APPENDIX S

Draft Mariposa Lakes Specific Plan Project
SB 610 Water Supply Assessment Stockton, California

NOVEMBER 17, 2006

DRAFT

MARIPOSA LAKES SPECIFIC PLAN PROJECT
SB610 WATER SUPPLY ASSESSMENT
STOCKTON, CALIFORNIA

Prepared for:

City of Stockton
Community Development Department – Planning Division
345 North El Dorado Street
Stockton, CA 95202

Prepared by:

California Water Service Company
1550 West Fremont St, Suite 100
Stockton, California 95203

1. Introduction

Gerry N. Kamilos, LLC, John Vernor and others have formed PCCP Mariposa Lakes LLC which is proposing a large development project, Mariposa Lakes Specific Plan (MLSP), for an approximately 3,810 acre area located in the unincorporated area of the City of Stockton (City) east and north of Mariposa Road, South of Farmington Road (SR 4), east of the Stockton city limits and west of Kaiser Road. Figure 1 is a regional map and Figure 2 is a vicinity map for the proposed project. The proposed development area is to be annexed by the City of Stockton. The scale of development for Mariposa Lakes exceeds criteria set forth in California state law pertaining to the requirement for preparation of a Water Supply Assessment (WSA) report (Senate Bill (SB) 610, California Water Code Section 10912).

The City Community Development Department sent a letter to California Water Service Company (Cal Water) as the water service provider for approximately half of the proposed development area requesting that a WSA be prepared for the portion of the development to be served by Cal Water. Water service for the remaining half of the Mariposa Lakes Specific Plan will be provided by the City of Stockton Municipal Utilities Department (COSMUD). On October 2, 2006, COSMUD submitted a WSA for its portion of the proposed development to the Community Development Department.

The Mariposa Lakes Specific Plan is not covered in Cal Water's Stockton District 2004 Urban Water Management Plan (UWMP); therefore, its water requirements and how they would be met are addressed in this WSA. The Stockton District UWMP document provides historic and forecasted water demand and supply data and analyses and can be referenced for more detailed information on those topics. Cal Water updates its Urban Water Management Plans every three years.

Senate Bill 610 (Chapter 643, Statutes of 2001) (SB 610) amended state law, effective January 1, 2002, to improve the link between information on water supply availability and land use development decisions made by cities and counties. SB 610 requires that detailed information regarding water supply availability be provided to local public agency decision-makers prior to approval of development projects that meet or exceed any of the following criteria:

1. A residential development of more than 500 dwelling units.
2. A shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet.
3. A commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
4. A hotel or motel with more than 500 rooms.

5. An industrial, manufacturing or processing plant or industrial park planned to house more than 1,000 persons occupying more than 40 acres of land or having more than 650,000 square feet of floor area.
6. A mixed-used project that includes one or more of the projects specified above.
7. A project that would demand an amount of water equivalent to, or greater than the amount of water required by a 500 dwelling unit project.

Since the proposed Mariposa Lakes Specific Plan exceeds a number of the above criteria, a SB 610 WSA is required.

A SB 610 WSA must address the adequacy of the water supply to meet the estimated demands of the proposed project over the next 20 years in addition to those of Cal Water's existing customers and other anticipated future users under normal, single dry year and multiple dry year conditions, and determine whether there is sufficient water supply to meet those needs. (Water Code §10911(a).)

Section 5, Water Code 10910, Paragraph (c) (3) states: *"If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water supply system has no urban water management plan, the water assessment for the project shall include a discussion with regard to whether the public water supply system's total projected water supplies during normal, single dry, and multiple dry water years during a 20 year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned for future uses, including agricultural and manufacturing uses."*

SB 610 requires that the information developed to address the adequacy of water supply be included in the administrative record that serves as the evidentiary basis for an approval action by the local public agency.

Under SB 610, water assessments must be furnished to local governments for inclusion in any environmental documentation for certain projects (as defined in Water Code 10912 [a]) subject to the California Environmental Quality.

The following are covered in this WSA:

1) Summary of existing conditions for the proposed development area
2) Summary of Mariposa Lakes Specific Plan (MLSP) proposed development
3) MLSP projected water demands for the next 20 years,
4) Cal Water Stockton District projected water demands for the next 20 years
5) City of Stockton Metropolitan Area (COSMA) General Plan Update projected water demands for the City of Stockton Municipal Utilities District and San Joaquin County as well as Cal Water Stockton District

6) Description and assessment of Cal Water's proposed water supply to meet MLSP and Stockton District demands for the next 20 years
7) Conclusion about the sufficiency of supply to MLSP and Stockton District demands

2. Description of Existing Conditions at the Proposed MLSP Development Area

The proposed MLSP development area is generally flat agricultural land used for growing nut trees (mainly almonds) and vegetables. Two creeks bisect the site and currently provide site drainage: Duck Creek to the north and North Littlejohns Creek to the south. Vegetables are grown on a few parcels north and south of Duck Creek (See Figure 3). There are three small residential areas: 1) along Farmington Road, 2) along Carpenter Road and 3) north of Mariposa Road. The western half of the project site is within the Flood Control Area Drainage District but is not an aquifer recharge area. Within the site, fifteen parties own 38 recorded parcels, ranging from 3.1 acres to 466 acres in area. Existing land uses within the MLSP area that will not change include: the state highway and county rights-of-way, portions of the adjacent railroad, the three residential areas and a 5 acre parcel on the north side of Mariposa Road.

3. Summary of Mariposa Lakes Specific Plan Proposed Development

The MLSP proposed development covers 3,810 acres. Following is a summary of the land use plan for the **Total Development (COSMUD + Cal Water Service Area)**:

- Residential:
  Low Density (4 dwellings units/acre): Acres: 1,108, Dwelling units: 4,520
  Medium Density (7 dwellings units/acre): Acres: 554, Dwelling units: 3,807
  High Density (17 dwellings units/acre): Acres: 111, Dwelling units: 1,874
  Total (6 dwellings units/acre): Acres: 1 773, Dwelling units: 10,201

- Commercial:
  Neighborhood: Acres: 43, Square feet of building: 463,914, Jobs: 911
  Village: Acres: 64, Square feet of building: 698,049, Jobs: 1,369
  Total: Acres: 107, Square feet of building: 1,161,963, Jobs: 2,280

- Industrial/Business/Professional:
  Business/Professional: Acres: 127, Square feet of building: 2,759,526, Jobs: 11,039
  General Industrial: Acres: 722, Square feet of building: 16,476,788, Jobs: 22,921
  Total: 849 Acres, Square feet of building: 19,236314, Jobs: 33,960

- Educational:
  Elementary Schools (6): Acres: 96
  High School: Acres: 54
  College: Acres: 20
  Religious/Institutional: 18

Total: Acres: 188

- Parks and Open Space: Acres: 426

- Miscellaneous:
  Amtrak Station: Acres: 8
  Circulation (roads, bike and pedestrian pathways): Acres: 307
  Existing residential: Acres: 146
  Total: Acres: 461

Following is a summary of the land use plan for the **Cal Water Service Area:**

- Residential:
  Low Density (4 dwellings units/acre): Acres: 442.2, Dwelling units: 1,739
  Medium Density (7 dwellings units/acre): Acres: 318.6, Dwelling units: 2,107
  High Density (17 dwellings units/acre): Acres: 24.1, Dwelling units: 434
  Total: Acres: 784.9, Dwelling units: 4,280

- Commercial:
  Total: Acres: 34.6, Square feet of building: 375,740, Jobs: 737

- Industrial/Business/Professional:
  Industrial: 470.4 Acres, Square feet of building: 10,658,140, Jobs: 18,820
  Business/Professional: 122.8 Acres, Square feet of building: 2,783,360, Jobs: 4,910
  Total: 593.2 Acres, Square feet of building: 13,440,500, Jobs: 23,730

- Educational/Institutional:
  Elementary Schools (2): Acres: 32
  High School (1): Acres: 53.8
  Religious/Institutional: Acres: 18
  Total: Acres: 103.8

- Community Parks (irrigated): Acres: 64.5

- Miscellaneous:
  Existing residential: Acres: 146

4. Water Demand Forecasts

Cal Water Service Area within the Mariposa Lakes Specific Plan Area

The following demand forecast is for full build-out of Cal Water's service area within Mariposa Lakes Specific Plan area.

Residential:

- Single-Family

For the five-year period from 1999 to 2003, average water consumption for single-family residences in the Cal Water Stockton District was 149,444 gallons/year/service or 409.4 gallons/day/service.

For single-family (and multi-family) residences in the Mariposa Lakes Specific Plan, it is proposed that 90% of the five year average daily water usage be used for the following reason. Water conservation measures will be incorporated into MLSP development. These will include: Xeriscape landscaping (low water consuming plantings; hence, lower irrigation demand), low flush toilets, low flow shower heads, and water conserving washing machines. While the American Water Works Association (www.AWWA.org) indicates that conservation measures (installation of more efficient water fixtures and regular checking for water leaks) results in a 30% reduction in internal residential water use, it is also recognized that water consumption for existing residences in the Cal Water Stockton District is preponderantly for older homes with small lots. These homes are likely to have fewer water fixtures than the new homes to be constructed in Mariposa Lakes, which are likely to include front yard landscaping with automatic irrigation systems. Hence, while there will be reductions in water use due to conservation measures being incorporated into the new homes, that may be offset by higher levels of water use associated with more fixtures and automatic landscape irrigation. Consequently, 90% of the Stockton District 5-year average is used here to forecast demand for single family and multi-family residences at build out in Mariposa Lakes.

Therefore, the single-family residential water annual average day forecasted demand is:

Dwelling Units	Gallons/day/Unit	Total Water Use
3,846	368.5	1,417,250 gallons/day

- Multi-family

For the five-year period from 1999 to 2003, average water consumption for multi-family residences was 88,133 gallons/year/service or 241.5 gallons/day/service. Using a 90% factor to account for water conservation measures incorporated into these residences, results in a value of 217.4 gallons/day/service.

Therefore, the multi-family residential water annual average day forecasted demand is:

Dwelling Units	Gallons/day/Unit	Total Water Use
434	217.4	94,350 gallons/day

Total Residential Annual Average Day Demand at Build out: 1,511,600 gallon/day

Commercial:

Commercial land acreage is projected to be 34.6 acres with 375,740 sq ft of building space.

The County Sanitation Districts of Los Angeles (CCDLA) developed a table of estimated demand for various types of commercial activities. Since in a WSA prepared for a development project in Torrance, CA, there was good agreement between the estimate of residential water usage derived from Cal Water data and that determined by using CCDLA data, estimates of water demand for commercial activities using CCDLA factors for those activities were used. They are summarized below and are used here since there is likely very little differences in internal water use for common standardized commercial stores within California.

County Sanitation Districts of Los Angeles
Commercial Activities Water Use Factors

Category	Average Use gallons/day/sq ft
Recreation/Entertainment:	
Multiplex movie theater	0.138
Bowling Alley	0.165
Fitness Center	0.165
Multi-purpose Recreation Center	0.85
Retail:	
Shopping Center	0.358
Electronic Superstore	0.110
Home Improvement	0.110
Discount Club	0.110
Home Furnishing	0.110
Office Supp	0.110
Pet Supply	0.110
Supermarket	0.65
Hotel:	0.138 gallons/room
Restaurants:	
High turnover	1.100
Fast Food	1.100
Quality	1.100

For another reference for commercial usage, measured water use in a new small shopping center with a mix of commercial activities in Cal Water's Mid-Peninsula District, which includes San Mateo, CA was obtained in another WSA study. Cal Water calculated an average use factor of 0.2 gallons/day/square ft.

Since no specific designation of commercial activities is identified for the MLSP, it is assumed that there will be a mix with the weighting as follows:

85 % retail (0.2) + 10% restaurants (1.10) + 5% recreation/entertainment (0.19) = 0.29 gallons/day/sq ft

Therefore, annual average day commercial water use at build out is estimated to be:

375,740 sq ft x 0.29 gallons/sq ft = 109,000 gallons/day

Industrial/Business/Professional:

Business/Professional: 122.8 Acres, Square feet of building: 2,783,360, Jobs: 4,910

- *Industrial:*

The MLSP indicates industrial uses as: 470.4 Acres, 10,658,140 square feet of building, and18,820 jobs. It indicates that designated industrial uses may include large assembly and storage areas, warehousing, professional and medical offices and wholesale retail outlets such as Costco and Home Depot. Prohibited uses include outside manufacturing, heavy industrial fabrication, processing, assembling and repair. Industrial uses are to be in accordance with City of Stockton's General Plan (Updated) and development codes. Buildings will be situated so that there is adequate space for parking and vehicular circulation.

Using the Urban Water Supply Handbook (McGraw-Hill 2002) in Table 5.9 (Average Rates of Non-residential Water Use from Establishment Level Data) as a reference, an estimate of water demand was developed. Water use factors vary widely in gallons per employee per day (g/e/d) depending on the type of industry. The overall average for manufacturing is 164 g/e/d based on a sample size of 2,790 manufacturing operations. Since this number includes industrial categories that are excluded from Mariposa Lakes such as chemicals and allied products, petroleum and coal products, primary metal industries, etc. and categories that are not likely for this area, which have very high water use rates, it is not considered appropriate for the MLSP. The following industries and business activities were selected and a weighted average value was calculated as follows:

MANUFACTURING (50%): Average = 125 g/e/d
- Electronic and other electrical: 95 g/e/d
- Instruments and related products: 66 g/e/d
- Printing and publishing: 37 g/e/d
- Food and kindred products: 469 g/e/d
- Lumber and wood products: 49 g/e/d
- Miscellaneous manufacturing: 36 g/e/d

WHOLESALE (25%): Average = 66.5 g/e/d

Durable goods 46 g/e/d
Non-durable goods 87 g/e/d

RETAIL (25%): Average = 50.2 g/e/d
Building materials and garden supplies: 35 g/e/d
General merchandise stores: 49 g/e/d
Automotive dealers and service stations: 49 g/e/d
Apparel and accessory stores: 68 g/e/d

The water consumption figure selected was:

0.5 x 125 + 0.25 x 66.5 + 0.25 x 50.2 = 91.7 gallons/employee/day.

Therefore, estimated annual average day industrial demand is: 91.7 g/e/d x 18,820 employees = 1,725,800 gallons/day

- *Business/Professional:*

Using the previously cited Table 5.9, the following consumption figures were averaged to come up with 114 gallons per employee per day:

Business services: 73 g/e/d
Health services: 91 g/e/d
Educational services: 117 g/e/d
Social services: 106 g/e/d
Finance, insurance and real estate services: 192 g/e/d
Public administration: 106 g/e/d
Hotels and lodging: 230 g/e/d
Engineering and Management: 58 g/e/d

Therefore, estimated annual average day business/professional demand is: 121.6 g/e/d x 4,910 employees = 597,000 gallons/day

Total estimated annual average day water demand for industrial/business/professional uses: 2,322,800 gallons/day

Educational/Institutional:

There are two elementary schools (32 acres), one high school (53.8 acres) and one religious/institutional facility: (18 acres) for a total of 103.8 acres.

Using the figure of 3,500 gallons/day/acre used for schools in the Rancho San Juan Specific Plan by Monterey County Planning and Building Inspection Department in 2005 yields: 103.8 acres x 3,500 gallons/day/acre = 363,300 gallons/day

Community Park (irrigated):

There are 64.5 acres of irrigated community park. These are separate from the linear green areas or parks along Duck Creek, several bike and pedestrian trails and roads. The latter are presumed to not be irrigated.

Cal Water has measured park and open space irrigation usage in a variety of urban applications and has found that it can range widely depending on the nature of the area, irrigation practices, type of vegetation and landscape cover, percentage of area irrigated, location and whether or not conservation practices are being followed. Usage can range from 2.0 acre-ft/acre/year to over 4.5 acre-ft/acre/year.

Given that it is anticipated that normal irrigation practices will be followed, an average application rate of 3.5 acre-ft/acre/year (ft/yr) is selected the representative rate.

Therefore, estimated annual average day community park landscape irrigation demand at build out: 64.5 acres x 3.5 acre-ft/acre/yr = 226 acre-feet/year x 325,851 gallons/acre-feet x 1/365 days/year = 201,600 gallons per day.

Cal Water Mariposa Lakes Specific Plan Service Area Total Estimated Annual Average Day Water Demand at Build Out:

4,508,300 gallons/day or 4.51 million gallons per day (mgd) or 5,054 acre-ft/yr

Maximum day demand is based on the peaking factor determined from historic water use records. The Cal Water Stockton District has a historical average peaking factor of 1.74 for both 5-year and 10-year averages. This factor is used here.

Cal Water Mariposa Lakes Specific Plan Service Area Total Estimated Maximum Day Water Demand at Build Out: 7,844,400 gallons/day or 7.84 mgd

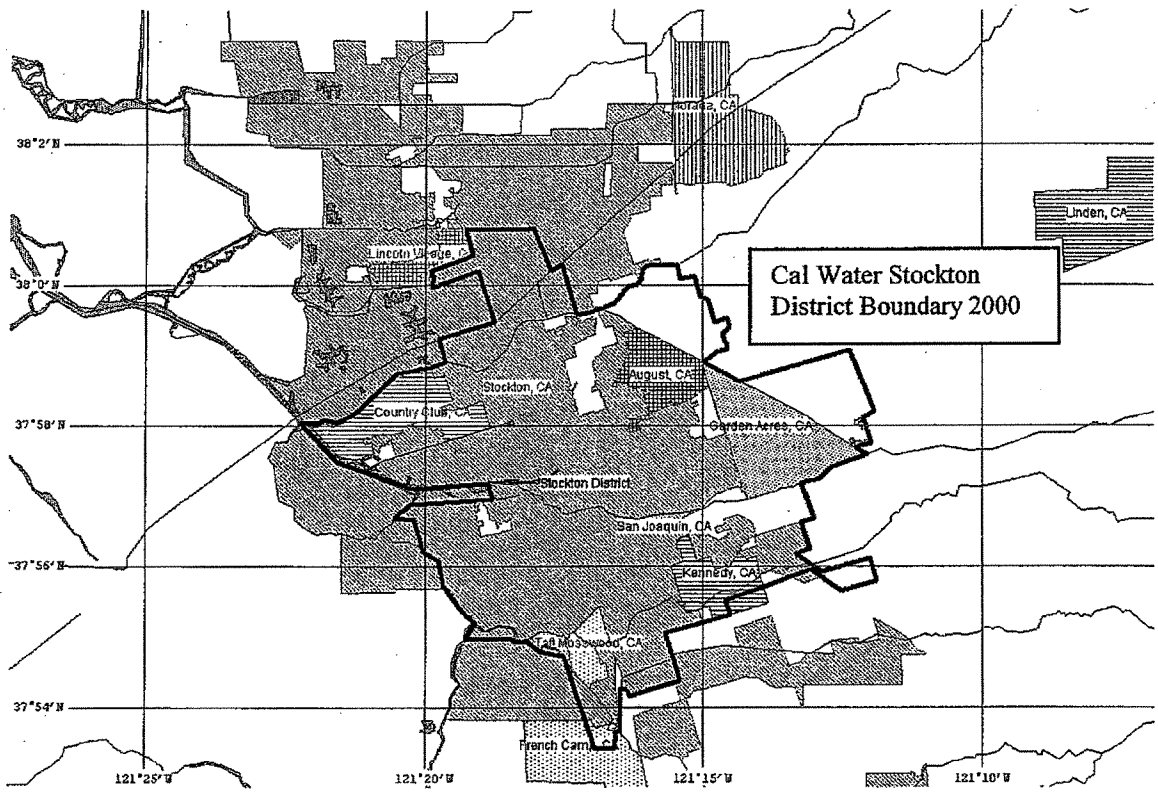
Reclaimed Water Demand Forecast: None for the Mariposa Lakes Specific Plan. All wastewater will be collected and conveyed to the City of Stockton's wastewater treatment facilities, treated and discharged to the San Joaquin River. These discharges are intended to supplement existing return flow credits for raw water supply for the City's Delta Water Supply Project.

Water Demand Forecast for the Cal Water Stockton District

Stockton District land use is predominantly residential and commercial. Single-family residences account for 88.6% of all services; multifamily residences represent 0.8% and commercial services 9.6%. Thus, 99% of all services are residential and commercial. The remaining 1% includes industrial, governmental, and other temporary functions such as construction.

The Cal Water Stockton District 2000 population is estimated to be 161,153 people based on US Census Bureau data shown in the following figure and table. Based on 1990 U.S.

Census data, Stockton District's population was estimated to 148,680. So for the 10 years between 1990 and 2000, Cal Water's service population increased by about 12,470 people or an average of 1,247 persons per year.



Cal Water Stockton District US Census Bureau Data for 2000		
Population	Housing Units	District Square Miles
161,153	53,911	42.29

Stockton District Water Demand Forecast

Cal Water projects water demand by multiplying its estimate of total projected services by demand per service. Historical data on number of services by customer classification (single family residential, multi-family residential, commercial, industrial, institutional and other) are given in the 2004 UWMP Sales Table and Demand per Service Table. Historical sales for each customer classification and the annual average service counts for that class are used to calculate the demand per service for a given classification. (Note: all residential services in the Stockton District are metered.)

Total system demand is forecasted by multiplying the number of services for each customer classification by the demand per service for that classification. This method

takes into account the significant differences for demand per service associated with each customer classification and the different growth rates for each classification.

In the 2004 UWMP, the growth pattern for the five-year period from 1999 to 2003 was applied to three different scenarios to project future demands for the Stockton District. The starting point for each projection was the actual annual average number of services in 1997.

Scenario #1: Low Growth in Demand

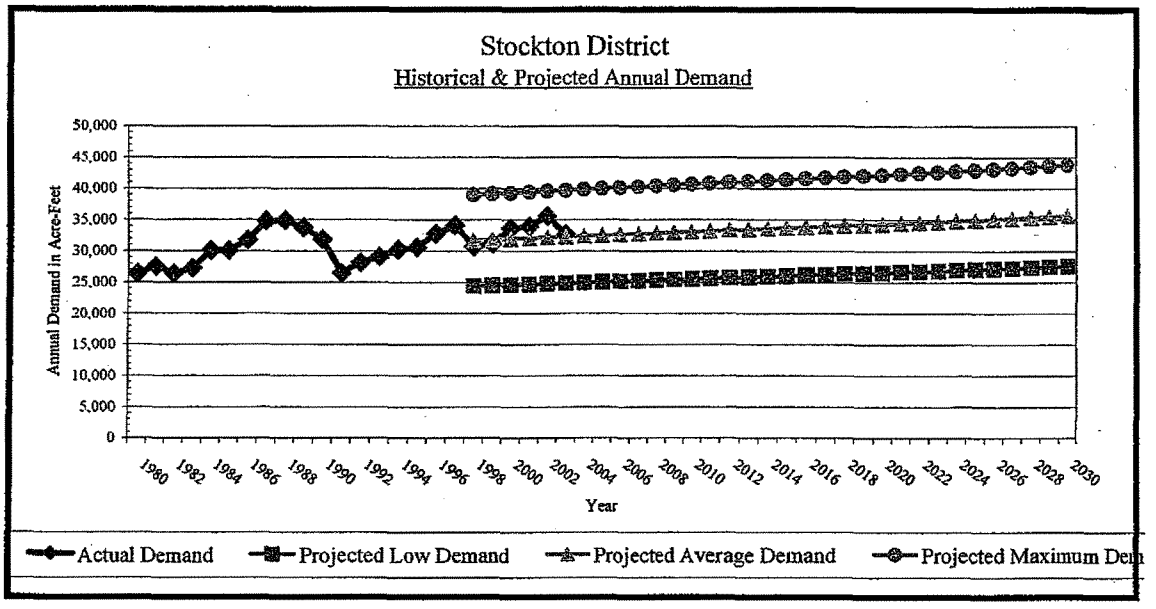
The five-year average annual growth pattern was applied to the lowest recorded demand per service for each customer class since 1980 was used to estimate total demand for the year 2030. This demand, which is heavily influenced by the extended drought in the early 1990s, is viewed as the level that would result from aggressive conservation in response to an extended drought condition without impacting public health and safety.

Scenario #2: Normal Growth in Demand

The five-year average annual growth pattern was applied to the average recorded demand per service for each customer class since 1980 was used to estimate total demand to 2030. This forecast represents the demand likely to occur if Cal Water's 10% conservation goal is achieved and maintained. To accomplish this level of demand, appropriate conservation programs must be effectively implemented.

Scenario #3: High Growth in Demand

The five-year average annual growth pattern was applied to the highest demand per service for each customer class since 1980 was used to estimate total demand to 2030. This growth rate is viewed as having a reasonable probability of occurring - not so much because demand per service is likely to be high (in light of the Cal Water's ongoing water conservation programs), but because of the recent high growth rate that is occurring throughout the Stockton metropolitan area. For example, as of October 1, 2006, Cal Water projects 531 new services from current new developments and 643 new services from proposed new developments for a total for a total of 1,174 new services in the next five years. Cal Water's estimated 2006 total services were 41,860. This represents a 0.566% per year growth (2.83 %/5 years) compared to the 10-year average from 1993 to 2003 of 0.32% per year.



With reference to the City of Stockton's 2006 Draft Water Supply Evaluation for its General Plan Update and other recent information on growth in the COSMA, a separate demand forecast was developed and follows.

Actual and Projected Water Demands for City of Stockton Metropolitan Area (COSMA) in Acre-Ft/year

(Percentage of Total Demand shown in parenthesis)

Year	Total Demand	City of Stockton	Cal Water	San Joaquin County
1994	54,260	22,619 (41.7%)	30,345 (55.9%)	1,296 (2.4%)
2004	68,714	34,550 (50.3%)	32,070 (46.7%)	2,094 (3.0%)
2010	81,250	42,170 (51.9%)	36,940 (45.5%)	2,140 (2.6%)
2020	106,250	64,030 (60.3%)	40,000 (37.6%)	2,220 (2.1%)
2030	137,500	92,200 (67.0%)	43,000 (31.3%)	2,300 (1.7%)

In comparison to Cal Water's 2004 Urban Water Management Plan, the above forecast for the Cal Water Stockton District differs as follows:

2010: halfway between normal and high estimated demand
2020: 94.7% of high demand or 5,630 acre-ft/yr more than normal demand
2030: 98% of high demand or 7,330 acre-ft/year more than normal demand.

In summary, a high growth demand is projected for Cal Water in the next 20+ years.

Accordingly, water demand forecast in five-year increments was developed for the next 20 years and is shown below.

Twenty-Year Projected Annual Average Day Water Demands for the Cal Water Stockton District

Year	MGD	Acre-Ft/Year
2006	30.05	33,690
2011	33.22	37,246
2016	34.59	38,776
2021	35.95	40,300
2026	37.28	41,800
2030	38.36	43,000

Mariposa Lakes:

An engineering consultant (Lynn Sutton) for the developer indicates that construction is planned to start in 2008 with full development build out occurring by 2028 or over a period of 20 years. For the purposes of this analysis, it is assumed that construction and use of facilities will be linear with time, so that completion and use of Cal Water's MLSP service area would be as follows:

2006: 0%
2011: 15%
2016: 40%
2021: 65%
2026: 90%
2030: 100%

Estimated average annual day water demand for Mariposa Lakes in five year forecast increments for the next 20 years is:

Cal Water Mariposa Lakes Water Demand

Year	MGD	Acre-ft/Year
2006	0.0	0
2011	0.676	758
2016	1.80	2,022
2021	2.93	3,285
2026	4.06	4,549
2030	4.51	5,054

Mariposa Lakes Specific Plan demand forecasts are not explicitly covered in Cal Water's June 2004 Urban Water Management Plan (UWMP) for the Stockton District.

Mariposa Lakes Specific Plan water demands are assessed in the context of the total projected growth in demand for the Stockton District.

For 2011: The estimated annual average day demand for the Stockton District is 33.22 mgd or an increase from 2006 (5-year period) of 3.17 mgd. The projected demand for Mariposa Lakes is 0.676 mgd or about 21% of the projected increase in forecasted water demand for that period.

For 2016: The estimated annual average day demand developed in this report for the Stockton District is 34.59 mgd or an increase from 2006 (10-year period) of 4.54 mgd. The projected demand for Mariposa Lakes is 1.80 mgd or about 40% of the projected increase in forecasted demand.

For 2021: The estimated annual average day demand developed in this report for the Stockton District is 35.95 mgd or an increase from 2006 (15-year period) of 5.9 mgd. The demand for Mariposa Lakes is 2.93 mgd or 50% of the projected increase.

For 2026: The estimated annual average day demand developed in this report for the Stockton District is 37.28 mgd or an increase from 2006 (20-year period) of 7.23 mgd. The forecasted demand for Mariposa Lakes is 4.06 mgd or 56% of the projected increase in forecasted demand.

As shown in the preceding analysis, the Mariposa Lakes Specific Plan represents an increasingly significant percentage of the projected increase in water demand for the Cal Water Stockton District. Since a higher than normal demand forecast was developed by Cal Water for the next 20 years, it is assumed here that projected demands for the Mariposa Lakes Specific Plan will account for more than half of that growth at the end of 20 years. Therefore, in providing an assessment of the adequacy of the Stockton District supply, the demand forecast as developed here for the Stockton District will be used with the explicit assumption that it includes demands associated with the MLSP.

The projected maximum day demand, which is based on using an average factor of 1.74 times the annual average day demand is presented below in five-year increments.

Stockton District Maximum Day Demand (MDD) Forecast

Year	MGD
2006	52.3
2011	57.8
2016	60.2
2021	62.5
2026	64.9

5. Cal Water's Water Supply for the Stockton District

Water furnished to Stockton District customers is a combination of groundwater and purchased treated surface water from Stockton East Water District (SEWD). SEWD contracts with Calaveras County Water District (CACWD) for supply from New Hogan Reservoir, which was built by the U.S. Army Corps of Engineers and is operated for flood control by that agency of the Federal Government. SEWD is the water master allocating releases from the reservoir for irrigation and municipal water uses. The reservoir is located 30 miles northeast of Stockton on the Calaveras River.
Under normal conditions SEWD's supply from this source equals 40,172 acre-ft/year. SEWD is also entitled to 12,650 acre-ft/year as a result of senior water rights of

landowners within SEWD's service area. The total supply available to SEWD and CACWD from New Hogan Reservoir is 84,100 acre-ft/year. Under contract SEWD may use all of the available supply not used by CACWD. Based on CACWD's current usage, SEWD normally receives 83,000 acre-ft/year. CACWD will eventually develop facilities to exercise its full entitlement, at which time SEWD will receive 52,822 acre-ft/year. The additional supply currently available to SEWD is being used for groundwater recharge. The New Hogan Reservoir supply is delivered through a 13-mile pipeline from Bellota Weir through the Bellota pipeline and/or to the Peters pipeline to the SEWD treatment plant. The treatment plant has a 50 mgd base load and 64 mgd peaking capacity.

To improve the reliability of water supply to the treatment plant, SEWD contracted with the United States Bureau of Reclamation in 1983 for 75,000 acre-ft/year from New Melones Reservoir on the Stanislaus River. A conveyance system was completed in 1994 to import this interim water supply. SEWD also contracts with South San Joaquin Irrigation District (SSJID) and Oakdale Irrigation District (OID) for supply from New Melones Reservoir, which is the current principal supply. Water from the New Melones Reservoir is conveyed via the Goodwin Tunnel, the Upper Farmington Canal, the natural Shirley, Hood and Rock Creeks system into the Farmington Reservoir. Water continues through the Lower Farmington Canal to 78-inch and 66-inch pipelines which connect to the Bellota and/or Peters pipelines. Part of the conveyed water is for in-lieu and direct groundwater recharge along the downstream portion of the Peters pipeline (for agricultural users) and at the SEWD water treatment plant (for urban users).

The CWS Stockton District uses SEWD treated surface water as its primary supply to meet its base load demands (late fall, winter and early spring) and as a supplemental source pumps groundwater to meet higher seasonal demands (late spring, summer and early fall).

In summary, surface water supplies from SEWD come from sources in the eastern Sierra Nevada foothills. Existing firm supplies for municipal and industrial (M&I) uses are estimated to yield 104,100 acre-ft/year under wet and above average hydrologic conditions. SEWD's full entitlements including interim and future supply sources could yield up to160,100 acre-ft/year.

SEWD's ability supply water in any given year is subject to: 1) annual precipitation and runoff and consequently what the deliveries to its conveyance system will be from its various sources, 2) water demands of the City, Cal Water and the County, 3) the capacity of the raw water delivery system to the SEWD WTP, 4) the capacity of the SEWD WTP and 5) the conveyance capacity of treated transmission lines from the WTP to the COSMA service areas.

Existing firm surface water contracts held by SEWD include a US Bureau of Reclamation (Reclamation or USBR) contract (New Hogan Reservoir) and a Calaveras County Water District (CACWD) contract on the Calaveras River based on appropriative water rights held by CACWD, and a Reclamation Central Valley Project (CVP) contract on the Stanislaus River (New Melones Reservoir). Contract documents, agreements, and

applications for these surface water supplies have been furnished to the City for its WSA for Mariposa Lakes

It is noted that information on both surface water and groundwater supplies that was developed for and presented in the "Water Supply Evaluation for the City of Stockton General Plan Update, May 2006 (WSE GPU)" in which Cal Water participated with the City and County in its preparation has been selectively used in this WSA. For more complete data, technical analyses and references with respect to the COSMA supply, please refer to that document.

Following is a modified summary of the sources cited in the WSE GPU based on assumptions explained in the paragraphs that follow this summary:

Current and Future SEWD Water Sources and Critical Year Availability

Source	Annual Contract Amount Acre-feet (AF)	Projected "Critical Year" Annual Availability (AF/year)			
		Planning Year			
		2000	2010	2020	2035
Current and Future "Firm" Sources of Supply					
Reclamation – New Hogan Water Supplies, CACWD and SEWD	Total Yield 84,100 AF SEWD Entitled to M&I or Ag 40,171 AF	20,000	12,000	12,000	12,000
CACWD Appropriative Water Rights	Unused CACWD Rights Current M&I: 24,000 AF to 10,000 in 2035	20,000	10,000	10,000	10,000
Reclamation – New Melones Interim Water Contract and Section 215 "Spill" Water	Total Contract 75,000 AF: M&I: 40,000 AF Ag & Recharge: 20,000 AF Losses: 15,000 AF	Not Available in Dry Years			
SSJID Transfer - Stanislaus River	M&I 2006 to 2020: 15,000 AF	4,000	4,000	4,000	0
OID Transfer - Stanislaus River (includes contract renewal & new contract)	M&I 2006 to 2020:15,000 AF Projected M&I 2020 to 2040: 20,000 AF	4,000	4,000	8,330	8,330
Future Appropriative Water Rights on the Calaveras River	Not Yet Determined: Assumed to be M&I 50,000 AF in Wet and Above Normal years Only	Not Available in Dry Years			
Total	Firm M&I 2006 to 2020: 104,100 AF Firm M&I 2020 to 2030: 94,100 AF Estimated Maximum Future M&I at 2030: 160,171 AF)	48,000	30,000	30,330	30,330

Calaveras River Contracts

The US Bureau of Reclamation contract for water stored in New Hogan Reservoir is a settlement contract that provides a firm supply of water in all hydrologic year types. The maximum amount available for M&I is approximately 40,171 acre-ft/year. The CACWD contract is also firm due to the contract being senior to most other water contracts on the river. However, as development continues in Calaveras County, less of the CACWD water will be available to SEWD and its customers. This contract currently yields 24,000 acre-ft/year but is anticipated to diminish over time to 10,000 acre-ft/year.

Stanislaus River Contracts

In 1983, SEWD contracted with the USBR for 75,000 acre-ft/year of surface water supply from the New Melones Project on the Stanislaus River to be delivered at the Goodwin Dam. In 1987, SEWD agreed to provide a minimum of 20,000 acre-ft/year of treated water to COSMA users in accordance with the contract entitled, "Second Amended Contract Among the Stockton East Water District, The California Water Service Company, The City of Stockton, The Lincoln Village Maintenance District, and The Colonial Heights Maintenance District Providing For The Sale of Treated Water." This agreement allocates SEWD treatment plant output to Cal Water, the City and the County based on each retailer's previous year's percentage of total water produced in the COSMA and is attached.

In 1994, SEWD completed construction of the Farmington Canal Project, connecting Goodwin Dam to SEWD's WTP expanding its raw water capacity. This provided access to SEWD's New Melones CVP Project Supply. However, in the mid 1990's implementation of the Central Valley Project Improvement Act (CVPIA) (P.L. 102-575) and other regulatory actions substantially reduced the volumes of water SEWD could expect to be delivered under its New Melones Project contract, especially in dry years.

Supplies from the Stanislaus River also based on two short-term transfer contracts with SSJID and OID (who hold senior water rights on the Stanislaus River) for 15,000 acre-ft/year each or a total of 30,000 acre-ft/year. The SSJID and OID contracts expire in 2010, but are renewable for another 10 years. Negotiations for a 10-year renewal period with both agencies are being initiated. In addition, the City, Cal Water and SEWD are seeking new longer-term contracts for increased supplies. Here it is assumed that only OID will enter into a new contract for 20,000 acre-ft/year from 2020 to 2040. This is based on OID's Draft Water Resources Plan, which indicates that a longer term transfer agreement should be obtained so that the revenues from annual water sales can help pay for improvements to their water delivery system facilities.

Projected Availability of Water for OID & SSJID Short and Longer Water Contracts

Percentage of Years	Volume Available Annually (AF/year)	
	2006 to 2020	2020 to 2040
85%	30,000	20,000
9%	12,500	8,333
6%	8,000	5,333

Other Potential Surface Water Supplies

Other future supplies are anticipated through future appropriative water right permits on the Calaveras and Stanislaus Rivers and Littlejohn's Creeks. However, these potential supplies are not included here although efforts to obtain these water rights permits will be made if at a later date that other supplies may not be sufficient to meet future long term water demands.

COSMA Groundwater Overview

Groundwater is an essential supply source for Cal Water. Cal Water currently and in the future will exercise its rights as an overlying groundwater appropriator to pump groundwater from the basin underlying its service area for potable water supply. It is also committed to managing this resource for long-term sustainability.

Managing groundwater for sustainability means to not over extract so that sources recharging the groundwater basin can increase storage during normal and wet hydrologic periods. While achieving this goal depends on the actions of many other users of this groundwater basin, Cal Water is committed to not having its actions contribute to overdrafting of the basin. Historically overdrafting has decreased basin storage, caused declines in static water levels, caused saline intrusions in the western reaches of the basin and accelerated spreading of contamination plumes in the greater COSMA.

In wet years, when surface water is more plentiful, storage in the groundwater basin is increased when more surface water is used and groundwater pumping reduced (i.e., in-lieu recharge) In dry years, groundwater is extracted at a higher rate to meet water demands when there are less surface water supplies available.

Groundwater use in the COSMA and areas in San Joaquin County to the east of COSMA has resulted in a decline of groundwater elevations from 1947 to 2004. Until 1978 agricultural users and municipal water suppliers relied entirely on groundwater supplies.

In the late 1970's, SEWD began providing treated surface water to Cal Water and the City of Stockton. Use of surface water in the COSMA resulted in an increase in groundwater elevations, which continued until the drought of the late 1980's and early 1990s. Groundwater basin storage and hence levels improved prior to the drought and from 1994 to 2000 when precipitation levels returned to normal. This improvement is attributed to increased natural recharge due to higher levels of annual precipitation, active recharge projects, and reduced groundwater pumping because of increased use of treated surface water by the COSMA water retailers.

As mentioned, from 1947 to 2004, the decline in groundwater basin storage in western San Joaquin County created a condition that resulted in saline water migrating from the west into the east-northeast area of the COSMA, degrading water quality and rendering it unsuitable for municipal or agricultural use in some locations.

An important factor in establishing the sustainable yield of the groundwater basin is to stop the advance or intrusion of saline water into the groundwater basin underlying the COSMA. Over the years, there have been various estimates of the sustainable long-term yield from the groundwater aquifer. The February 1992 Supplemental Report for Water Supply prepared for the

COS Special Planning Area Study states: *"about 40,000 acres and an average withdrawal of 0.75 AF/ac/year. ...groundwater can provide from 0.75 to 1.0 AF/ac/year on a long term basis."*

Other references to sustainable groundwater yield are included in the City of Stockton 1995 Urban Water Management Plan Update, which uses a long-term firm yield of 1.0 AF/ac/year, and from the North Stockton Master Plan in which 0.75 AF/ac/year is used.

A common objective of Cal Water, the City of Stockton Municipal Utilities District (COSMUD) and San Joaquin County is to reduce groundwater overdraft and protect the groundwater basin from further saline intrusions and water quality degradation. To that end, COSMUD made a conservative assumption for groundwater extraction to insure that in the long-term groundwater basin storage is adequately maintained, if not enhanced, and therefore has adopted a 0.60 acre-ft/acre/year factor for supply planning purposes.

Cal Water views an average groundwater long term withdrawal rate of 0.60 acre-ft/acre/year as a conservative goal and assesses future use of groundwater in its service area based on that goal with the understanding that it may use the 0.75 acre-ft/acre/year withdrawal rate (or slightly higher) if future circumstances warrant it.

Section 10910(f)(2) requires a description of the groundwater basin and the efforts being taken to prevent long-term overdraft.

The groundwater basin underlying San Joaquin County is part of the contiguous Central Valley aquifer system, which supplies groundwater to agricultural, domestic, and industrial water users from Redding to Bakersfield. The basin consists of Pre-Tertiary igneous and metamorphic rocks of the Sierra Nevada that continue west beneath the valley floor. Marine sediments, thousands of feet thick, overlie the basement rocks. Continental deposits overlie the marine rocks and act as the primary freshwater aquifer in the study area. In local areas, fresh water may be present in both marine and continental deposits, and saline water may be found in continental deposits.

DWR Bulletin 146 identifies the usable aquifer in the eastern portion of San Joaquin County as the continental deposits of the Miocene and younger age formations. The usable aquifer is present within the boundaries of the county in distinct geologic formations that include the Mehrten Formation, the Laguna Formation, the Victor Formation, flood basin deposits, and alluvial fan and stream channel deposits. The thickness of the usable aquifer ranges from less than 100 feet in the eastern edge of the county to over 3,000 feet in the southwestern edge, and is approximately 1,000 feet beneath the City of Stockton.

Groundwater in the San Joaquin County area moves from sources of recharge to areas of discharge. Most recharge to the aquifer system occurs from the Delta and along active stream channels where extensive sand and gravel deposits exist. Consequently, the highest groundwater elevations typically occur near the Delta, the Stanislaus River, and the San Joaquin River. Other sources of recharge within the project area include subsurface recharge from fractured geologic formations to the east, as well as deep percolation from applied surface water and precipitation.

Municipal and agricultural uses of groundwater within San Joaquin County contribute to an overall average yield of groundwater estimated to be 867,000 acre-ft/year. Over at least 60 years, groundwater elevations declined from 40 to 60 feet. As a result, a regional cone of depression has formed in Eastern San Joaquin County creating a gradient that allows saline water underlying

the Delta region to migrate northeast within the southern portions of the City. Groundwater underlying the City generally flows to the east due to the regional cone of depression.

There are four major aquifer formations within the Eastern San Joaquin County Groundwater Basin. The uppermost aquifer known as the Victor formation consists of stream deposits that are typically 150 feet thick composed of unconsolidated gravel, sand, silt, and clay. The Victor aquifer is unconfined throughout the county. The Laguna aquifer formation outcrops in the eastern portion of the county and slopes downward to the west. The Laguna has a maximum thickness of 1,000 feet and is composed of discontinuous lenses of unconsolidated to semi-consolidated sand and silt with lesser amounts of clay. The Laguna is generally unconfined with local semi-confined conditions present where clay layers exist. All 56 active and inactive wells in Cal Water's Stockton District extract from these two formations.

The remaining two aquifers are the Mehrten Formation and the Valley Springs Formation. The Mehrten aquifer outcrops to the east like the Laguna but slopes steeper to the west with a maximum thickness of 600 feet. This formation is confined to semi-confined in the central portion of the region becoming unconfined in the east. West of Stockton this formation contains saline groundwater. The Valley Spring aquifer is of marine origin and, therefore, contains saline groundwater.
Groundwater overdraft conditions have existed in the San Joaquin County Basin since the 1920s. Major groundwater extractions around Stockton have caused a greater-than-average rate of decline. In the1950s groundwater elevations in this vicinity fell below sea level. Based on work done by Brown and Caldwell, DWR estimates the annual overdraft from this subbasin at 70,000 acre-ft/year.

Average static groundwater elevation records maintained since 1940 indicate a gradual yet constant decline caused by regional overdraft conditions. This decline, which represents a 65-foot drop in the average static level in District wells over a 37-year period, continued through 1977. The availability of supplemental imported supply resulted in a 45-foot recovery in district wells during the following ten years. The recent six-year drought, however, caused average static groundwater elevations in district wells to drop approximately 30 feet. Heavy rainfall in 1993 improved the availability of imported supplies resulting in a noticeable thirty-foot recovery with a high average elevation occurring in 1999. Since then this average elevation has stayed relatively constant. A copy of DWR's Bulletin 188 description of the San Joaquin Groundwater Basin is attached. The responsiveness of groundwater elevations to artificial recharge through in-lieu replenishment and surface spreading illustrates the validity and importance of these operations.

In the past, the groundwater basin underlying San Joaquin County has been classified by DWR as being in overdraft, especially in the northeastern portion of the County. The City of Stockton, Cal Water, SEWD and San Joaquin County, have as a result of the establishment of the use of surface supplies to the east and the SEWD conveyance and treatment facilities voluntarily reduced groundwater withdrawals and thereby improved groundwater basin storage and elevations for areas underlying the COSMA. Groundwater levels have stabilized, i.e., and no significant declines since the end of the drought in the late 1980s and early 1990s.

The SEWD treatment plant will by the end of 2006 produce 50 mgd on an annual average basis and up to 64 mgd to meet peak summer demands. At a minimum, Cal Water, the City and the

County support expansion of SEWD WTP capacity to 60 mgd on an annual average day basis with capability of producing up to 74 mgd to meet peak summer demands. Further studies are planned in 2007 to determine whether an increase in capacity greater than 60 mgd is warranted. In this WSA, it is assumed that expansion of the SEWD WTP will be to 60 mgd by 2010. An additional engineering study, CEQA environmental documentation and design work will precede construction for this expansion. It is anticipated that the CEQA document will be a negative declaration or a mitigated negative declaration due to the construction occurring on the existing SEWD plant site. Financing of plant improvements is expected to be through payments made by Cal Water, the City and the County (based on revenues from their ratepayers) and possibly in part from state and federal grants, if available and attainable.

Water Demand and Groundwater Supply

Cal Water's supply operations plan is based on first meeting demand with SEWD treatment plant supply and secondly with pumped groundwater. The existing improvements to the WTP (addition of pretreatment facilities and upgrade of the final pumping station and related electrical work) and further planned improvements to expand treatment plant capacity are the basis for the supply forecasts for the SEWD plant.

Well station capacity within the Cal Water service area has been and will continue to be sized to provide a significantly higher supply capacity than what is projected for normal hydrologic conditions for projected annual average day demands to 2030. Cal Water Stockton District well capacity is and will be in the future sized to meet single and multiple dry year conditions during maximum day demand with anticipated reductions in SEWD plant production. In short, with anticipated reductions in SEWD supply during critical dry years, groundwater becomes the main supply source; hence, the reason for maintaining well capacity well in excess of normal use.

The timing and amount of water assumed available from each SEWD source is based on conservative estimates of the reliable yield of each source and the probability of the various contracts being renewed in the next 35 years.

The SSJID and OID contract for a total of 30,000 acre-ft/year (15,000 acre-ft/year from each district) is due to expire in 2010, but has a 10-year renewal option. Cal Water, the City, the County and SEWD plan to renew the contract to 2020 and negotiate with both SSJID and OID for a new contract to 2040. The assumption is made that only OID will negotiate a long-term contract and that will be for 20,000 acre-ft/year. In addition to the OID/SSJID contracts, the New Hogan and the New Melones CVP contracts are considered. The New Hogan contract is assumed to be subject to Central Valley Project (CVP) deficiencies that include shortages of up to 40 percent in critical years as well as provisions that make the New Melones CVP contract water available only in the wet years.

The firm of MWH for the City of Stockton developed a 70-year historic model of hydrology of the area to determine the adequacy of the sum total of water supplies under varying hydrologic conditions. MWH assumed in dry years when surface water curtailments would be required, groundwater, conservation and if necessary rationing would enable supply to meet demand. The objective was to show that over the 70 years, groundwater use does not exceed the sustainable yield of 0.75 AF/acre/year in any one year and 0.60 AF/acre/year over a long-term average. The MWH analysis which is presented in the WSE for the General Plan Update shows that in even the driest historical hydrologic periods (1976 to 1978 or 1987 to 1992) there is sufficient water

supply to meet existing water demands with 2035 surface water supply availability and use of groundwater for all COSMA water retailers.

Stockton District: Existing Groundwater Supply

Cal Water's 23 active wells as shown in Table 1A have a design capacity of 28,255 gallons per minute (gpm) or 40.69 mgd. Table 1B is a summary of the District's 8 standby wells which have a total capacity of 6,565 gpm or 9.45 mgd. Standby wells could be used in the event of an emergency situation such as unexpected loss of output from the SEWD treatment plant. Production capacity of the 23 active wells is about 70% of actual 2006 maximum day demand and 56% of estimated maximum day demand for 2026. With the addition of the capacity of the standby wells during an emergency, total well production would be 34,820 gpm or about 50 mgd. Because of storage capacity limitations and distribution system restrictions, simultaneous operation of all active wells at their design output rate would not likely occur. While the District has nominally sufficient groundwater production capacity in its active wells to supply forecasted annual average day demands to 2030 (38.36 mgd), this as explained is not a realistic sole source for supply.

Table 1A
Cal Water Stockton District: Summary of Active Water Wells

Well	Status	Age of Well	Design Flow Rate (GPM)	Well Total Depth (ft)	2005 Production		Water Quality Issues
					M.G.	A.F.	
STK-W-007-02	Active	49	1400	516	148.2	454.8	
STK-W-016-01	Active	59	1000	408	192.6	591.1	NONE
STK-W-018-01	Active	58	600	408	12.2	37.4	NONE
STK-W-021-01	Active	57	1100	420	118.0	362.1	NONE
STK-W-035-01	Active	52	625	427	21.0	64.5	NONE
STK-W-036-01	Active	53	900	503	35.7	109.6	NONE
STK-W-052-01	Active	40	750	552	121.6	373.1	NONE
STK-W-059-01	Active	46	1750	520	23.9	73.2	NONE
STK-W-060-01	Active	45	1800	520	114.3	350.6	NONE
STK-W-061-01	Active	45	1600	512	19.3	59.2	NONE
STK-W-062-01	Active	44	1000	527	0.0	0.0	NONE
STK-W-063-01	Active	45	1800	540	276.3	848.0	NONE
STK-W-066-01	Active	41	1750	510	105.6	324.2	NONE
STK-W-066-02	Active	34	1750	502	295.0	905.3	NONE
STK-W-067-01	Active	39	1000	522	10.2	31.4	NONE
STK-W-068-01	Active	39	1700	520	330.4	1,013.9	NONE
STK-W-069-01	Active	39	1000	530	261.5	802.4	NONE
STK-W-069-02	Active	39	500	546	321.8	987.5	NONE
STK-W-071-01	Active	37	1100	545	85.3	261.8	NONE
STK-W-075-01	Active	32	1200	580	47.7	146.3	NONE
STK-W-076-01	Active	32	1100	514	120.4	369.5	NONE
STK-W-077-01	Active	31	1700	500	172.6	529.8	NONE
STK-W-079-01	Active	29	1100	537	490.3	1,504.7	NONE
Total Design			28,225				
Total Measured Max Day 2006:			25,266				

Table 1B Cal Water Stockton District: Summary of Standby Water Wells							
Well	Status	Age of Well	Design Flow Rate (GPM)	Well Total Depth (ft)	2005 Production		Water Quality Issues
					M.G.	A.F.	
STK-W-004-02	Standby	42	700	548	23.5	72.1	Arsenic
STK-W-043-02	Standby	41	900	517	128.4	394.0	Arsenic
STK-W-044-01	Standby	48	565	510	172.8	530.3	Arsenic
STK-W-046-01	Standby	50	650	450	0.0	0.0	Arsenic
STK-W-047-01	Standby	49	900	519	6.3	19.2	Arsenic
STK-W-049-01	Standby	48	1000	512	0.1	0.2	Arsenic
STK-W-051-01	Standby	47	1100	570	49.3	151.3	Arsenic
STK-W-070-01	Standby	37	750	585	338.7	1,039.3	Arsenic
TOTAL			6,565				

Stockton District: Future Groundwater Supply

The current Stockton general plan area is 82,064 acres and the urban service area is 66,004 acres.

Based on the City's proposed General Plan Update and a calculation made by the firm of West Yost, which is currently preparing a Water Supply and Facilities Master Plan for the Stockton District for Cal Water, the projected service area for Cal Water is 29,530 acres.

If Cal Water limits groundwater use during normal hydrologic conditions to not more than 0.6 ac-ft/yr per acre of service area, then Cal Water's groundwater supply would be as follows:

29,530 acres x 0.6 acre-ft/yr/acre = 17,718 acre-ft/yr.

Cal Water's current (2006) active wells if operated continuously have a design capacity output of 45,564 acre-ft/yr. Since realistically that is not attainable, were the wells operated 90% of the time, they could produce 41,000 acre-ft/yr.

For future supply scenarios, it is assumed that Cal Water's service area in 2010 is 25,000 acres and in 2030 or 20 years later, it is 29,530 acres and that development proceeds linearly with time. Therefore, the following are projections for groundwater production by Cal Water:

2010: 25,000 acres x 0.6 acre-ft/yr/acre = 15,000 acre-ft/yr
2020: 27,265 acres x 0.6 acre-ft/yr/acre = 16,359 acre-ft/yr
2030: 29,530 acres x 0.6 acre-ft/yr/acre = 17,718 acre-ft/yr

Were Cal Water to limit groundwater use during normal hydrologic conditions to not more than 0.75 ac-ft/yr/acre of service area, then Cal Water's groundwater supply would be as follows:

29,530 acres x 0.75 acre-ft/yr/acre = 22,148 acre-ft/yr

For future supply scenarios, the following are projections for groundwater production by Cal Water:

2010: 25,000 acres x 0.75 acre-ft/yr/acre = 18,750 acre-ft/yr
2020: 27,265 acres x 0.75 acre-ft/yr/acre = 20,449 acre-ft/yr
2030: 29,530 acres x 0.75 acre-ft/yr/acre = 22,148 acre-ft/yr

Were Cal Water to limit groundwater use during normal hydrologic conditions to not more than 0.90 ac-ft/yr per acre of service area, then Cal Water's groundwater supply would be as follows:

29,530 acres x 0.9 acre-ft/yr/acre = 26,577 acre-ft/yr

For future supply scenarios, the following are projections for groundwater production by Cal Water:

2010: 25,000 acres x 0.9 acre-ft/yr/acre = 22,500 acre-ft/yr
2020: 27,265 acres x 0.9 acre-ft/yr/acre = 24,538 acre-ft/yr
2030: 29,530 acres x 0.9 acre-ft/yr/acre = 26,577 acre-ft/yr

Mariposa Lakes Groundwater Usage

Based on information in the Kleinfelder September 18, 2006, "Integrated Water Management Plan Mariposa Lakes", most existing wells in the MLSP area are used for agricultural irrigation and are generally 300 to 500 feet deep in alluvial materials. Historical on-site groundwater pumpage is estimated to be 11,430 acre-ft/year based on an annual average application rate of 3.0 acre-ft/year/acre and an application area of 3,810 acres.

Based on information in the Stantec April 7, 2006 "Mariposa Lakes Study on Water Service", the total Mariposa Lakes Specific Plan area is 3,493 acres and Cal Water's proposed service area is 1,995 acres.

If it is assumed that the distribution of irrigated agricultural land is proportional to service area, than the estimated annual existing groundwater pumping rate in the Cal Water proposed MLSP service area is 5,985 acre-ft/yr or approximately 6,000 acre-ft/yr.

For a safe yield limit of 0.6 acre-ft/yr/acre, the pumping rate for drinking water supply for new wells located in the area would be 1,197 acre-ft/yr or approximately 1,200 acre-ft/yr.

For a safe yield limit of 0.75 acre-ft/yr/acre, the pumping rate for drinking water supply for new wells located in the area would be approximately 1,500 acre-ft/yr.

Therefore, current extraction rates for agricultural irrigation appear to be at a minimum 4 (6,000/1,500) times greater than the long term safe yield rate using the 0.75 acre-ft/yr/acre factor.

Managing the quantity of water recharged to and extracted from the aquifers in the MLSP area will contribute to achieving adequate groundwater storage and hence long-term sustainable supply for the groundwater basin as a whole. Most of the land that is being developed in the MLSP area is being used for nut trees (mainly almonds) and vegetables. Irrigation methods include traditional flood or spray irrigation

The estimated annual average day water demand for Cal Water's MLSP service area at build out is 5,054 acre-ft/yr (4,549 ac-ft/yr in 2026) for an area of 1,995 acres or about 2.53 ac-ft/year/acre.

Based on Table 10 at build out in 2030, approximately 50% of Cal Water's projected supply will be treated surface water with the balance coming from groundwater. Therefore, Cal Water's estimated annual average day groundwater demand for its MLSP service area would be 1.26 acre-ft/year/acre if it were to construct new supply wells in the area for supply and adhere to its policy of using a combination of surface and groundwater to meet demand.

Based on Cal Water Stockton District 2004 UWMP data, total demand for 2005 is estimated to be 32,560 acre-ft or 29 mgd. Cal Water estimates that the 2005 quantity of water for indoor use or that went to the sanitary sewer to be 11.2 mgd. Therefore, the estimated outdoor use was 17.8 mgd or 61% on average.

In 2005, Kleinfelder prepared a geotechnical report that identified the predominant soil types in the MLSP area based on 20 borings at the site. Soils for the area are characterized as "…. *Predominantly of moderately to highly plastic silty clay to depths ranging from about 2 to 9 ½ feet below site grade, followed by low plastic sandy and clayey sand and 'clean' sand.*"

Pacific Advanced Civil Engineering Inc (PACE) in their April 7, 2006 "Off-Site Regional Hydrologic Investigation" characterizes soils primarily consisting of clay of having high swelling potentials and "very slow infiltration rates". Sandy-loam soils have moderate infiltration rates and well-drained sands have high infiltration rates. It is reasonable to assume that only a low percentage of outdoor water used for urban landscape irrigation or for that matter existing agricultural irrigation would recharge to underlying aquifers at the MLSP site.

If outdoor urban water use is 95% landscape irrigation and it is assumed that 9% of applied irrigation water infiltrates below the plant root and vadose zones and passes into the groundwater, then 0.95 x 0.09 x 0.61 = 0.052 or 5.2% of average annual day demand will be recharged to the groundwater system.

In terms of the MLSP development, groundwater recharge would be as follows:
0.052 x 2.53 ft/yr = 0.13 ft/yr

Net consumptive use would be 1.26 ft/yr – 0.13 ft/yr = 1.13 ft/yr or 1.13 acre-ft/yr/acre.

It is noted that the above is an estimate only. Groundwater recharge is a function of many variables, which include weather, hydrologic conditions, irrigation practices, crops or vegetation type, soils, geologic conditions, etc. One way to calculate recharge is to collect data and make estimates of monthly irrigation, monthly precipitation, runoff, plant evapo-transpiration, evaporation, initial soil moisture and soil's available water holding capacity. Recharge is the net of applied irrigation plus precipitation minus water losses associated with other conditions.

If it is assumed that groundwater recharge from agricultural irrigation on average is also 9%, then the amount of recharge that agriculture provides would be: 0.09 x 3.0 ft/yr or 0.27 ft/yr so that net "consumptive use" of groundwater would be 3.0 ft/yr – 0.27 ft/yr = 2.73 ft/yr. This compares to the estimated net "consumptive use" for the MLSP at build out of 1.13 ft/yr, which is 1.60 ft/yr less.

For Cal Water's MLSP service area, this equates to a decrease in consumptive use of groundwater of 1,995 acres x 1.60 ft/yr = 3,192 acre-ft/yr, which would be a significant improvement.

6. Comparison of Cal Water Forecasted Demand with Forecasted Supplies

As previously mentioned, Cal Water, the City of Stockton and San Joaquin County contract with SEWD for treatment and delivery of treated water from either the Calaveras River or the Stanislaus River. Each purveyor's share is based on that purveyor's prior water year total demand and the percentage it represents of SEWD's total demand. From April 1, 2004 to March 31, 2005, based on SEWD records, the SEWD water treatment plant produced 39,050 acre-ft of drinking water. Allocations among the urban contractors were:

City of Stockton:	19,426 (49.74%)
Cal Water:	18,247 (46.73%)
County:	1,377 (3.53%)

The following tables present forecasts of allocation of SEWD treated water supply for the City of Stockton, Cal Water and San Joaquin County.

Table 2
Forecast of SEWD Allocation of Treated Water Based on an Average Annual Production of 50 mgd or 56,054 acre-ft/yr under Current Terms of Second Amended Agreement

	Acre-ft/yr		
Year	**City of Stockton**	**Cal Water**	**County**
2010	29,090	25,500	1,460
2020	33,800	21,080	1,180
2030	37,560	17,545	953

For the projections shown in Table 2, Cal Water's change in SEWD plant output relative to the 2004-2005 amount received would be as follows:

2010: +7,253 acre-ft
2020: +2,833 acre-ft
2030: -702 acre-ft

Table 3
Forecast of SEWD Allocation of Treated Water Based on an Average Annual Production of 60 mgd or 67,260 acre-ft/yr under Current Terms of the Second Amended Agreement in Acre-ft/year

Year	**City of Stockton**	**Cal Water**	**County**
2010	34,910	30,600	1,750
2020	40,560	25,290	1,410
2030	45,065	21,050	1,145

For the projections shown in Table 3, Cal Water's change in SEWD plant output relative to the 2004-2005 amount received would be as follows:

2010: +12,353 acre-ft
2020: +7,043 acre-ft
2030: +2,803 acre-ft

Following are comparisons of Cal Water forecasted demands with supply for various supply scenarios.

Table 4
Scenario 1: Comparison of Demand with Cal Water Stockton District Supply: 1) SEWD Plant Capacity at 50 mgd with annual production of 56,054 acre-ft/yr and Cal Water Allocation based on Current Second Amended Agreement and 2) Groundwater Pumping Rate at 0.60 acre-ft/year/acre

		Acre-feet/year			
Year	Total Demand	Groundwater Supply	SEWD Supply	Total Supply	Surplus or Deficit
2006	33,690	15,000	22,500	37,500	+3,810
2010	36,940	15,000	25,500	40,500	+3,560
2011	37,246	15,000	25,058	40,058	+2,812
2020	40,000	17,100	21,080	38,180	-1,820 (1.62 mgd)
2021	40,300	17,100	20,730	37,830	-2,470 (2.20 mgd)
2026	41,800	17,400	18,959	36,359	-5,441 (4.85 mgd)
2030	43,000	17,718	17,545	36,745	-6,255 (5.58 mgd)

Table 5
Scenario 2: Comparison of Demand with Cal Water Stockton District Supply: 1) SEWD Supply for Plant Capacity at 50 mgd with annual production of 56,054 acre-ft/yr and Cal Water Allocation based on Current Second Amended Agreement and 2) Groundwater Pumping rate at 0.75 acre-ft/year/acre

		Acre-feet/year			
Year	Total Demand	Groundwater Supply	SEWD Supply	Total Supply	Surplus or Deficit
2006	33,690	15,000	22,500	37,500	+3,810
2010	36,940	18,750	25,500	44,250	+7,310
2011	37,246	18,750	25,058	43,808	+6,562
2020	40,000	20,449	21,080	41,529	+1,529
2021	40,300	20,449	20,730	41,179	+879
2026	41,800	21,469	18,959	40,428	-1,372
2030	43,000	22,148	17,545	39,693	-3,307

Table 6

Scenario 3: Comparison Demand with Cal Water Stockton District Supply: 1) SEWD Supply for Plant Capacity at 50 mgd with annual production of 56,054 acre-ft/yr and Cal Water Allocation based on Current Second Amended Agreement and 2) Groundwater Pumping rate at 0.90 acre-ft/year/acre

Acre-feet/year

Year	Total Demand	Groundwater Supply	SEWD Supply	Total Supply	Surplus or Deficit
2006	33,690	15,000	22,500	37,500	+3,810
2010	36,940	22,500	25,500	48,000	+11,060
2011	37,246	22,500	25,058	47,558	+10,312
2020	40,000	24,538	21,080	45,618	+5,618
2021	40,300	24,538	20,730	45,268	+4,968
2026	41,800	25,761	18,959	44,720	+2,920
2030	43,000	26,577	17,545	44,122	+1,122

Table 7

Scenario 1A: Comparison of Demand with Cal Water Stockton District Supply: 1) SEWD Plant Capacity at 50 mgd with annual production of 56,054 acre-ft/yr and 50/50 split of SEWD Supply with City of Stockton and 2) Groundwater Pumping rate at 0.60 acre-ft/year/acre

Acre-feet/year

Year	Total Demand	Groundwater Use	SEWD Supply	Total Supply	Surplus
2006	33,690	15,000	22,500	37,500	+3,810
2010	36,940	15,000	26,960	41,960	+5,020
2011	37,246	15,000	26,960	41,960	+4,714
2020	40,000	17,100	26,920	44,020	+4,020
2021	40,300	17,100	26,920	44,020	+3,720
2026	41,800	17,400	26,900	44,300	+2,500
2030	43,000	17,400	26,880	44,280	+1,280

Table 8

Scenario 4: Comparison of Demand with Cal Water Stockton District Supply: 1) SEWD Plant Capacity at 60 mgd with annual production of 67,260 acre-ft/yr and Cal Water Allocation under Current Second Amended Agreement and 2) Groundwater Pumping rate at 0.60 acre-ft/year/acre

Acre-feet/year

Year	Total Demand	Groundwater Supply	SEWD Supply	Total Supply	Surplus or Deficit
2006	33,690	15,000	22,500	37,500	+3,810
2010	36,940	15,000	30,600	45,600	+8,660
2011	37,246	15,000	30,600	45,600	+8,354
2020	40,000	17,100	25,290	42,390	+2,390
2021	40,300	17,100	24,866	41,966	+1,666
2026	41,800	17,400	22,746	40,146	-1,654
2030	43,000	17,718	21,050	38,768	-4,232

Table 9

Scenario 4A: Comparison of Demand with Cal Water Stockton District Supply: 1) SEWD Plant Capacity at 60 mgd with annual production of 67,260 acre-ft/yr and 50/50 Split of SEWD Supply with City and 2) Groundwater Pumping rate at 0.60 acre-ft/year/acre

Acre-feet/year

Year	Total Demand	Groundwater Existing Use	SEWD Supply	Total Supply	Surplus
2006	33,690	15,000	22,500	37,500	+3,810
2010	36,940	15,000	32,560	47,560	+10,620
2011	37,246	15,000	32,560	47,560	+10,314
2020	40,000	17,100	32,520	49,620	+9,620
2021	40,300	17,100	32,500	49,600	+9,300
2026	41,800	17,400	32,500	49,900	+8,100
2030	43,000	17,718	32,480	50,198	+7,198

Table 10

Scenario 5: Comparison of Demand with Cal Water Stockton District Supply: 1) SEWD Plant Capacity at 60 mgd with annual production of 67,260 acre-ft/yr and Cal Water Allocation under Current Second Amended Agreement and 2) Groundwater Pumping rate at 0.75 acre-ft/year/acre

Acre-feet/year

Year	Total Demand	Groundwater Supply	SEWD Supply	Total Supply	Surplus or Deficit
2006	33,690	15,000	22,500	37,500	+3,810
2010	36,940	18,750	30,600	49,350	+12,410
2011	37,246	18,750	30,600	49,350	+12,104
2020	40,000	20,449	25,290	45,739	+5,739
2021	40,300	20,449	24,866	45,315	+5,015
2026	41,800	21,469	22,746	44,215	+2,415
2030	43,000	22,148	21,050	43,198	+198

With the SEWD WTP expanded to 60 mgd capacity and annual production at 67,260 acre-ft/yr and the current terms of the Second Amended Agreement unchanged, and Cal Water pumping groundwater at a rate of 0.75 acre-ft/year/acre (long term sustainable rate), this would provide an adequate supply for normal hydrologic conditions in the year 2030 as follows:

	Acre-ft/yr
Groundwater:	22,148
SEWD plant:	21,050
Total Supply:	43,198 versus Total Demand: 43,000

It is noted that previously the firm yield of the supply to the SEWD plant for 2006 to 2020 was estimated to be 104,100 acre-ft/yr and for the period from 2020 to 2030 to 94,100 acre-ft/yr. Maximum estimated future yield at 2030 was estimated to be 160,171 acre-ft/yr.

Maximum Day Demand Analysis

Table 11
Projected Maximum Day Demand for Cal Water (Peaking Factor: 1.74)

Year	Annual Demand (AF/yr)	Annual Average Day (mgd)	Maximum Day (mgd)
2006	33,690	30.05	52.29
2010	36,940	32.95	57.33
2011	37,246	33.22	57.81
2020	40,000	35.68	62.08
2026	41,800	37.28	64.88
2030	43,000	38.36	66.75

The SEWD plant peaking capacity at 50 mgd is estimated to be 64 mgd and at 60 mgd is estimated to be 74 mgd. If peak flow output is split between the City and Cal Water after deducting 3.4 mgd for the County, then Cal Water would get 30.3 mgd on maximum day from a 50 mgd plant and 35.3 mgd on maximum day from a 60 mgd plant.

Cal Water's existing active wells have a capacity of about 28,255 gpm. If the capacity of the largest well (1,800 gpm) is subtracted from that total in keeping with the AWWA standard of having that well down on maximum day demand, then the current active well capacity to meet maximum day demand is 26,455 gpm or 38.1 mgd.

If Cal Water were to add no more wells and the SEWD plant were to remain at 50 mgd with a peaking capacity of 64 mgd, then Cal Water would have 30.3 + 38.1 = 68.4 mgd of capacity or would be able to meet maximum day demand in 2030, which is forecasted to be 66.75 mgd. As previously mentioned, because of current storage capacity distribution system limitations, simultaneous operation of all wells at their design rate would be difficult. The Water Supply and Facilities Master Plan (WSFMP) currently being prepared by West Yost for Cal Water will specifically address system hydraulic constraints and recommend a plan for improvements that will enable Cal Water to more fully utilize total capacity of its supply sources during peak seasonal demand periods.

If Cal Water were to add no more wells and the SEWD plant capacity were to be increased to 60 mgd with a peaking capacity of 74 mgd, then Cal Water would have 35.3 + 38.1 = 73.4 mgd of capacity, which would exceed the forecasted maximum day demand in 2030 by 6.65 mgd.

Summary: Existing Supply for Normal or Above Normal Hydrologic Conditions:

1. With strong growth in water demand for the Cal Water Stockton District, conservative assumptions about groundwater production (0.6 acre-ft/yr/acre) and the SEWD treatment plant annualized production at 50 mgd (56,054 acre-ft/yr), Cal Water will have a deficit of supply of about 5,440 acre-ft/yr in 2026 (20 years from now) if allocation of output from the SEWD plant continues to be governed by the terms of the Second Amended Agreement. If that agreement were amended or replaced with a new agreement, which provided for a 50/50 split with the City of Stockton, Cal Water would have adequate supply to 2026 (surplus +2,500 acre-ft/yr).

2. With strong growth in water demand for the Cal Water Stockton District, conservative assumptions about groundwater production (0.6 acre-ft/yr/acre) and the SEWD treatment plant annualized production at 60 mgd (67,260 acre-ft/yr), Cal Water will have a deficit in supply by 2026 (-1,654 acre-ft/yr) if allocation of output from the SEWD plant continues to be governed by the terms of the Second Amended Agreement. If that agreement were amended or replaced with a new agreement, which provided for a 50/50 split with the City of Stockton there would be adequate supply in 2026 (surplus +8,100 acre-ft/yr).

3. With strong growth in water demand for the Cal Water Stockton District, less conservative but still sustainable assumptions about groundwater production (0.75 acre-ft/yr/acre) and the SEWD treatment plant annualized production at 60 mgd (67,260 acre-ft/yr), Cal Water will have an adequate supply to 2030 (+198 acre-ft/yr) if allocation of output from the SEWD plant continues to be governed by the terms of the Second Amended Agreement.

Cal Water Existing Supply for Dry Year and Multiple Dry Year Hydrologic Conditions

As shown in the SEWD supply sources table, for a "critical" dry year, the available supply from sources providing water to the SEWD treatment plant were estimated to be about 30,330 acre-ft/yr from 2020 to 2040 based on data modified in this analysis taken from the City of Stockton WSE for the General Plan Update. The modification made here assumes that OID will enter into a long-term transfer agreement with SEWD, the City and Cal Water in order to generate additional revenues to pay for system improvements.

Normal supplies are estimated to be 94,100 acre-ft/yr so this is a reduction in supply of 63,770 acre-ft/yr or 67.7% or more conservatively 70%, which represents an extreme drought condition.

The San Francisco Public Utility Commission (SFPUC), which receives the greatest share of its supply from the Hetch Hetchy reservoir in the Sierra Mountains and a smaller amount from the Calaveras and San Antonio reservoirs (east of Fremont and Milpitas and south of Pleasanton uses the following drought supply criteria. For an 8.5 year "design drought" (similar to the extended 1987 – 1992 drought) followed by critically dry conditions similar to 1976-1977, average cutback in supply for Cal Water's South San Francisco District would be 25% assuming existing supplies in 2030. Cutbacks would be smaller during early years and would increase throughout the drought with larger cutbacks in the later years, which are estimated to be 40% maximum during the last 2.5 years of the drought. SFPUC does assume that it will be able obtain some additional supplies from improvements in the Calaveras reservoir, conjunctive groundwater use and recycled water use, but these are only a fraction of surface sources and are not included.

For the multiple supply sources to the SEWD treatment plant, it is assumed here that for a multiple dry year period, average reduction would be higher than that used by SFPUC or 30% and for a sustained drought condition during the last several years, supply reduction would be 50%.

It is also assumed that there would be reduction in demand during the first and second years of 10%, the third and fourth years of 15%, and the fifth and sixth years and beyond of 20%. As is explained in the demand management section, which follows, these are demonstrably achievable goals by Cal Water.

1. Single Dry Year. With respect to water demand, two scenarios are assessed. The first scenario is that there is no increased emphasis on conservation and therefore demand is the same as forecasted for normal hydrologic conditions. The second scenario is that the need for conservation is effectively communicated by Cal Water to its customers and demand is reduced by 10%. For 2026, normal demand is forecasted to be 41,800 acre-ft/yr. With 10% reduction, demand is estimated to be 37,620 acre-ft/yr in 2026. Using a conservative supply assumption, SEWD treatment plant annualized production is estimated to be reduced by 30% or would be 0.70 x 50 mgd = 35 mgd (39,238 acre-ft/yr). If allocation of output from the SEWD plant is governed by the terms of the Second Amended Agreement, Cal Water's 2026 share would be 13,271 acre-ft/yr. If Cal Water pumped its wells at a rate to offset reduction in SEWD plant production, its pumping rate would be as follows:
   Scenario 1: 41,800 – 13,271 acre-ft/yr = 28,529 acre-ft/yr/29,530 acres = 0.97 acre-ft/yr/acre. This is within the range of 0.75 to 1.0 acre-ft/yr/acre cited as sustainable.
   Scenario 2: 37,620 – 13,271 acre-ft/yr = 24,349 acre-ft/yr/29,530 acres = 0.82 acre-ft/yr/acre. This is within the range of 0.75 to 1.0 acre-ft/yr/acre cited as sustainable.

   If the Second Amendment agreement were amended or replaced with an agreement which provided for a 50/50 split with the City of Stockton, Cal Water's SEWD supply in 2026 would be 18,830 acre-ft/yr. Under Scenario 1, groundwater would have to supply 22,970 acre-ft/yr/29,530 acres = 0.78 acre-ft/yr/acre, which is within the sustainable yield. Under Scenario 2, groundwater would have to supply 18,790 acre-ft/yr/29,530 acres = 0.63 acre-ft/yr/acre, which is clearly a sustainable yield.

2. Multiple Dry Years – early period. As a result of additional efforts by Cal Water and the City, water demand is reduced by 15%, or for 2026 it is estimated to be 35,530 acre-ft/yr. SEWD treatment plant annualized production is reduced by 30% or would be 0.70 x 50 mgd = 35 mgd (39,238 acre-ft/yr).
   If allocation of output from the SEWD plant continues to be governed by the terms of the Second Amended Agreement, Cal Water's 2026 share would be 13,271 acre-ft/yr. If Cal Water pumped its wells at a rate to offset the reduction in SEWD plant production, its pumping rate would be as follows: 35,530 – 13,271 acre-ft/yr = 22,259 acre-ft/yr/29,530 acres = 0.75 acre-ft/yr/acre - the low end of the sustainable range of 0.75 to 1.0 acre-ft/yr/acre. If the Second Amendment agreement were amended or replaced with an agreement which provided for a 50/50 split with the City of Stockton, Cal Water's SEWD supply in 2026 would be 18,830 acre-ft/yr. Groundwater would have to supply 16,700 acre-ft/yr/29,530 acres = 0.565 acre-ft/yr/acre, which is well below the sustainable yield.

3. Multiple Dry Years – late period. Water demand is reduced by 20% or for 2026 it is estimated to be 33,440 acre-ft/yr. SEWD treatment plant annualized production would be reduced by 50% or would be 0.50 x 50 mgd = 25 mgd (28,027 acre-ft/yr).
   If allocation of output from the SEWD plant continues to be governed by the terms of the Second Amended Agreement, Cal Water's 2026 share would be 9,480 acre-ft/yr. If Cal Water pumped its wells at a rate to offset the reduction in SEWD plant production, its pumping rate would be as follows: 33,440 – 9,480 acre-ft/yr = 23,960 acre-ft/yr/29,530 acres = 0.81 acre-ft/yr/acre – in the sustainable range of 0.75 to 1.0 acre-ft/yr/acre. If the Second Amendment agreement were amended or replaced with an agreement which

provided for a 50/50 split with the City of Stockton, Cal Water's SEWD supply in 2026 would be 13,450 acre-ft/yr. Groundwater would have to supply 19,990 acre-ft/yr/29,530 acres = 0.68 acre-ft/yr/acre, which is below the sustainable yield.

4. Multiple Dry Years – late period: ***Worst Case Scenario***. Water demand is reduced by 20% as a result of a very strong demand management program or for 2026 it is estimated to be 33,440 acre-ft/yr. SEWD treatment plant annualized production is reduced by 70% or would be 0.30 x 50 mgd = 15 mgd (16,816 acre-ft/yr).
   If allocation of output from the SEWD plant continues to be governed by the terms of the Second Amended Agreement, Cal Water's 2026 share would be 5,688 acre-ft/yr. If Cal Water pumped its wells at a rate to offset the reduction in SEWD plant production, its pumping rate would be as follows: 33,440 – 5,688 acre-ft/yr = 27,752 acre-ft/yr/29,530 acres = 0.94 acre-ft/yr/acre – within the sustainable range of 0.75 to 1.0 acre-ft/yr/acre. If the Second Amendment agreement were amended or replaced with an agreement which provided for a 50/50 split with the City of Stockton, Cal Water's SEWD supply in 2026 would be 8,070 acre-ft/yr. Groundwater would have to supply 25,370 acre-ft/yr/29,530 acres = 0.86 acre-ft/yr/acre, which is in the sustainable yield range.

Ground Water Quality

Water delivered to customers in the Stockton District meets all federal and state drinking water regulations.

The quality of groundwater produced by the District's active wells can be highly mineralized depending on the location. Wells in the western part of the District show the highest levels. For example, water quality reports for 2003 show total dissolved solids (TDS) concentrations ranging from 140 to 622 mg/l. The secondary standard for TDS is 500 mg/l, so some wells exceed the standard. According to the Kleinfelder September 18, 2006, "Integrated Water Management Plan Mariposa Lakes", "A saline front, identified on the basis of a groundwater chloride concentration of 300 mg/l or greater, was found to be moving east at a rate of up to approximately 350 feet per year between 1980 and 1998. As of 1996, the front had not yet reached Highway 99. The saline front is estimated to be moving at a rate of between 150 and 350 feet per year (West Yost, 2004; Eastern San Joaquin County Groundwater Recharge Banking Groundwater Master Plan, 2004)." The District Manager indicates that information communicated recently by the USGS based on their study of saline groundwater that the source and rate of advance of the front may be significantly less.

For some wells, iron and manganese levels exceeded secondary drinking water standards resulting in those wells being taken out of service.

Other wells have had concentrations of volatile organic compounds (VOCs), particularly trichloroethylene (TCE) and tetrachloroethylene (PCE), which were at or exceeded the maximum concentration limit (MCL). These wells were taken out of service.

Arsenic is a major problem in the Stockton District. When the 10 parts per billion (ppb) federal arsenic standard when into effect in January 2006, Cal Water had 18 wells that had to either be shutdown or have the pumped water treated. Four of these wells (with a fifth as a future option) were kept in production as a result of a newly constructed blending facility, which was completed in Spring 2006 and combines well water with SEWD treated surface water to produce

an arsenic concentration of approximately 5 ppb limit – ½ the MCL. All other affected wells were taken out of service. As indicated in Table 1B eight (8) wells are in a standby status for emergency supply.

Since it is Cal Water's position that it will add wells within or in close vicinity to the proposed service area in the Mariposa Lakes development, groundwater quality for drinking water in that area is an important consideration. Kleinfelder in their more comprehensive and detailed April 7, 2006, "Integrated Water Management Plan Mariposa Lakes" report, based on water quality sampling from 9 monitoring wells indicates that was water quality relative to drinking water standards was good overall, but noted the following:

1) Presence of atrizine and elevated levels of nitrates (NO_3) in monitoring well 2
2) Diuron and fecal coliform in monitoring well 6
3) Elevated NO_3 in monitoring well 4

Water quality issues represent a concern with respect to ongoing and future use of groundwater to meet supply requirements for both the Stockton District as a whole and Mariposa Lakes in particular. Cal Water will either have to provide treatment (wellhead, clustered or centralized), shut down non-complying wells or construct new wells in locations where water quality complies with public drinking water standards. Without specific information on the type, concentration and extent of contaminants, the location, depth, water bearing formations, proximity to contaminant plumes, age, condition and yield of particular wells, it is not possible to indicate in this WSA the impact on total yield or quantity of supply available nor what additional yield could be obtained through economically feasible treatment of contaminated groundwater. Answers to those questions will be addressed in the Water Supply and Facilities Master Plan currently being prepared for Cal Water by West Yost. A draft version for Cal Water's review is anticipated in February or March 2007.

Recycled Water

Recycled water does not have a significant direct use potential in the Stockton District because of the City's success in obtaining a water right for its proposed Delta Water Supply Project (DWSP). Return flow credits obtained from the City discharging treated water to the San Joaquin River are the primary basis for the water rights for the DWSP treatment plant. California Water Code Section 1485 provides that a municipality discharging a treated wastewater into the San Joaquin River may seek a water right to divert a like amount of water, less losses, from the river or Delta downstream of the point of wastewater discharge.

Nonetheless, a brief summary of the quantity of wastewater generated in Cal Water's service area and a description of the collection, treatment and reuse of that wastewater by the City of Stockton is provided.

Municipal wastewater is generated by a combination of residential, commercial and industrial sources. The quantity of wastewater generated is proportional to the population and water use in the service area. For 2005, the estimated wastewater flow from the Cal Water service area is 11.2 mgd or 12,550 acre-ft/yr. The estimate was obtained by calculating the amount of indoor water use in Cal Water's service area as 90 percent of January water use and assuming that all indoor water use is discharged to the sanitary sewer.

The City of Stockton operates and maintains the sewer collection system consisting of gravity sewers, pump stations, and force mains. Collected wastewater is conveyed via trunk sewers and interceptors to the Stockton Regional Wastewater Control Facility (SRWCF) for treatment.

The SRWCF provides tertiary treatment during the summer and secondary treatment for the remainder of the year. Tertiary treatment includes dual media filtration, chlorination, and dechlorination. Treatment plant effluent flow is discharged to the San Joaquin River. The SRWCF currently treats an average annual flow nearly 30 mgd, of which approximately 11.5 mgd comes from Cal Water's service area or approximately 38%.

Because of the essential requirement for return flow credit of the discharged treated wastewater (and projected high costs of reuse based on a study done by the City), there are currently no plans for use of recycled water in Cal Water's Stockton Service Area.

New Supply: City of Stockton Delta Water Supply Project (DWSP)

For the following reasons with respect to supply uncertainties pertaining to:

1) Reliability of long term supplies to the SEWD treatment plant
2) Impacts of the current terms of the Second Amended Agreement on Cal Water's future supplies from the SEWD treatment plant
3) Changing groundwater quality conditions and their potential adverse effect on the quantity or reliability of future groundwater supplies
4) Uncertainty over which long term safe yield extraction rate should be used for normal hydrologic conditions, i.e., 0.6 acre-ft/yr/acre versus 0.75 acre-ft/yr/acre or higher (up to 1.0 acre-ft/yr/acre)
4) Location of suitable new wells and the distribution of demands within the Cal Water service area, which will be addressed in Cal Water's Water Supply and Facility Master Plan,

Cal Water plans on participating in the City of Stockton's Delta Water Supply Project to enhance treated surface water supply quantity and reliability and to minimize the effects of possible future losses of groundwater supplies. Greater use of surface water during normal and wet years will further improve groundwater storage due to less pumping and hence increase supply availability during dry weather periods.

The specifics on the basis for the DWSP being a reliable future source of supply are provided in the City of Stockton's WSA for Mariposa Lakes Specific Plan, dated October 2, 2006 and can be found in Section 3.2 of that report. The reader is referred to that report for more information on this project and why its implementation is highly realistic.

The initial phase of the DWSP, which according to Table 10 in the City's WSA, is scheduled to be in operation in 2010 is for an annual average production of 30 mgd or 33,632 acre-ft/year. In 2020, the City plans to have Phase 2 of the project in operation, which will increase average annual production to 60 mgd or 67,264 acre-ft/yr through 2050.

Cal Water is currently in discussions with the City with respect to determining the percentage of its participation in the DWSP and anticipates resolving that issue within the first part of 2007.

As an example and for illustration purposes only, the following two tables illustrate, respectively, the effect of Cal Water participating at a 10 mgd or 11,210 acre-ft/yr basis from the year 2010 to 2030 for a SEWD plant at 60 mgd and 50 mgd under the terms of the current Second Amended Agreement and with groundwater extraction at the conservative rate of 0.60 acre-ft/year/acre. In the case of the SEWD plant not being expanded beyond 50 mgd there is sufficient supply to beyond 2030. In the case of the SEWD plant being expanded to 60 mgd, the supply surplus in 2030 is only 2,023 acre-ft/yr or 1.8 mgd.

Table 12

Comparison of Demand with Cal Water Stockton District Supply: 1) SEWD Plant Capacity at 50 mgd with annual production of 56,054 acre-ft/yr and Cal Water Allocation under Current Second Amended Agreement and 2) Groundwater Pumping rate at 0.60 acre-ft/year/acre and 3) Participation in the DWSP at 10 mgd with an annual production of 11,210 acre-ft/yr

Acre-feet/year

Year	Total Demand	Groundwater Supply	SEWD Supply	DWSP Supply	Total Supply	Surplus or Deficit
2006	33,690	15,000	22,500	0	37,500	+3,810
2010	36,940	15,000	25,500	11,210	51,710	+14,770
2011	37,246	15,000	25,058	11,210	51,268	+14,022
2020	40,000	17,100	21,080	11,210	49,390	+9,390
2021	40,300	17,100	20,730	11,210	49,040	+9,040
2026	41,800	17,400	18,959	11,210	47,569	+5,769
2030	43,000	17,718	17,545	11,210	47,955	+4,955

Table 13

Comparison of Demand with Cal Water Stockton District Supply: 1) SEWD Plant Capacity at 60 mgd with annual production of 67,260 acre-ft/yr and Cal Water Allocation under Current Second Amended Agreement and 2) Groundwater Pumping rate at 0.60 acre-ft/year/acre and 3) Participation in the DWSP at 10 mgd with an annual production of 11,210 acre-ft/yr Acre-feet/year

Year	Total Demand	Groundwater Supply	SEWD Supply	DWSP Supply	Total Supply	Surplus or Deficit
2006	33,690	15,000	22,500	0	37,500	+3,810
2010	36,940	15,000	30,600	11,210	56,810	+19,870
2011	37,246	15,000	30,600	11,210	56,810	+19,564
2020	40,000	17,100	25,290	11,210	53,600	+13,600
2021	40,300	17,100	24,866	11,210	53,176	+12,876
2026	41,800	17,400	22,746	11,210	51,356	+9,556
2030	43,000	17,718	21,050	11,210	49,978	+6,978

Cal Water Stockton District Demand Management Program

Cal Water has ongoing water demand management programs as part of its commitment to achieving more efficient uses of water and to specifically address drought conditions that might impact groundwater table levels. Cal Water promotes conservation through informational and

customer assistance activities. Cal Water programs include distribution system water audits and leak detection, plumbing retrofits (toilets, showerheads), high efficiency washing machine rebates, and public education.

Cal Water has conducted conservation programs in the Stockton District for several years. The Company believes that managing demand is an important element in the overall management of water supply and has made efforts to promote conservation through educational, informational, and customer assistance activities. The CPUC has recently requested substantial enhancements of Cal Water's conservation programs and that additional funds be included in the Stockton 2007 rate filing.

External Measures to Achieve Public Support

Cal Water participates in cooperative conservation activities with area water suppliers, SEWD, City of Stockton Water Department and San Joaquin County. Table 14 indicates implementation levels in the Cal Water Stockton service area.

TABLE 14

Conservation Measure	Date Implemented	Program End Date
BMP 01 Residential Survey	2000/2001	N/A at this time
BMP 02 Plumbing Retrofit	1992	Ongoing
BMP 07 Public Information	1988	Ongoing
BMP 08 School Programs	1991	Ongoing
BMP 14 Toilet Rebates	2000/2001	Ongoing
BMP 06 Washing Machine Rebate Program	2002	Ongoing

Internal Measures to Achieve Efficient Water Management

Distribution System Water Audit and Leak Detection Program

Annually, Cal Water completes a prescreening system audit to determine the level of unaccounted for water in each system and to evaluate whether a full-scale system audit is needed. Cal Water uses a simple method to calculate unaccounted for water, subtracting total sales from total water production, and then dividing the result by the total production amount to obtain the percentage of production that is lost. In 2003, the Stockton District's unaccounted for water was 5.28% and has averaged 4.24% over the past ten years.

Cal Water is prepared to conduct full-scale system water audits in the event that unaccounted for water is 10% or more, providing that a full-scale system audit is cost-effective to implement. If cost-effective, a full-scale audit will be implemented using methodology consistent with that described in AWWA's *Water Audit and Leak Detection Guidebook.*

Water Efficient Landscape Guidelines

In 1992, water efficient landscape guidelines were developed (See Appendix B). These guidelines apply to all landscapes designed for Cal Water properties including renovations. For ease of adoption by districts with a multitude of climates and microclimates, the guidelines are generic. They do, however, adhere to water efficient landscape (Xeriscape) principles.

Overall District Goals

Cal Water recognizes the importance of conservation in managing its own water resources. While economic and regulatory constraints of integrating conservation into supply management have proven challenging, Cal Water is participating in efforts to develop demand management strategies, standards, and criteria by working with the California Urban Water Conservation Council. This Council was formed as part of the MOU primarily to oversee the implementation of the BMPs and to improve water conservation practices and analyses. Cal Water is committed to this process and the development of an integrated resource plan.

Cal Water's conservation programs are intended to assist customers in their efforts to use water efficiently as well as to educate them about their water supply, overall. This will lead them to make informed decisions concerning the efficient use of water and enable them to better respond to required reductions in water use should a water shortage or emergency occur. During periods of water shortages, the Company's conservation programs can be expanded and may include more restrictive measures such as mandatory reductions, rationing, and penalties.

Cal Water has conducted conservation programs in the Stockton District for many years and co-sponsors conservation activities. The Company believes that managing demand is an important element in the overall management of water supply and has made efforts to promote conservation through educational, informational, and customer assistance activities.

Water Rationing Plan

Cal Water has developed a four-stage rationing plan as shown in Table 15. The plan includes voluntary and mandatory stages. Approval from the CPUC must be obtained prior to implementation of mandatory restrictions.

TABLE 15
RATIONING STAGES AND REDUCTION GOALS

SHORTAGE	STAGE	DEMAND REDUCTION GOAL	TYPE OF PROGRAM
Minimum 5 - 10%	Stage 1	10% reduction	Voluntary
Moderate 10 - 20%	Stage 2	20% reduction	Voluntary or Mandatory
Severe 20 - 35%	Stage 3	35% reduction	Mandatory
Critical 35 - 50%	Stage 4	50% reduction	Mandatory

Water Rationing Actions to Be Taken By Cal Water

Stage 1

Cal Water maintains an ongoing public information campaign consisting of distribution of literature, speaking engagements, monthly bill inserts, and conservation messages printed in local newspapers. Educational programs in area schools are also ongoing.

Stage 2

- Cal water will aggressively continue its public information and education programs.
- Ask consumers for 10 to 20 percent voluntary or mandatory water use reductions.
- Prior to implementation of mandatory reductions, obtain approval from CPUC.
- Lobby for passage of drought ordinances by appropriate governmental agencies.

Stage 3

- Implement mandatory reductions after receiving approval from CPUC.
- Maintain rigorous public information campaign explaining water shortage conditions.
- Water use restrictions go into effect. Prohibited uses can include watering resulting in gutter flooding, using a hose without shutoff device, filling of pools or fountains, etc.
- Limiting landscape irrigation by restricting the hours of the day and or days of the week during which water for irrigation can be used.
- Monitor production weekly for compliance with necessary reductions.
- Installation of flow-restrictor on the service line of customers who consistently violate water use restrictions.

Stage 4

- All of steps taken in prior stages intensified.
- Discontinuance of water service on customers consistently violating water use restrictions.
- Monitor production daily for compliance with necessary reductions.
- More restrictive conditions for, or a prohibition of landscape irrigation.

Water Rights to Groundwater Supply

Cal Water owns the land on which its wells are located and would be located for future wells to be constructed. Under state law, the use of percolating groundwater in California is governed by the doctrine of correlative rights and reasonable use, which gives the overlying property owner a common right to reasonable, beneficial use of the basin supply on the overlying land until the basin is adjudicated. Aside from the correlative water rights, Cal Water does not have any other existing water supply entitlements or water rights.

It has been noted that the Stockton District's wells are located in a non-adjudicated groundwater basin. The principal concern for this basin is to manage the groundwater system to improve the overall balance between rates of extraction and recharge (both natural and designed) in order to achieve long-term sustainable use.

Water Supply Permits and Approvals

For prospective new well sites and other water facilities such as storage tanks and booster pump stations, Cal Water follows a standard procedure in which it establishes interest on the part of a property owner to sell all or a designated piece of its property to Cal Water for a water supply

purpose. In the case of a well site, Cal Water first determines its suitability for a production well. This includes a conducting a sanitary survey, Phase 1 environmental assessment, a right of entry agreement, design and construction of a test well, testing of the yield and water quality of the test well and evaluation of findings. If a site is determined to be suitable, Cal Water generally purchases the property from the owner. In the case of public properties, it may enter into a long-term lease or obtain a permanent easement.

After a well is constructed and before use, Cal Water demonstrates to California Department of Health Services (DHS) that water from the well complies with all drinking water standards. Cal Water also files the well logs obtained by the driller with the Department of Water Resources.

Design and Construction of the Mariposa Lakes Water Supply System

Cal Water will provide the developer with a will serve letter indicating its intention to serve as the water utility for providing water service to residents, businesses and other activities within the proposed service area. Water system improvements may include new wells and pumps, transmission lines, storage facilities, distribution system, SCADA, meters, etc. As the developer proceeds with planning and preliminary design of the development, Cal Water will work with it's planner and engineer, the City of Stockton, DHS and other agencies that may be involved in the design and construction of the required water supply facilities.

Upon receipt of the appropriate agreements and deposits, Cal Water will prepare design drawings and specifications for potable water system facilities for compliance with state standards and Cal Water's standards with respect to storage capacities, pipe sizes, booster pumps, fire flows, equipment, materials, communication and control systems and interconnection with the Stockton District system.

Cal Water's Stockton District, supported by engineering, water quality and customer service staff in San Jose, will be responsible for providing ongoing operations and maintenance services for the water system.

Capital costs for design and construction of new supply facilities required to serve a new development, the water distribution system, and storage and booster pump stations are the responsibility of the developer.

With respect to the Stockton District, Cal Water has an ongoing capital improvement program to upgrade and improve the distribution system, replace wells that have reached the end of their useful life and provide treatment of groundwater due to contaminants. Cal Water's Stockton District capital improvement program is separate from and will not include costs associated with the design and construction of water supply and system facilities required for the Mariposa Lakes Specific Plan. However, upon complete transfer of ownership of the water supply and system facilities to Cal Water by the developer, those facilities will be incorporated into Cal Water's capital improvement program.

SB 610 Section 10910 Paragraph (d)(2) requires an identification of existing water supply entitlements, water rights, or water service contracts held by the public water system shall be demonstrated by providing information related to all of the following. Information on these topics follows:

(A) *Written contracts or proof of entitlement to an identified water supply.*

Proof of entitlement to use of wells cited as the supply source for the development is demonstrated by Cal Water's ownership of its well properties and the wells and its legal right to use the underlying percolated waters.

A copy of the Second Amended Agreement demonstrating entitlement to SEWD treated water is attached.

(B) *Copies of a capital outlay program for financing the delivery of a water supply system that has been adopted by the public water system.*

The developer of Mariposa Lakes Specific Plan will prepare with Cal Water a preliminary water system facilities plan.

Capital costs for design and construction of required water system facilities are the responsibility of the developer. Either the developer's or a Cal Water selected contractor will construct the system with Cal Water providing construction oversight.

Cal Water's Stockton District capital improvement program is separate from and does not include any of the fore-mentioned costs associated with the design and construction of water supply and system facilities required for the Mariposa Lakes Specific Plan.

Cal Water is currently preparing a Water Supply and Facilities Master Plan that is expected to be completed in 2007. The Plan will provide specific recommendations for water system facility or capital improvements over a 20-year period for the Stockton District. It is Cal Water's intention to update this plan and recommended capital improvements every three to five years.

(C) *Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.*

Cal Water is required to obtain the following permits including:

1. Water system amendment permit from California Department of Health Services (DHS)
2. A conditional use permit from the City of Stockton Community Development Department for its stations (wells, storage, booster pumps)
3. Well construction/building permit from the SJC Emvironmental Health Department and the City Building Inspection Department
4. An air quality permit from the San Joaquin County Air Pollution District

Cal Water is highly experienced in preparing applications and obtaining the necessary permits as they are needed in order to proceed with design, construction, start up and operation of required water facilities.

Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.

As previously noted, Cal Water is familiar with the approvals it must obtain from the City of Stockton Community Development Department, the California Department of Health Services and San Joaquin County Air Pollution Control Agency.

7. Determination of Supply Sufficiency

Based on:

- Existing and planned expansion of Cal Water's well production capacity in the Stockton District,
- Existing and planned expansion of the SEWD water treatment plant capacity,
- SEWD's existing sources of raw water supply and plans and activities to secure and expand those sources,
- City of Stockton's Delta Water Supply Project and Cal Water's plan to participate in that project,
- Cal Water's current preparation of a Water Supply and Facilities Master Plan to improve the capability of the District system to effectively move various supply sources to areas of demand for normal, peak seasonal and maximum day conditions and the overall reliability and performance of the entire supply system and to provide the highest water quality to its customers
- Successful historical experience in providing water to fully meet demands during single dry and multiple dry years,
- In-place, ongoing conservation programs and best management practices for reducing customer demand during single and multi-year droughts including implementation of a water rationing program if required,
- Ongoing and future planned coordination and cooperation with the City of Stockton, Stockton East Water District and San Joaquin County for managing long term sustainable surface and groundwater supplies for the COSMA,

Cal Water believes it will have more than adequate water supplies to meet the projected demands of its proposed Mariposa Lakes Specific Plan service area in addition to those of its existing customers and other anticipated future water users in the Stockton District for the 20 year period from 2006 to 2025 under normal, single dry year and multiple dry year conditions.

Approval Authority

California Water Service Company's Board of Directors, by resolution, has delegated approval authority for SB610 Water Supply Assessments to two Cal Water Vice Presidents (officers of the company).

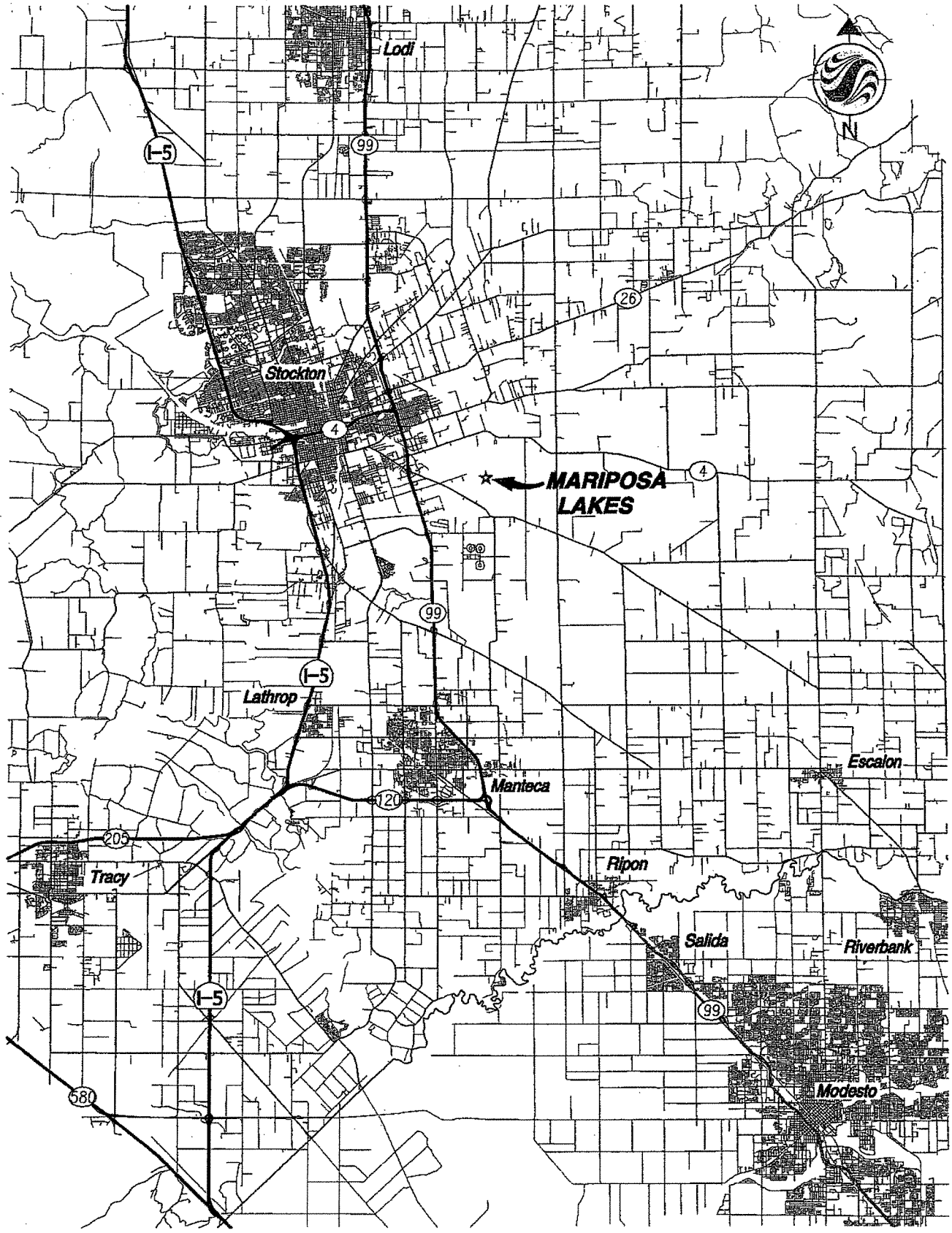
Approved:

_____ Date: _____

Stan Ferraro
Vice President

_____ Date: _____

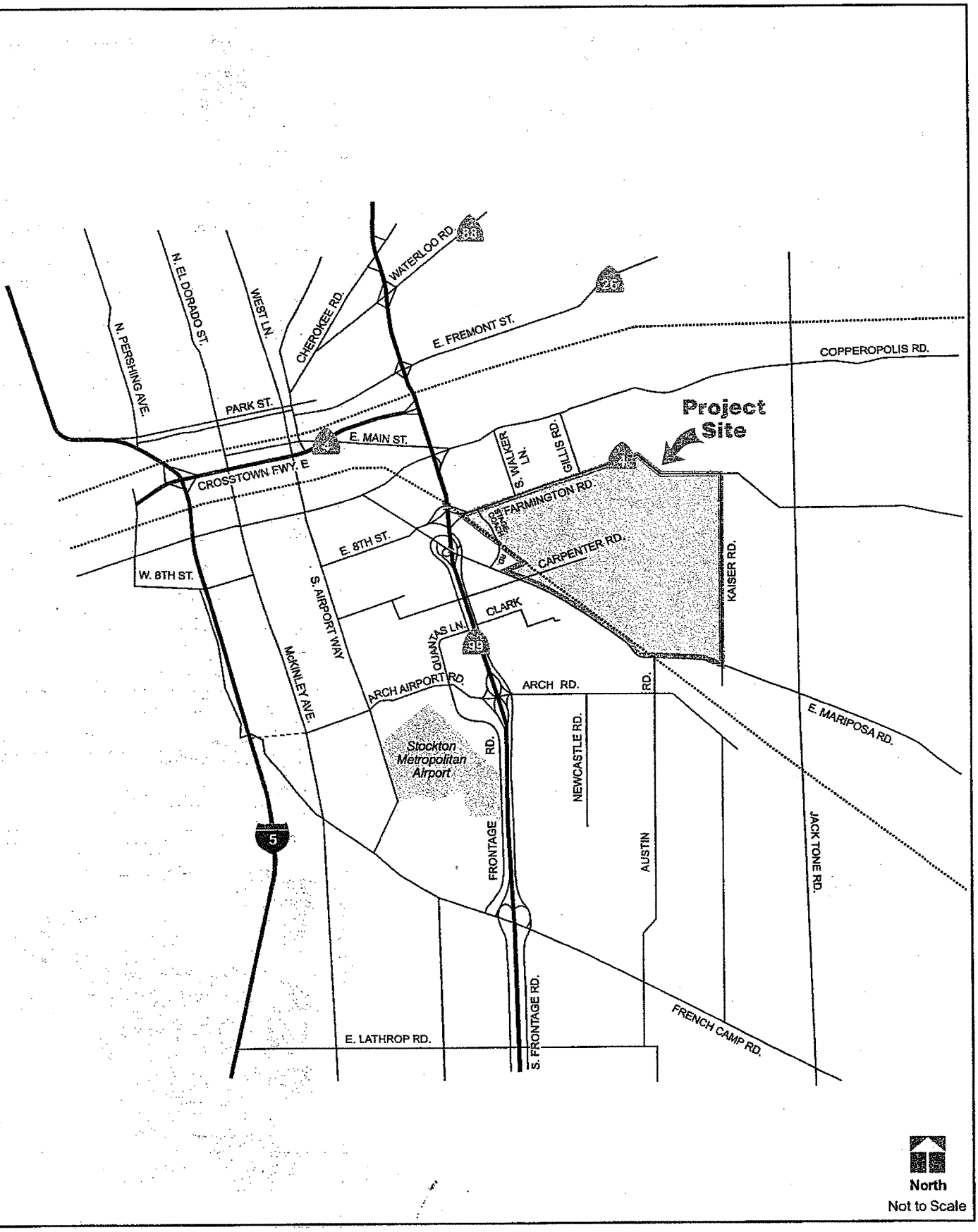
Mike Rossi
Vice President



Stantec Consulting Inc.
1016 12th Street
Modesto, CA U.S.A.
95354
Tel. 209.521.8986
Fax. 209.521.9045
www.stantec.com

Stantec

		INITL	8-3-06
REGIONAL CONTEXT MAP	MARIPOSA LAKES		EXHIBIT NO. 1



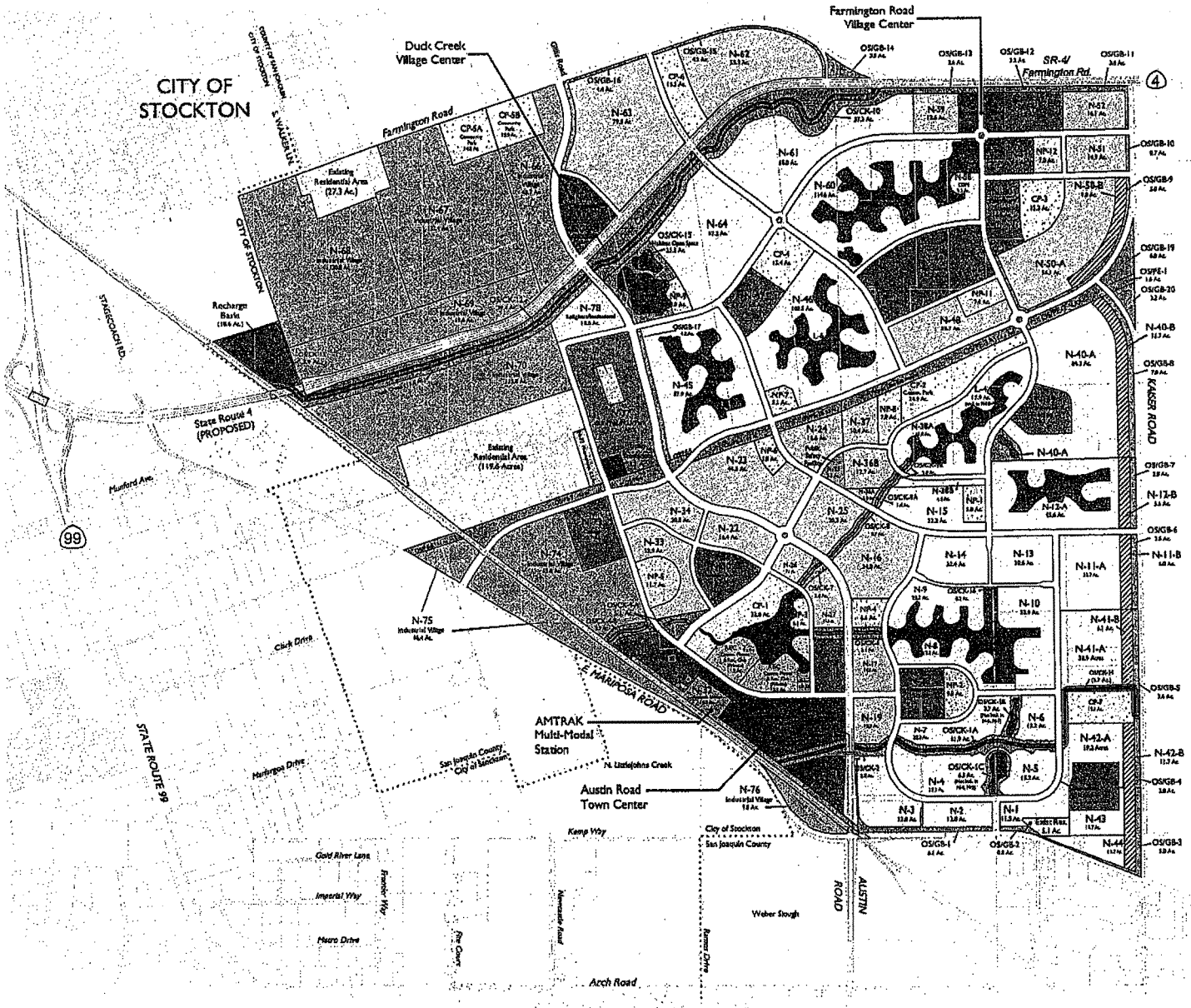
City of Stockton
Mariposa Lakes Traffic Study

Vicinity Map

Figure **1**

TJKM

11-082 - 10/17/06 - CK



Mariposa Lakes

Stockton, California

Land Use Map

Figure 4.3

Land Use Legend

Key	Land Use	Acres
	Village Residential Estate	52.9 ac
	Village Low Density Residential	1,007.4 ac
	Village Medium Density Residential	511.7 ac
	Village High Density Residential	55.4 ac
	Village Center/Commercial	92.7 ac
	Industrial	614.7 ac
	Business-Professional	57.3 ac
	Religious Institution	18.0 ac
	Library	2.0 ac
	Amtrak Station	14.9 ac
	Public Safety Facility	3.5 ac
	PG & E Substation (Utilities)	3.2 ac
	Elementary/High Schools	153.7 ac
	College	20.7 ac
	Private Recreation Center	24 ac
	Maintenance Facility (HOA)	5.2 ac
	Public Parks	214.8 ac
	Open Space	321.2 ac
	Existing Residential	152 ac
	Lakes 1, 2, 3, & Recharge Basin	87.8 ac
	Major Circulation (Roads & R.R.)	402.1 ac
	Total:	3,810 acres

LAND PLANNER / LANDSCAPE ARCHITECT:

RANDALL PLANNING & DESIGN INC.
Landscape Architecture • Golf Facilities Site and Environmental Planning

SCALE:

0 900 1800 3600 5400