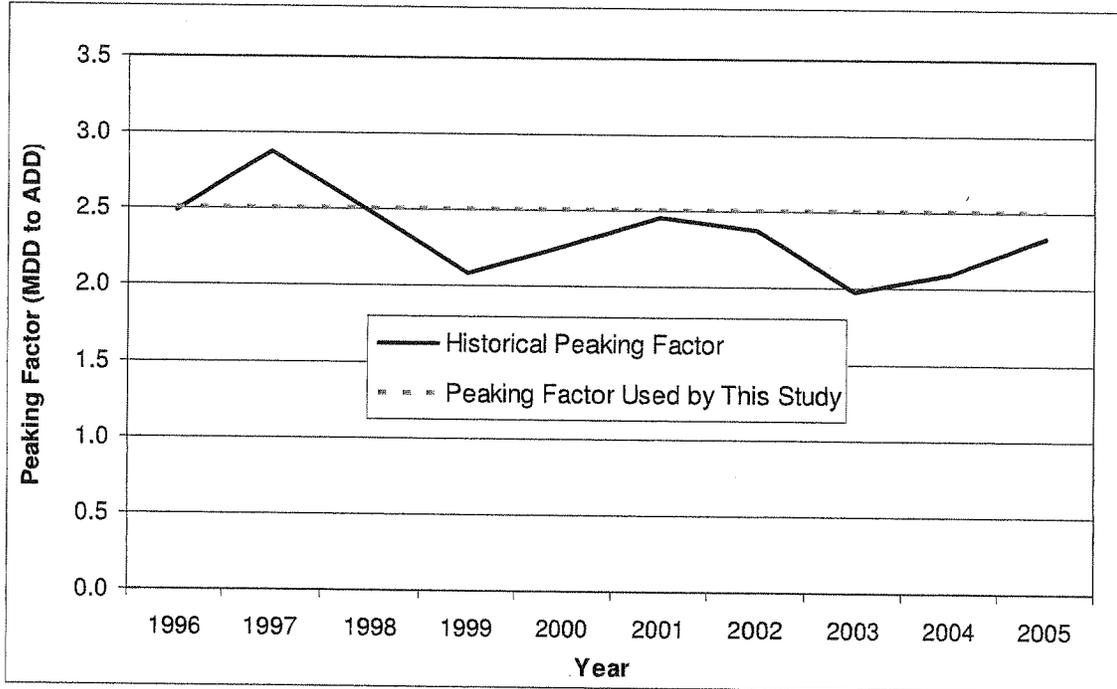
Based on the historical average day and maximum day demands provided by GSWC (see Table 3), the peaking factors from 1996 to 2005 ranged from 1.84 to 3.11 (see Figure 3). A peaking factor of 2.5 appears to be adequately conservative based on trends over the past 10 years.

TABLE 3
Historical Average and Maximum Day Demands
Existing and Future Water Demands—Apple Valley North System

Year	Average Demands		Maximum Day Demands	Peaking Factor (MDD:ADD)
	(ac-ft/yr)	(gpm)	(gpm)	
1996	379	235	583	2.49
1997	277	172	493	2.87
1998	268	166	411	2.48
1999	323	200	417	2.08
2000	320	198	448	2.26
2001	324	201	494	2.46
2002	353	219	521	2.38
2003	350	217	429	1.98
2004	396	246	514	2.09
2005	416	258	602	2.34

Note: Demands include non-revenue water use.

FIGURE 3
Historical Peaking Factors for Maximum Day Demand



The peaking factor for peak hour demand (PHD) was designated as 1.70 (times MDD) for the years 1980 to 2005 by GSWC. Table 4 summarizes the peaking factors developed for the Master Plan.

TABLE 4
Summary of Peaking Factors
Existing and Future Water Demands – Apple Valley North System

Peaking Factor Type	Peaking Factor
MDD	2.50 x ADD
PHD	1.70 x MDD

Future System Projections

Growth Rate Projections

The growth rate projection for the Apple Valley North Water System customer service area (CSA) was developed using estimates obtained from SCAG for population, household and employment data, which was recently updated based on 2000 U.S. Census data. The methodology used to project future water demands was described as follows.

SCAG-derived census-tract projections were used to determine growth rate from 2005 to 2030. The Apple Valley North Water System serves the northeast portion of the Town of Apple Valley and some additional surrounding unincorporated areas. According to GSWC,

the CSA is estimated to expand as shown in Figure 4. The growth projection analysis consisted of superimposing CSA boundaries over census tract boundaries and township boundaries, identifying the applicable overlapping census tracts and townships, and developing percentage estimates of the CSA in the overlapping townships. Table 5 lists the overlapping census tracts and townships within the Apple Valley North CSA.

FIGURE 4
Existing and Assumed Future Customer Service Areas for Apple Valley North Water System

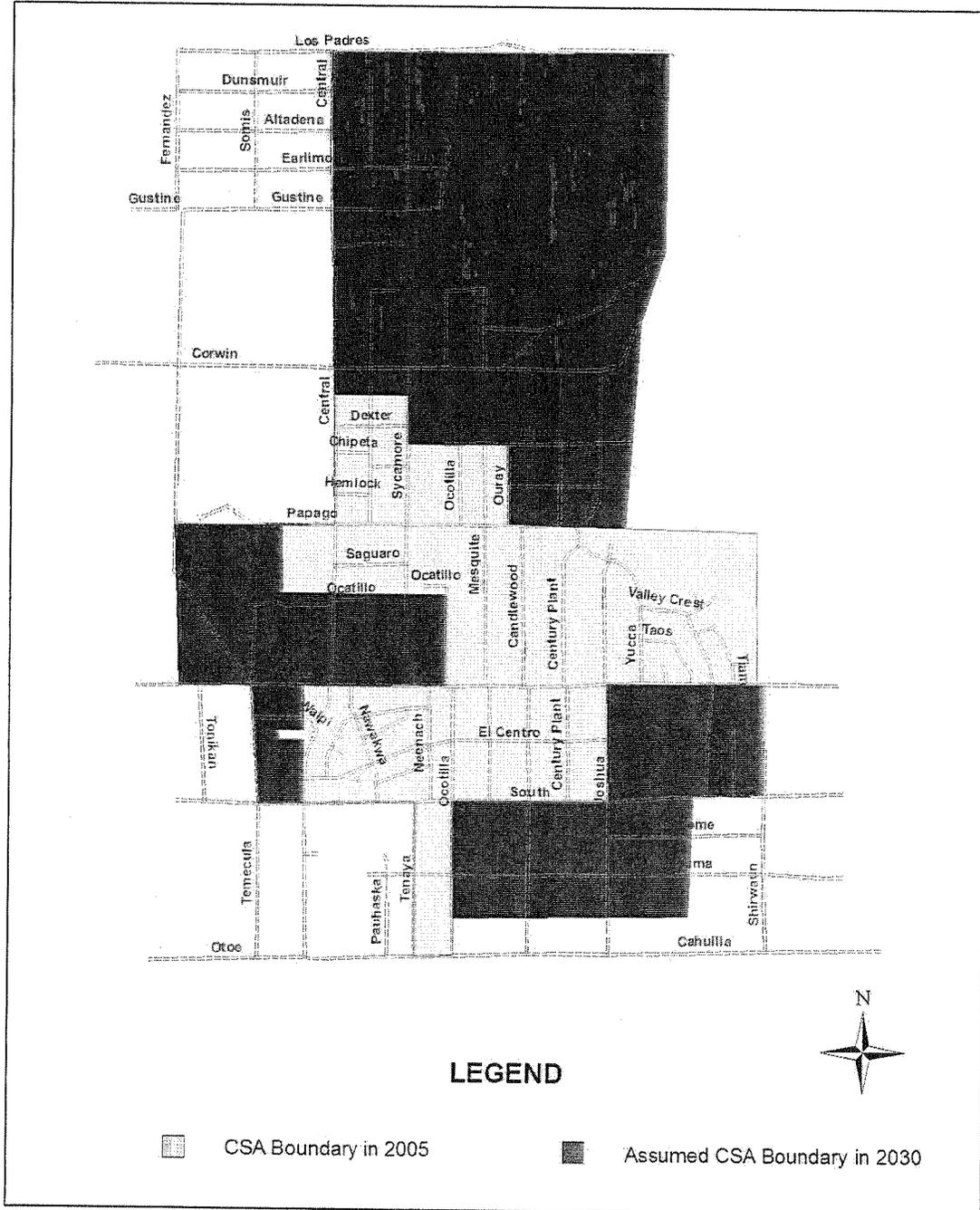


TABLE 5
Census Tracts and Townships in the CSA
Existing and Future Water Demands – Apple Valley North System

Census Tract	Township	Percentage of Census Tract and Township in CSA (%) ^a
Year 2005		
12100	Unincorporated Area	0.03
12100	Town of Apple Valley	2.82
9713	Town of Apple Valley	5.63
Year 2030		
12100	Unincorporated Area	0.25
12100	Town of Apple Valley	6.06
9713	Town of Apple Valley	8.83

^a Percentage of Township in CSA (%) = (Area of Township within the CSA) / (Total Area of the Township)

It was assumed that the population, household and employment are uniformly distributed in each township. Then the population, household and employment in the Apple Valley North Water System CSA 2005 and 2030 boundaries could be calculated as shown in Table 6. In 2005, the served population was estimated to be 540; and in 2030, it was expected to be 1,464. From 2005 to 2030, the served population increases 171 percent, which is a growth rate of approximately 4.1 percent per year. The number of served households is expected to grow 224 percent from 2005 to 2030, which equates to a growth rate of 4.8 percent per year. The number of served employment is expected to grow 267 percent during the same period, which equates to a growth rate of 5.3 percent per year.

TABLE 6
Population, Household and Employment Projections in the CSA
Existing and Future Water Demand – Apple Valley North System

Census Tract	Township	Population in Township*	Household in Township*	Employment in Township*	Population in CSA	Household in CSA	Employment in CSA
2005 Projections							
12100	Unincorporated	7,602	2,842	1,190	2	1	0
12100	Apple Valley town	7,317	2,102	7,024	205	59	197
9713	Apple Valley town	5,904	1,937	1,154	333	109	65
Sub-Total					540	169	262
2030 Projections							
12100	Unincorporated	10,937	4,779	1,928	27	12	5
12100	Apple Valley town	9,638	3,666	12,765	584	222	774
9713	Apple Valley town	9,655	3,545	2,072	853	313	183
Sub-Total					1,464	304	961
Overall Growth Rate (%)					171	224	267
Growth Rate per Year (%)					4.1	4.8	5.3

TABLE 6
Population, Household and Employment Projections in the CSA
Existing and Future Water Demand – Apple Valley North System

Census Tract	Township	Population in Township*	Household in Township*	Employment in Township*	Population in CSA	Household in CSA	Employment in CSA
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* This data was obtained from SCAG.

Water Demand Projections

It was assumed that the number of connections is proportional to the population. The future number of service connections was projected first and then the future annual average demands were calculated based on the average water demand per customer, which was estimated at 0.6440 AFY/conn. (see Table 1), and the future number of service connections. These projections are summarized in Table 7.

TABLE 7
Projections for Number of Service Connections and Future Water Demands
Existing and Future Water Demands – Apple Valley North Water System

Planning Year	Projected Active Service Connections	Projected Annual Average Demands (ac-ft/yr)
2005	648	417 ^a
2010	792	510
2015	967	623
2020	1,180	760
2025	1,440	927
2030	1,757	1,132

^a This number may not match the historical data in Table 1 because it was calculated using the average water demand per customer.

Figure 5 shows the historical and projected annual water demands for the Apple Valley North System from 1984 until 2030.

FIGURE 5
Historical Water Use and Future Water Use Projections

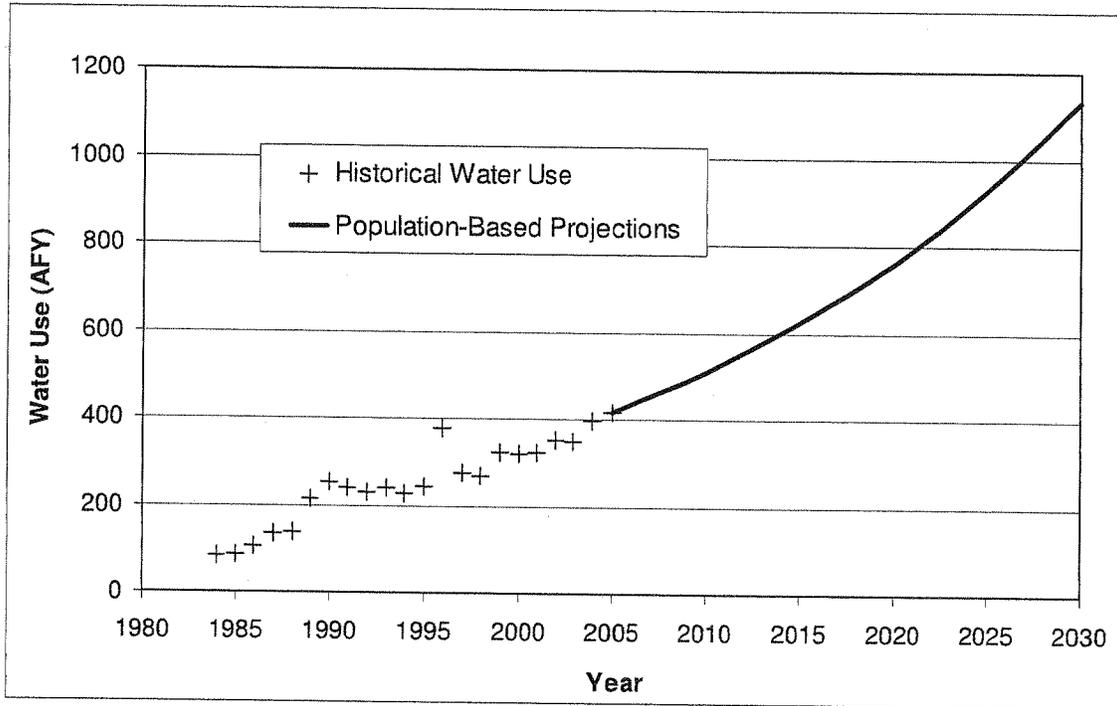


Table 8 summarizes the projected demands for ADD, MDD, and PHD using the peaking factors shown in Table 4.

TABLE 8
Water System Demands for ADD, MDD, and PHD
Existing and Future Water Demands – Apple Valley North System

Planning Year	Demand Period and Peaking Factor ^a			
	Annual Average	ADD (gpm)	MDD (gpm)	PHD (gpm)
	(ac-ft/yr)	1.00 x avg	2.50 x ADD	1.70 x MDD
2005	417 ^b	258	645	1,097
2010	510	316	790	1,343
2015	623	386	965	1,641
2020	760	471	1,178	2,002
2025	927	575	1,438	2,444
2030	1,132	701	1,753	2,980

^a Totals may not agree due to rounding.

^b This number may not match the historical data in Table 1 because it was calculated using the average water demand per customer.

Source Water Assessment

A source water assessment was conducted for each of the groundwater wells serving the customers of GSWC – Apple Valley North System in September 2000.

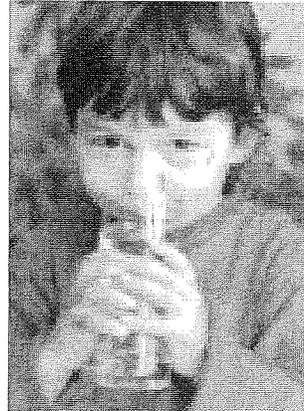
Three of the groundwater wells are considered most vulnerable to the following activities, which have been associated with contaminants that have been detected in the water supply:

- Septic systems – high density
- Septic systems – low density
- Housing – high density

A copy of the assessment may be viewed at:
CDPH San Bernardino District Office or
Governmental Center 4th Floor
464 West 4th St. Suite 437
San Bernardino, CA 92401

You may request a summary of the assessment be sent to you by contacting:
CDPH San Bernardino District Office
At (909) 383-4320

For more details or information contact:
Jeffrey Long at (800) 999-4033



Golden State Water Company
13608 Hitt Rd
Apple Valley CA 92308

Existing and Future Water Demands – Apple Valley South Water System

PREPARED FOR: Golden State Water Company

PREPARED BY: CH2M HILL

DATE: April 6, 2007

Purpose

The purpose of this technical memorandum is to provide documentation for the existing and future demands for the Master Plan for Golden State Water Company's (GSWC) Apple Valley South Water Distribution System (Apple Valley South). This consists of the presentation of 2005 demands and the development of future demands. Demands are first projected to represent average day demand (ADD), and then are peaked to match maximum day demand (MDD) and peak hour demand (PHD). This technical memorandum is organized in the following manner:

- Existing Water Demands
- Future System Projections

Existing Water Demands and Peaking Factors

The data used to develop the current demand and future demand projections includes the historical water production provided by GSWC. Data was also obtained from the Southern California Association of Governments (SCAG) for population, household and employment estimates.

Historical Water Use

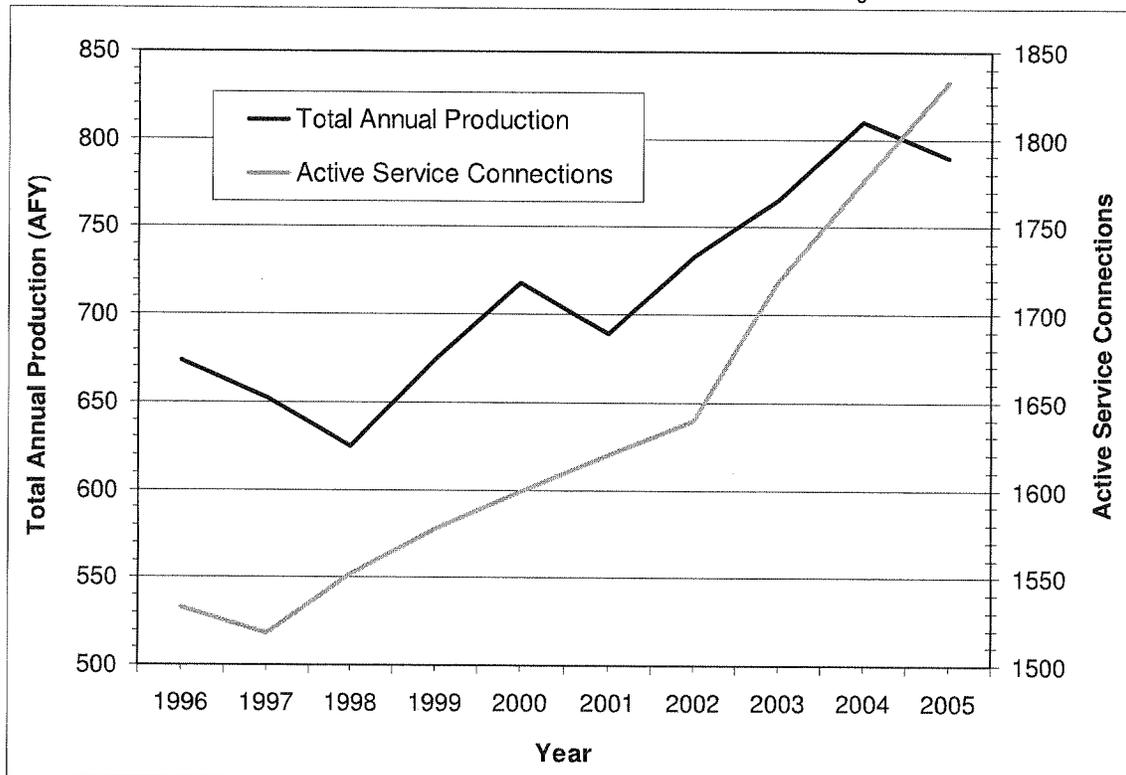
It was assumed that the historical water production equaled the historical water demand including the non-revenue water. Table 1 is a summary of the historical annual water productions for the years 1996 to 2005. The average water demand per customer from 1996 to 2005 was 0.4351 AFY/conn. Figure 1 presents the historical annual water productions and number of active service connections graphically.

TABLE 1
 Historical Annual Water Productions
 Existing and Future Water Demands – Apple Valley South System

Year	Active Service Connections	Average Demand (AF/yr)	Average Demand per Connection (AFY/conn)
1996	1,533	673	0.4390
1997	1,518	652	0.4295
1998	1,552	625	0.4027
1999	1,578	674	0.4271
2000	1,599	718	0.4490
2001	1,620	689	0.4253
2002	1,640	733	0.4469
2003	1,719	766	0.4456
2004	1,776	810	0.4561
2005	1,833	789	0.4304

Note: Demands shown include non-revenue water.

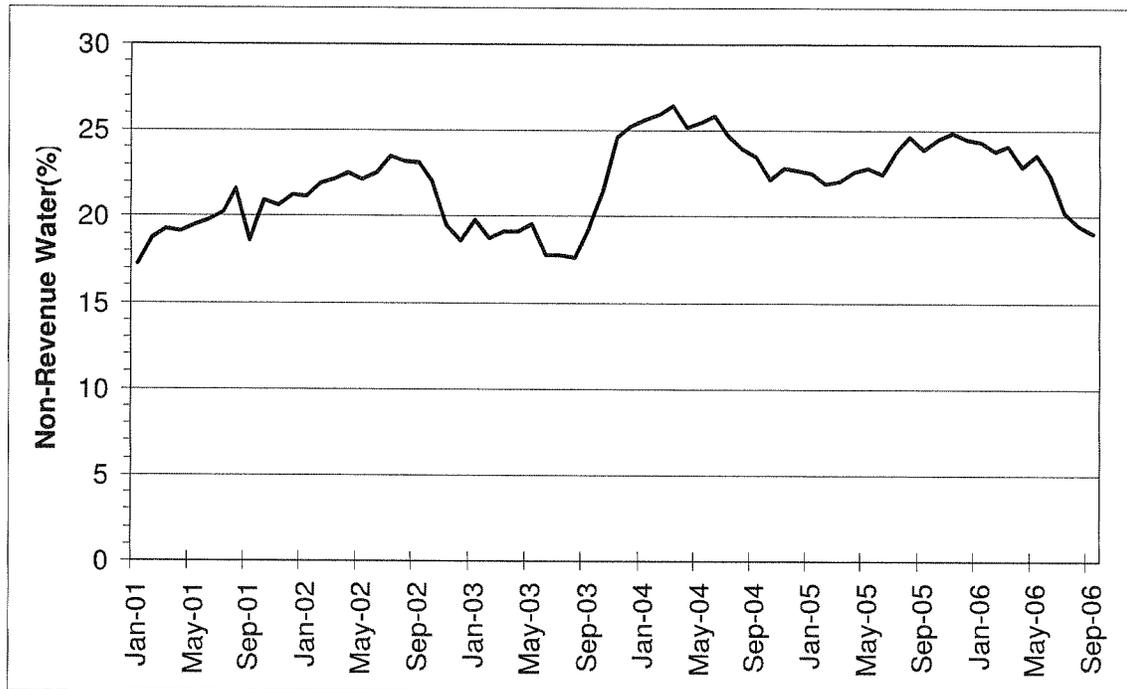
FIGURE 1
 Historical Annual Production Totals and Active Service Connections for the Years 1996 through 2005



Non-Revenue Water

No-revenue water equals the water production less the water sale, which accounts for all the water loss during operations and distribution. For this study, GSWC provided historical water loss totals by year as a combination of four water systems: Apple Valley North, Apple Valley South, Desert View and Lucerne Valley. The combined non-revenue water for the four systems ranges from 17.3 percent to 26.4 percent over the last 6 years. The average for this period is 22 percent. Figure 2 presents the combined non-revenue water graphically.

FIGURE 2
Historical Non-Revenue Water



System specific non-revenue water use was not available for this study. Since the Desert View and Lucerne Valley systems are very small (about 10% of the total) and are of the same age as the Apple Valley North and South systems, the combined non-revenue water was assumed to be a reasonable approximation for the Apple Valley North and South systems. Table 2 presents the breakdown of the existing water demand in Apple Valley South System estimated from the average combined non-revenue water use rate.

TABLE 2
Existing Water Demands
Existing and Future Water Demands—Apple Valley South Water System

Demand Description	Demand (gpm)
Existing Water Sales	382
Non-Revenue Water (22%)	107
Total Existing Water Demand	489

Peaking Factor Identification

To evaluate the performance of the Apple Valley South System under conditions such as MDD and PHD, peaking factors were developed to facilitate the calculation of MDD and PHD using ADD. This approach promotes the calculation of ADD for various planning years and then allows a direct calculation for other demand periods using the appropriate peaking factor.

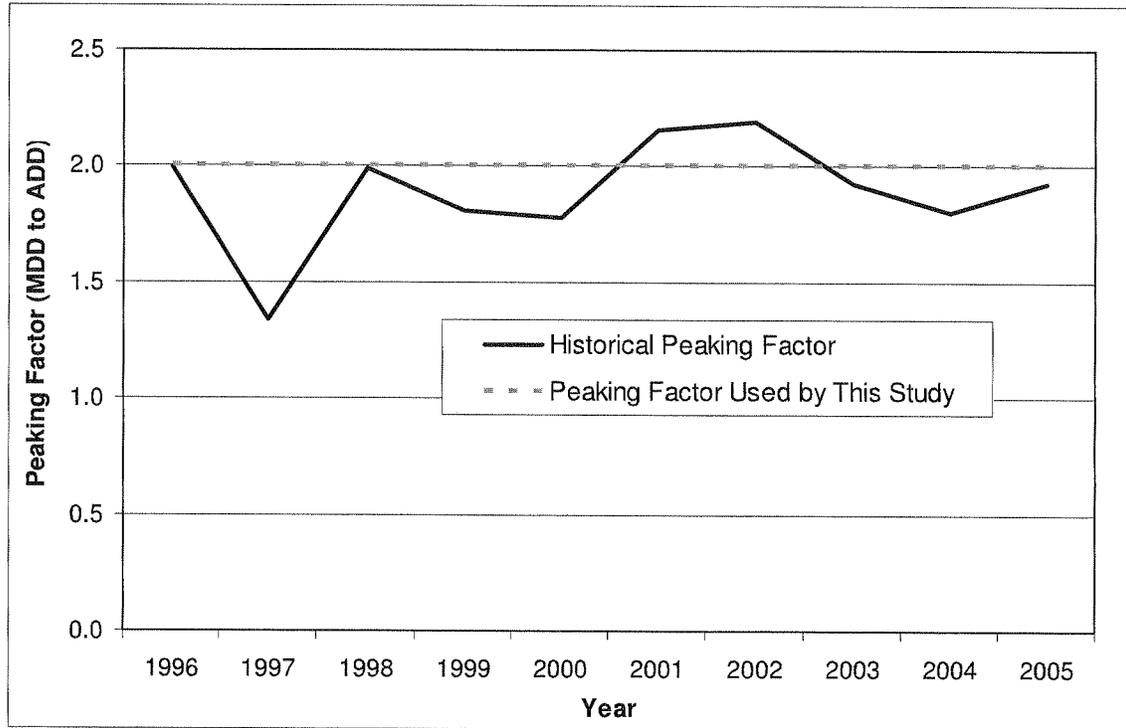
Based on the historical average day and maximum day demands provided by GSWC (see Table 3), the peaking factors from 1996 to 2005 ranged from 1.34 to 2.19 (see Figure 3). A peaking factor of 2.00 appears to be adequately conservative based on trends over the past 10 years.

TABLE 3
Historical Average and Maximum Day Demands
Existing and Future Water Demands—Apple Valley South System

Year	Average Demands		Maximum Day Demands	Peaking Factor (MDD:ADD)
	(ac-ft/yr)	(gpm)	(gpm)	
1996	673	417	833	2.00
1997	652	404	542	1.34
1998	625	388	771	1.99
1999	674	418	756	1.81
2000	718	445	791	1.78
2001	689	427	920	2.15
2002	733	455	997	2.19
2003	766	475	914	1.93
2004	810	502	904	1.80
2005	789	489	941	1.92

Note: Demands include non-revenue water use.

FIGURE 3
Historical Peaking Factors for Maximum Day Demand



The peaking factor for peak hour demand (PHD) to MDD was designated as 1.70 for the years 1980 to 2005 by GSWC. Table 4 summarizes the peaking factors for hydraulic modeling.

TABLE 4
Summary of Peaking Factors
Existing and Future Water Demands – Apple Valley South System

Peaking Factor Type	Peaking Factor
MDD	2.00 x ADD
PHD	1.70 x MDD

Future System Projections

Growth Rate Projection

The growth rate projection for the Apple Valley South Water System customer service area (CSA) was developed using SCAG’s population, household and employment data, which was recently updated based on 2000 U.S. Census data. The methodology is described as follows.

SCAG-derived census-tract projections were used to determine growth rate from 2005 to 2030. The Apple Valley South Water System serves the southeast of the Town of Apple Valley and surrounding unincorporated areas. According to GSWC, the CSA is estimated to expand as shown in Figure 4. The growth projection analysis consisted of superimposing CSA boundaries over census tract boundaries and township boundaries, identifying the applicable overlapping census tracts and townships, and developing percentage estimates of the CSA in the overlapping townships. Table 5 lists the overlapping census tracts and townships within the Apple Valley South CSA.

TABLE 5
Census Tracts and Areas in the CSA
Existing and Future Water Demands – Apple Valley South System

Census Tract	Township	Percentage of Census Tract and Township in CSA (%) ^a
Year 2005		
9707	Town of Apple Valley	4.23
9709	Town of Apple Valley	24.95
9712	Town of Apple Valley	32.43
Year 2030		
12100	Unincorporated Area	0.06
9707	Town of Apple Valley	19.01
9708	Unincorporated Area	3.76
9708	Town of Apple Valley	81.64
9709	Town of Apple Valley	35.53
9712	Unincorporated Area	94.31
9712	Town of Apple Valley	56.96

^a Percentage of Township in CSA (%) = (Area of Township within the CSA) / (Total Area of the Township)

It was assumed that the population, household and employment are uniformly distributed in each township. Then the population, household and employment in the Apple Valley South Water System CSA 2005 and 2030 boundaries could be calculated as shown in Table 6. In 2005, the served population was estimated to be 3,421; and in 2030, it was expected to be 10,624. From 2005 to 2030, the served population increases 210 percent, which is a growth rate of approximately 4.6 percent per year. The number of served households is expected to grow 277 percent from 2005 to 2030, which equates to a growth rate of 5.4 percent per year. The number of served employment is expected to grow 272 percent during the same period, which equates to a growth rate of 5.4 percent per year.

TABLE 6
Population, Household and Employment Projections in CSA
Existing and Future Water Demands – Apple Valley South System

Census Tract	Township	Population in Township*	Household in Township*	Employment in Township*	Population in CSA	Household in CSA	Employment in CSA
2005 Projections							
9707	Apple Valley Town	3,739	1,356	925	158	57	39
9709	Apple Valley Town	5,806	1,708	1,407	1,448	426	351
9712	Apple Valley Town	5,596	1,759	1,983	1,815	570	643
Sub-Total					3,421	1,054	1,033
2030 Projections							
12100	Unincorporated	10,937	4,779	1,928	5	2	1
9707	Apple Valley Town	4,900	2,306	1,774	931	438	337
9708	Unincorporated	6,255	2,188	607	235	82	23
9708	Apple Valley Town	1,604	373	518	1,339	305	423
9709	Apple Valley Town	7,686	2,899	2,633	2,731	1,030	936
9712	Unincorporated	720	274	29	679	258	27
9712	Apple Valley Town	8,256	3,256	3,685	4,703	1,855	2,099
Sub-Total					10,624	3,971	3,846
Overall Growth Rate (%)					210	277	272
Growth Rate per Year (%)					4.6	5.4	5.4

* This data was obtained from SCAG.

Water Demand Projections

It was assumed that the number of connections is proportional to the population. The future number of service connections was projected first and then the future annual average demands were calculated based on the average water demand per customer, which was estimated at 0.4351 AFY/conn. (see Table 1), and the future number of service connections. These projections are summarized in Table 7.

TABLE 7
 Projections for Number of Connections and Future Water Demands
Existing and Future Water Demands – Apple Valley South System

Planning Year	Projected Active Service Connections	Projected Annual Average Demands (AF/yr)
2005	1,833	798 ^a
2010	2,299	1,000
2015	2,883	1,254
2020	3,617	1,574
2025	4,537	1,974
2030	5,692	2,477

^a This number may not match the historical data in Table 1 because it was calculated using the average water demand per customer.

Figure 5 shows the historical and projected annual water demands for the Apple Valley South System from 1984 until 2030.

FIGURE 5
Historical Water Use and Future Water Use Projections

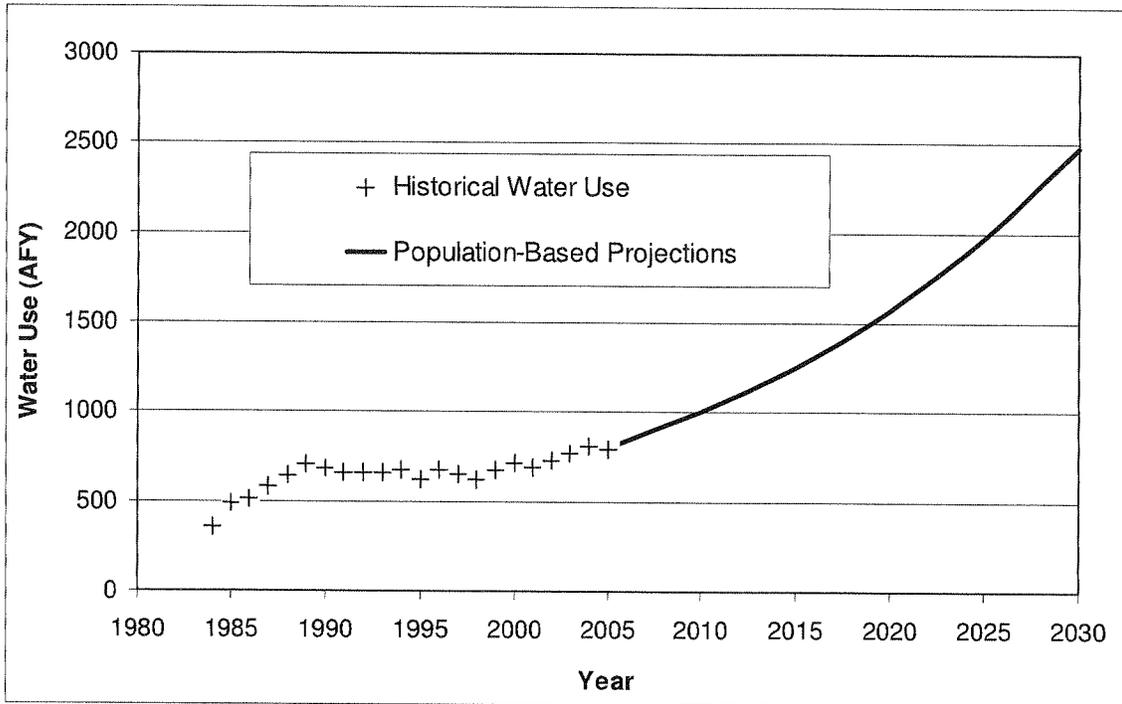


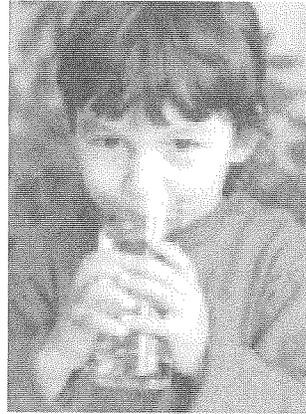
Table 8 summarizes the projected demands for ADD, MDD, and PHD using the peaking factors shown in Table 4.

TABLE 8
Water System Demands for ADD, MDD, and PHD
Existing and Future Water Demands – Apple Valley South System

Planning Year	Demand Period and Peaking Factor ^a			
	Annual Average (ac-ft/yr)	ADD (gpm) 1.00 x avg	MDD (gpm) 2.00 x ADD	PHD (gpm) 1.70 x MDD
2005	798 ^b	494	988	1,680
2010	1,000	620	1,240	2,108
2015	1,254	778	1,556	2,645
2020	1,574	976	1,952	3,318
2025	1,974	1,224	2,448	4,162
2030	2,477	1,535	3,070	5,219

^a Totals may not agree due to rounding.

^b This number may not match the historical data in Table 1 because it was calculated using the average water demand per customer.



Source Water Assessment

A source water assessment was conducted for each of the groundwater wells serving the customers of GSWC – Apple Valley South System in September 2000.

Three of the groundwater wells are considered most vulnerable to the following activities, which have been associated with contaminants that have not been detected in the water supply:

- Wells – water supply
- Machine shops

A copy of the assessment may be viewed at:
CDPH San Bernardino District Office or
Governmental Center 4th Floor
464 West 4th St. Suite 437
San Bernardino, CA 92401



Golden State Water Company
13608 Hitt Rd
Apple Valley CA 92308

You may request a summary of the assessment be sent to you by contacting:
CDPH San Bernardino District Office
At (909) 383-4320

For more details or information contact:
Jeffrey Long at (800) 999-4033