Section 2: Water Supply Requirements

This section assesses the current water demand and supply for CCSD, as well as future water demands, based on projections using past billing and production data as well as an existing Geographic Information System (GIS). Water supply reliability requirements are also discussed.

2.1 Current Water Supplies

Two groundwater basins, San Simeon and Santa Rosa, currently provide a water supply for CCSD and riparian users. The basins are recharged primarily by San Simeon and Santa Rosa Creeks, respectively. The creeks also sustain high quality habitat for a variety of aquatic and terrestrial species. Both creeks terminate into lagoons that are home to both the endangered Tidewater Goby as well as the threatened South-Central Coast Steelhead. In addition, the riparian corridor provides habitat for the threatened Red-Legged Frog as well as the Southwestern Pond Turtle. Generally, Santa Rosa Creek has a much longer reach of perennial flow areas that contribute to the survival of juvenile and smolt-sized steelhead during the summer. Approximately 12 miles of such habitat exists along the Santa Rosa Creek. In contrast, San Simeon Creek is blocked by a natural rock fall, and has about one-mile of perennial habitat area in its upper reaches.[3] Additionally, CCSD recharges the underflow of San Simeon Creek with treated wastewater effluent down-gradient from its well field. To maintain a high quality water supply, and to avoid impacting fish habitat, groundwater from Santa Rosa Basin is only used sparingly by CCSD to supplement groundwater from the San Simeon Basin. Descriptions of the two basins are provided below.

The SWRCB has issued and administered diversion permits for both groundwater basins. In addition, the CCC has issued development permits that provide further limits to CCSD water withdrawals. During January of 2003, CCSD began investigating the process of adjudicating the San Simeon Basin. To date, neither basin has been adjudicated.

The United States Geological Survey (USGS) conducted a detailed study of the hydrogeology of the two groundwater basins that was later summarized in a 1998 report[4]. Although the report is dated 1998, the water budget table was based on an April 1988 through March 1989 time frame. Table 2-1 presents an update to the simulated annual water budget developed within the USGS report. In developing this table, all inflows and outflows were assumed to remain the same as in the 1998 report except for a 1991 change in operation by CCSD to its spray field system. In 1991, the CCSD converted a spray field operation into a percolation pond operation. This change decreased losses due to evaporation, and increased inflows into the San Simeon Basin by approximately 60 AF. It is also worth noting that although the water year for the 1998 USGS report was based on 1988 through 1989 CCSD demands, the current CCSD demands are very close to the same 800 AFY.

[3] D.W Alley &Associates

[4] U.S. Geological Survey. 1998. Report 98-4061; Hydrogeology, Water Quality, Water Budgets, and Simulated Responses to Hydrologic Changes in Santa Rosa and San Simeon Creek Ground-Water Basins, San Luis Obispo County, California

TABLE 2-1
FLOW SUMMARY FOR SAN SIMEON AND SANTA ROSA BASINS[(a)]

	Santa Rosa Basin			San Simeon Basin		
Budget Item	**Inflow**	**Outflow**	**Net Flow**	**Inflow**	**Outflow**	**Net Flow**
Rainfall Recharge	140	0	140	50	0	50
Creek Seepage	1,120	650	470	950	410	540
Subsurface Inflow & Outflow						
Onshore Boundaries	370	0	370	150	0	150
Ocean Boundary	0	60	-60	0	320	-320
Agricultural Water Use						
Pumpage	0	890	-570	0	450	-280
Irrigation-Return Flow	320	0		170	0	
Nonagricultural Water Use						
Municipal Pumpage	0	250		0	550	
Rural Pumpage	0	10		0	<10	
Wastewater Recharge			-240			-50
Percolation Ponds	0	0		500	0	
Septic Tanks	10	0		<10	0	
Irrigation-Return Flow	10	0		0	0	
Phreatophyte Transpiration	0	160	-160	0	30	-30
Total Net Flow			-50			+60

Note:
(a) All values rounded to the nearest 10 AFY. Positive net flow indicates flow into basin; negative net flow indicates flow out of basin.

2.1.1 San Simeon Basin

The San Simeon Basin consists of 29.0 square miles (18,560 acres). The main source of groundwater recharge is San Simeon Creek. Two other tributaries are Van Gordon Creek and Steiner Creek.

2.1.1.1 CCSD Water Rights

Under CCSD's diversion permit for the San Simeon Basin, Permit No. 17287, the following restrictions apply:

- Maximum rate of diversion: 5.0 AF/day (2.5 cubic feet per sec [cfs])
- Maximum annual diversion: 1,230 AF
- Maximum dry season diversion: 370 AF. The dry season is defined as the date surface flow ceases at the Palmer Flats gaging station until October 31 of that year.

Based on these limitations, the permitted remainder of 860 AF for diversion during the winter months could hypothetically supply CCSD for the entire current year. However, CCSD lacks seasonal storage and cannot store the water for the dry season. Additionally, the permitted winter diversion value does not account for drought conditions such as carry-over capacity needed from one dry year to the next. The start of the dry season varies each year and is predicated upon flow at the Palmer Flats flow gage. CCSD pumped 321 AF from the San

Simeon Basin in the wet season for 2001. Assuming the start of the dry season at May 1, 2002 (a conservatively early date), and the end of the dry season at October 31, CCSD would have pumped 424 AF during this period in 2001, and 384 AF during this period in 2002. Although both of these later amounts are above the permitted value of 370 AF, the diversion permit on San Simeon Creek ties the start of the dry season to when flow at the Palmer Flats stream gage stops as opposed to the May 1 calendar date. Therefore, the actual start of the dry season on the San Simeon creek varies depending upon the winter rainfall amount and late season rainfall patterns. Thus, the start of the actual dry season on San Simeon can be as late as June or July, depending on the preceding winter rainfall season.

CCSD owns three groundwater wells in the San Simeon basin: SS-1, SS-2, and SS-3. Each well has a pumping capacity of 450 to 500 gallons per minute (gpm), for a total pumping capacity of 1,350 to 1,500 gpm (2,183 to 2,425 AFY.)

Although it has relatively high hardness, the groundwater in San Simeon Basin is of excellent quality. Wells SS-2 and SS-3 are not considered groundwater under the direct influence of surface water and thus are not subject to the Surface Water Treatment Rule (SWTR) because they are located over 150 ft from the creek water. However, well SS-1, depending on creek flow, may be within 150 ft of the creek water. During these times, SS-1 is not operated. When compared to the Santa Rosa groundwater, San Simeon groundwater tends to be lower in hardness, iron, and manganese and is, therefore, considered to be of better quality.

2.1.1.2 Riparian/Habitat Water Rights

Several riparian users also pump from San Simeon Creek upstream of CCSD. The uses mainly consist of agricultural irrigation. Certain agricultural pumpers have claimed a loss of well capacity due to CCSD's use of the San Simeon well field. As a result of these past claims, CCSD provides irrigation water to one agricultural user directly from its San Simeon wells. More recently, CCSD entered into a fallowing agreement with an agricultural user during the summer of 2002. An estimated 38 percent of water used for irrigation is returned to the basin (Table 2-1).[5]

The amount of flow needed for habitat has not been fully addressed and is a very complex issue due to the numerous factors effecting the aquatic environment (e.g., erosion and sedimentation, El Nino weather events, and canopy cover and temperature). However, restrictions by the CCC development permit place further limits on CCSD's diversion permits in an attempt to further address habitat needs. Additionally, CCSD performs routine fish surveys on both the creeks and lagoons to assess conditions as well as monitor for potential habitat impacts. San Simeon Creek, although not as productive as Santa Rosa Creek, is home to the South-Central Coast Steelhead, an evolutionary significant unit of the species, which is listed as threatened under the Federal Endangered Species Act. However, a natural rock fall in the upper reach of the creek blocks migration of the steelhead. Depending upon the timing of late season rainfall and creek flows, adult steelhead have become trapped in pools along the creek prior to completing their outgoing ocean migration. Past practices by both CCSD's certified biologist, as well as a riparian irrigator, have included relocating adult fish around restrictions. However, in recent years the California Department of Fish and Game has been reluctant to allow the fish relocation practice to continue without specific permitting in place. Opinions have also varied as to whether fish

[5] U.S. Geological Survey. 1998. Hydrogeology, Water Quality, Water Budgets, and Simulated Responses to Hydrologic Changes in Santa Rosa and San Simeon Creek Ground-Water Basins.

relocations were interfering with the natural selection process, or whether riparian and municipal pumping was necessitating the need to relocate fish. Most recently, representatives of the National Marine Fisheries Service have expressed a desire for the completion of a habitat conservation plan in order to address this issue. Additionally, CCSD has begun investigating the legal process for adjudicating the San Simeon groundwater basin in order to develop a long-term process for managing withdrawals from the aquifer.

2.1.1.3 California Coastal Commission Development Permit Limitations

During May of 1981, the CCC approved an amendment to existing developments permits that modified the annual number of water connections at 125 per year (Coastal permit number 428-10). Condition 4 of the CCC permit 428-10 limits the total combined production from both creeks to less than 1,230 AFY. Additionally, it calls for no more than 260 AF to be withdrawn from the Santa Rosa Creek between July 1 and November 20, and no more than 147 AF per month outside of this period. In addition to these conditions, the CCC has required that at least 20 percent of CCSD supply be made available for visitor serving purposes.

2.1.2 Santa Rosa Basin

The Santa Rosa Basin consists of 43.38 square miles (27,760 acres). It has two basins divided by an underground fault line or bedrock ridge. The lower basin is recharged by upper basin spillage. The upper basin is not threatened by saltwater intrusion and is of better water quality than the lower basin. The watershed provides an important habitat for the threatened South-Central Coast Steelhead. It also supports the Tidewater Goby, Red-Legged Frog and Southwestern Pond Turtle. Vegetation found in the watershed includes Cottonwoods, Sycamores, Coast Live Oak, White Alder, California Laurel, Willows, and non-native Blue Gum.

2.1.2.1 CCSD Water Rights

Similar to San Simeon Creek, the SWRCB has issued a diversion permit specifying allowed withdrawals by the CCSD for the Santa Rosa Creek. SWRCB Permit No. 20387 covers CCSD's use of the Santa Rosa aquifer and contains the following restrictions:

- Maximum rate of diversion: 5.3 AF/day (2.7 cfs)
- Maximum annual diversion: 518 AF
- Maximum dry season (May 1 to October 31) diversion: 260 AF

Due to MtBE contamination in the lower Santa Rosa Basin, two wells (SR-1 and SR-3) were placed out of service. A new temporary well (SR-4) was constructed in the upper Santa Rosa Basin near the Coast Union High School, away from any known contamination. This newer well has a capacity of 450 to 500 gpm (728 to 808 AFY).

Groundwater from the Santa Rosa basin requires filtration and chemical treatment prior to potable use due to the need to meet the State's surface water treatment rule, and the need to remove high iron and manganese concentrations. Manganese and iron are the main source of taste and odor problems experienced by CCSD, as well as the cause of discoloration of fixtures. A proprietary "Pureflow" treatment system is used at well SR-4 for iron and manganese removal in conjunction with filtering aids and hypochlorite disinfection. Groundwater is chlorinated to oxidize and precipitate the manganese as well as any other source of turbidity, and passes

through a proprietary filter medium to remove any precipitate. The older wells, SR-1 and SR-3, also have a proprietary "Filtronics" treatment process for the same purpose. Due to its poor quality, groundwater from the Santa Rosa Basin is typically used to supplement and back up the San Simeon Basin groundwater supply.

2.1.2.2 Riparian/Habitat Water Rights

Several riparian users also pump from Santa Rosa Creek upstream of CCSD. Similar to San Simeon Creek, the uses mainly consist of agricultural irrigation. An estimated 36 percent of water used for irrigation is returned to the basin (Table 2-1).[6] During 2001, CCSD acquired the East/West Ranch along with the riparian water rights associated with that property. Although the East/West Ranch water rights are not appropriative, the acquisition of this property provides CCSD with a means to control agricultural use within the Ranch, and to consequentially limit or prevent any future irrigation.

As with the San Simeon Basin, the amount of flow required to address habitat needs has not been fully addressed. During the dry season of 2002, an empirical approach was developed by water operators that ceased pumping well SR-4 under certain conditions. The monitoring activity shut down the new well whenever flow in the creek was observed to be dropping in level, or slowing in velocity. Although changes in creek flow may have been due to upstream riparian pumping activities, no conclusive evidence was obtained to prove this hypothesis. Additionally, the 2002 rainy season was less than average, and little rainfall occurred during the last half of the season. As the result of these efforts, and despite the lack of rainfall, the creek flow persisted throughout the dry season of 2002. As a result, during the peak demand months of 2002, well SR-4 provided only minor production (approximately 37 AF total from July 1, 2002 through October 31, 2002).

2.1.3 Assessment of Current Water Supplies

The current water rights diversion permits from the SWRCB allow CCSD to pump a maximum of 1,118 AF during the wet season, and 630 AF during the dry season, from both the San Simeon and Santa Rosa Basins. However, the current CCC Development permit limits the total annual diversion from both creeks to no more that 1,230 AF. Additionally, the dry season start date, duration and beginning groundwater levels limit the actual availability of groundwater from both basins. The report entitled, "Baseline Water Supply Analysis," dated 2000 by Kennedy/Jenks Consultants developed a model based on historical data that projected basin response to increased levels of water demand to determine the adequacy of the groundwater supply. To interpret the model supply outputs, the following criteria were applied to determine whether water supplies appear to be adequate for the assumed water demand projections:

- The projected groundwater level at the end of the dry season in the San Simeon Basin is above the minimum groundwater level criteria for the specific hydrologic classification.
- There is at least an approximately 90 or 95 percent probability of occurrence that the groundwater level at the beginning of the dry season in the San Simeon basin is greater than the minimum groundwater level for the specified hydrologic classification.

[6] Ibid.

- The projected draw down in the Santa Rosa Basin is less than 28 ft at the existing wells SR-1 and SR-3.

- The annual and dry season water rights limitations for each basin are not exceeded.

From the model, it was determined that the current groundwater supply was marginal to inadequate to provide a 90 percent level of reliability for water demands in the year 1999 (3,796 connections) and was inadequate to provide a 95 percent reliability level for the same water demand. This conclusion was based on the following model results:

- The projected ending groundwater level in the San Simeon Basin is expected to be above the minimum groundwater level criterion if the basin is completely recharged at the beginning of the dry season.

- The probability that groundwater levels will be sufficiently high at the beginning of the Dry Season to maintain the minimum criteria is near the 90 percent reliability objective but well below the 95 percent reliability objective, particularly in critically dry years.

- The projected drawdown in the Santa Rosa Basin near wells SR-1 and SR-3 is expected to be less than 28 ft.

- The expected production requirements from each basin are within the dry season water rights limitations.

Furthermore, it was determined that the basins are not adequate to provide a 90 percent or 95 percent level of reliability for water demands greater than 10 percent of the 1999 demands (4,176 connections). Thus, the basins cannot reliably meet the increased demands of the waiting list and grandfathered connections (4,650 connections) without an additional source of recharge. A total of 286 AF of groundwater from the San Simeon Basin and 201 AF from the Santa Rosa Basin would be available with a 93 percent reliability during the dry season for a multi-dry year without causing adverse environmental impacts to the basins as determined by the model using the assumptions previously stated. However, since the Baseline report was completed in 2000, operation of well SR-4 has been minimal during the dry season due to concerns over potential habitat impacts. For this reason, dry season production is only assumed to be available from the San Simeon aquifer, and limited to approximately 286 acre ft. Table 2-2 provides an estimate of the supply availability based on the SWRCB diversion permits, the CCC Development permit, and negligible use of the Santa Rosa aquifer during the dry season.

TABLE 2-2
ESTIMATE OF EXISTING SUPPLY AVAILABILITY

Supply Availability	San Simeon (AFY)	Santa Rosa (AFY)	Total (AFY)
Annual[(a)]	1,230	518	1,230[(c)]
Dry Season[(b)]	286	201	286[(d)]
Wet Season	944	317	944[(e)]

Notes:
(a) Maximum annual availability as restricted by the SWRCB diversion permits.
(b) Dry season and wet season availability as determined from "Baseline Water Supply Analysis," 2000, by Kennedy/Jenks.
(c) 1,230 AF maximum annual amount allowed by CCC Development permit.
(d) The Santa Rosa supply is not expected to operate during the dry season and is expected to only operate as a supplemental source during the wet season. Thus is its not anticipated to increase the dry season supply availability.
(e) Difference between Annual and Dry Season availability, (1230 – 286 = 944 AF).

2.2 Current Water Demands

Table 2-3 provides a summary of annual production totals for CCSD over the last twelve years. The total potable water demand for 2002, based on CCSD water production, was 810 AF. Assuming a dry season starting May 1 and ending October 31, the total dry season demand for 2002 was approximately 459 AF. During 2002, the majority of the 459 AF pumped during the dry season, 385 AF, was pumped from the San Simeon aquifer. If the dry season actually started on May 1, 2002, CCSD would have exceeded its permitted maximum of 370 AF during the dry season by about 98 AF. However, the assumed May 1 dry season start date is a conservative estimate. For example, the dry season in 2002 actually started later in the summer, with July 7, 2002 as the start date of low flow in San Simeon Creek.

In addition to the well production used for its metered customers, CCSD also provides a 2-inch water connection from its San Simeon wells to an agricultural property that is used for agricultural irrigation. The connection to the agricultural property is based on an earlier hearing with the SWRCB, over potential impacts to an irrigation well that is jointly owned by both the agricultural property and CCSD. Well production numbers shown in Table 2-3 include the extra demand CCSD was required to deliver to the riparian users. During summer of 2001, agricultural watering occurred during the peak of the dry season in order to soften a new field for plowing. During the subsequent 2002 irrigation season, the same agricultural irrigator entered into a fallowing agreement with CCSD to suspend watering. However, the fallowing agreement was not enacted until halfway through the 2002 irrigation season.

TABLE 2-3
CCSD WATER PRODUCTION

	San Simeon Basin (AF)			Santa Rosa Basin (AF)			Total (AF)		
Year	Wet	Dry[(a)]	Total	Wet	Dry	Total	Wet	Dry	Total
1988	283.0	282.6	565.6	70.5	183.4	253.9	353.5	466.0	819.5
1989	297.9	324.5	622.4	36.8	137.8	174.6	334.7	462.3	797.0
1990	252.1	205.1	457.2	62.2	144.4	206.6	314.3	349.5	663.8
1991	178.8	226.1	404.9	67.4	83.4	150.8	246.2	309.5	555.7
1992	265.7	276.6	542.3	26.7	108.7	135.4	292.4	385.3	677.7
1993	299.6	390.9	690.5	0.8	0.1	0.9	300.4	391.0	691.4
1994	240.4	297.6	538.0	41.1	83.0	124.1	281.5	380.6	662.1
1995	283.5	392.4	675.9	1.9	0.0	1.9	285.4	392.4	677.8
1996	293.2	424.8	718.0	0.18	0.12	0.3	293.3	425.0	718.3
1997	319.0	359.5	678.5	12.6	94.7	107.3	331.6	454.2	785.8
1998	294.5	412.8	707.3	0.08	0.12	0.2	294.6	412.9	707.5
1999	306.7	467.4	774.1	0.07	0.46	0.53	306.8	467.8	774.6
2000	345.8	453.0	798.8	0.0	0.0	0.0	345.8	453.0	798.8
2001	321.3	424.0	745.3	9.0	43.7	52.7	330.3	467.7	798.0
2002	343.1	384.6	727.8	7.3	74.4	81.7	350.4	459.0	809.5

Notes:
(a) Based on the assumption of a May 1 start date and an October 31 end date for the dry season. The actual dates will vary each year depending upon creek flows and rainfall patterns.
Source: CCSD Water Operations Staff Report, December 2002.

Figures 2-1 and 2-2 summarize CCSD total production and Santa Rosa dry season production from 1988 through 2002 in comparison with the maximum production allowed by the CCC Development permit.

2.3 Projected Water Demands

In the report entitled “Task 3: Potable Water System Modeling” dated June 2004, by Kennedy/Jenks Consultants, future water demands were projected and the necessary water system improvements were evaluated. The report presented projected demands for four build-out scenarios for 2022. The four scenarios are:

1. 6,700 connections
2. 5,700 connections
3. 5,250 connections
4. 4,650 connections

Because of an expressed desire by the CCSD Board to improve “quality of life” by allowing for some future increase in unit consumption, increases of 10, 20, and 50 percent in consumption above existing baseline demands were also analyzed. The projected water demands for each scenario are summarized in Tables 2-4 and 2-5 along with quality of life increases expressed as a percentage increase above existing consumption levels. Appendix C is an excerpt from the modeling report that provides a more detailed discussion of the development of existing and projected water demands.

Figure 2-1
CCSD Historic Annual Production (1988 to 2002)

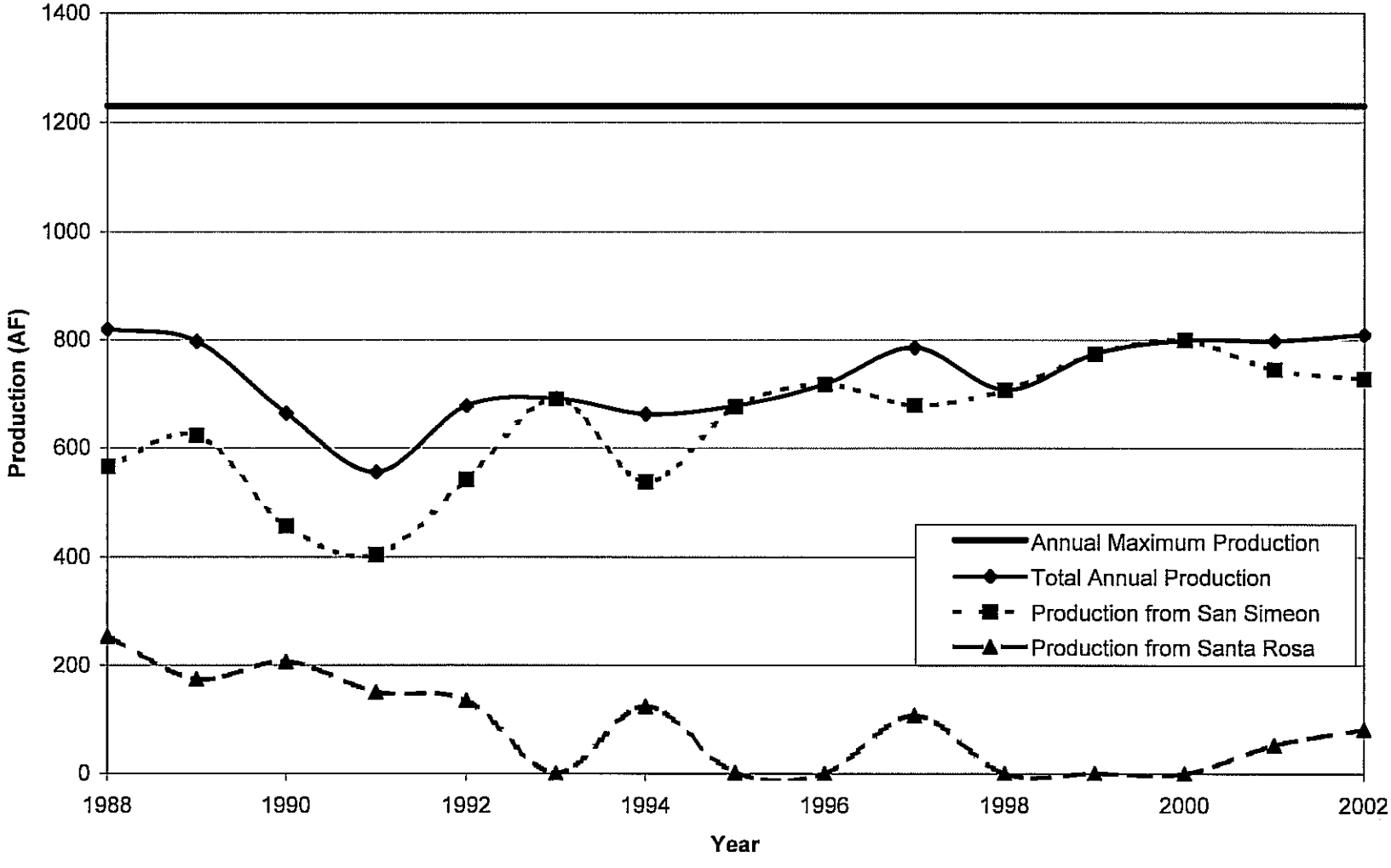
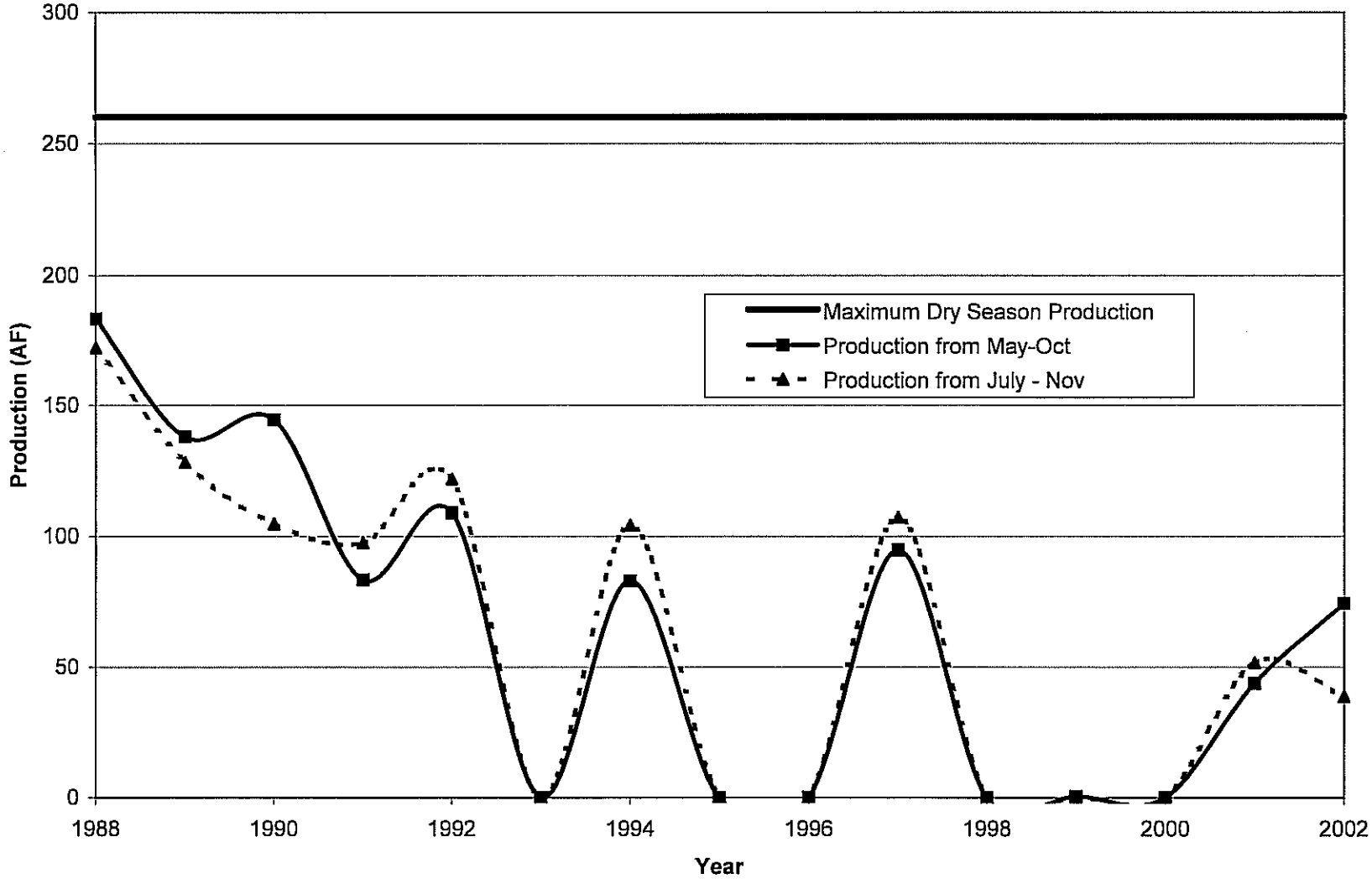


Figure 2-2
Dry Season Production (1988 to 2002) for the Santa Rosa Basin

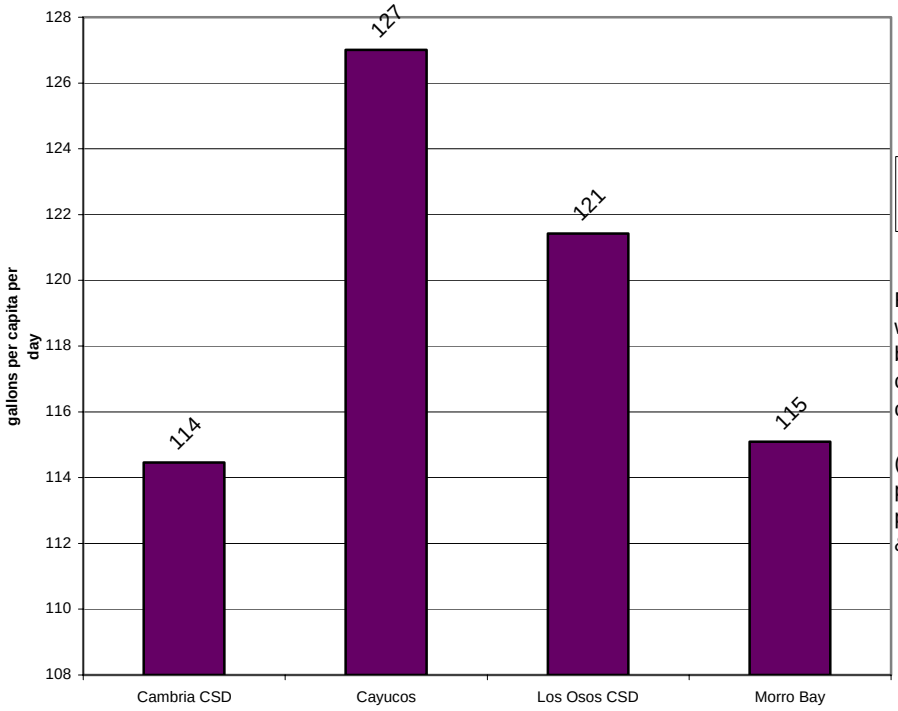


Future demand projections were developed using 1999 through 2003 billing and production data. This data was subsequently used by Kennedy/Jenks Consultants to make corrections using adjustment factors to account for differences between billing totals and actual water delivered into the distribution system from the production wells. By using this approach, both commercial and residential consumption was included. Historically, approximately 25 percent of the District's supply has gone to commercial accounts that are primarily visitor serving enterprises.

Assuming either 1.66 or 2.21 residents per household and 90 gallons per capita per day (gpcd), the total annual future demand was projected for each scenario. These future demands were then added onto the existing demands from the metered data. Because the metered data included both commercial and residential use, the future demand volumes also account for the 20 percent commercial use required by the CCC permit. These population densities are based on 2000 Census data utilizing a 75 percent and 100 percent occupancy rate, respectively. Based on a statistical analysis of historical water consumption described in the "Baseline Water Supply Analysis" dated December 8, 2000 by Kennedy/Jenks Consultants, the average water consumption is 114 gpcd (90 percent confidence level) of which, approximately 25 percent is due to commercial consumption. Accordingly, the residential consumption factor is 90 gpcd. In order to develop summer and winter demands from average demands, seasonal demand factors were developed from historic seasonal water use, which account for increased demands from summer tourism and vacation homes. Based on current wet season and dry season average day demands, future average day demands for wet and dry seasons were determined.

The projected baseline demands presented were derived based on CCSD's current consumption rate (114 gpcd), which includes extensive water demand management measures designed to reduce overall consumption. This rate differs by approximately 6 percent from the average consumption rate (121 gpcd) for other central coast communities located within the same relative microclimate (evapotranspiration zone [ET]) and approximately 10 percent from the maximum consumption rate (127 gpcd) for the same communities. These communities included Morro Bay, Cayucos, and Los Osos. Figure 2-3 compares CCSD's existing water use with the other communities.

FIGURE 2-3
COMPARSION OF WATER CONSUMPTION[(a)]



For those locations where data was availabe, the bimonthly billed amount is shown for the corresponding gpd/residential connection.

(a) total production divided by population, where total production includes commercial & retail

TABLE 2-4
PROJECTED POTABLE WATER DEMAND (AFY) FOR CCSD (1.66 PEOPLE/UNIT)

Scenario	Estimated Housing Units	Estimated Development Year	Projected Demand			Total Percent Increase		
			Wet Season	Dry Season	Total	10	20	50
Existing	3,812	2002	350	459	810	891	972	1,215
1	6,700[(a)]	2029	600	853	1,454	1,599	1,745	2,181
2	5,700[(b)]	2020	511	726	1,237	1,361	1,484	1,855
3	5,250[(c)]	2016	471	669	1,139	1,253	1,367	1,709
4	4,650[(d)]	2011	417	592	1,009	1,110	1,211	1,514

Notes:
(a) Total number of future dwelling units from GIS analysis. Includes acquisition of the East/West Ranch, non-controversial changes from the Draft 2000 North Coast Area Plan, merged single-family lots, and no subsequent lot retirements. Also included are an additional 163 mixed-use residential units within commercial land use areas, and 387 future multi-family units.
(b) Scenario 1 less the retirement of approximately 1,000 "likely non-buildable" high-density vacant single-family residential parcels.
(c) Maximum number of dwelling units permitted under a May 29, 1981 CCC Development Permit. (CCC Permit 428-10).
(d) Maximum number of dwelling units estimated by adding 3,812 existing units (estimated as of the end of 2002) plus 165 connections in process, plus 670 remaining CCSD wait listed customers. This approximates the number of dwelling units served by a proposed desalination project that was subject of an August 2000 advisory ballot.

TABLE 2-5
PROJECTED POTABLE WATER DEMAND (AFY) FOR CCSD (2.21 PEOPLE/UNIT)

Scenario	Estimated Housing Units	Estimated Development Year	Projected Demand			Total Percent Increase		
			Wet Season	Dry Season	Total	10	20	50
Existing	3,812	2002	350	459	810	891	972	1,215
1	6,700[(a)]	2029	747	1,062	1,809	1,990	2,171	2,714
2	5,700[(b)]	2020	636	903	1,539	1,693	1,847	2,309
3	5,250[(c)]	2016	585	832	1,418	1,559	1,701	2,126
4	4,650[(d)]	2011	519	737	1,256	1,381	1,507	1,883

Notes:
(a) Total number of future dwelling units from GIS analysis. Includes acquisition of the East/West Ranch, non-controversial changes from the Draft 2000 North Coast Area Plan, merged single-family lots, and no subsequent lot retirements. Also included are an additional 163 mixed-use residential units within commercial land use areas, and 387 future multi-family units.
(b) Scenario 1 less the retirement of approximately 1,000 "likely non-buildable" high-density vacant single-family residential parcels.
(c) Maximum number of dwelling units permitted under a May 29, 1981 CCC Development Permit. (CCC Permit 428-10).
(d) Maximum number of dwelling units estimated by adding 3,812 existing units (estimated as of the end of 2002) plus 165 connections in process, plus 670 remaining CCSD wait listed customers. This approximates the number of dwelling units served by a proposed desalination project that was subject of an August 2000 advisory ballot.

A density of 1.66 people/unit as determined by 2000 Census and a range of projected demand between Scenario 3 and 4 are assumed. This range was selected because it represents the minimum projected demand (Scenario 4 that includes the grand-fathered and wait list connections) and the most likely worst-case demand (Scenario 3 that is the maximum number of units permitted by the CCC for CCSD). Per the recommendation of the CCSD Board, an increase from the current 90 gpcd (12 CCF per bi-monthly billing month) to 135 gpcd (18 CCF

TABLE 2-7
SUPPLY VS. DEMAND PROJECTIONS (1.66 PERSONS/ DWELLING UNIT)

	Scenario 1			Scenario 2			Scenario 3			Scenario 4		
	6700 Residential Units			5700 Residential Units			5250 Residential Units			4650 Residential Units		
	winter	summer	annual	winter	summer	annual	winter	summer	annual	winter	summer	annual
Max Day Demand (gpm) [a]	1,128	1,577		960	1,342		884	1,236		783	1,095	
Average Day Demand (gpm) [b]	752	1,051		640	894		589	824		522	730	
Baseline Demand (AF) [c]	600	853	1,454	511	726	1,237	471	669	1,139	417	592	1,009
Supply (AF) [d]	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF) [e]	**344**	**-567**	**-224**	**433**	**-440**	**-7**	**473**	**-383**	**91**	**527**	**-306**	**221**
Demand with 10% increase (AF)	661	939	1,599	562	799	1,361	518	736	1,253	458	652	1,110
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**283**	**-653**	**-369**	**382**	**-513**	**-131**	**426**	**-450**	**-23**	**486**	**-366**	**120**
Demand with 20% increase (AF)	721	1,024	1,745	613	871	1,484	565	802	1,367	500	711	1,211
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**223**	**-738**	**-515**	**331**	**-585**	**-254**	**379**	**-516**	**-137**	**444**	**-425**	**19**
Demand with 50% increase (AF)	901	1,280	2,181	766	1,089	1,855	706	1,003	1,709	625	888	1,514
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**43**	**-994**	**-951**	**178**	**-803**	**-625**	**238**	**-717**	**-479**	**319**	**-602**	**-284**

Notes:
(a) From "Task 3: Potable Water System Modeling" prepared by Kennedy/Jenks Consultants, dated March 2004.
(b) Calculated by dividing the Max Day Demand by the Max Day Demand Factor of 1.5
(c) Conversion of gpm to AF. 181 days were assumed for the winter season and 184 days for the summer season.
(d) From Table 2-2
(e) Supply minus Demand

TABLE 2-8
SUPPLY VS. DEMAND PROJECTIONS (2.21 PERSONS/ DWELLING UNIT)

	Scenario 1 6700 Residential Units			Scenario 2 5700 Residential Units			Scenario 3 5250 Residential Units			Scenario 4 4650 Residential Units		
	winter	summer	annual	winter	summer	annual	winter	summer	annual	winter	summer	annual
Max Day Demand (gpm) [a]	1,403	1,962		1,194	1,669		1,100	1,538		974	1,362	
Average Day Demand (gpm) [b]	936	1,308		796	1,113		733	1,025		649	908	
Baseline Demand (AF) [c]	747	1,062	1,809	636	903	1,539	585	832	1,418	519	737	1,256
Supply (AF) [d]	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF) [e]	**197**	**-776**	**-579**	**308**	**-617**	**-309**	**359**	**-546**	**-188**	**425**	**-451**	**-26**
Demand with 10% increase (AF)	822	1,168	1,990	699	994	1,693	644	915	1,559	570	811	1,381
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**122**	**-882**	**-760**	**245**	**-708**	**-463**	**300**	**-629**	**-329**	**374**	**-525**	**-151**
Demand with 20% increase (AF)	897	1,274	2,171	763	1,084	1,847	703	998	1,701	622	884	1,507
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**47**	**-988**	**-941**	**181**	**-798**	**-617**	**241**	**-712**	**-471**	**322**	**-598**	**-277**
Demand with 50% increase (AF)	1,121	1,593	2,714	953	1,355	2,309	878	1,248	2,126	778	1,105	1,883
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**-177**	**-1,307**	**-1,484**	**-9**	**-1,069**	**-1,079**	**66**	**-962**	**-896**	**166**	**-819**	**-653**

Notes:
(a) From the "Task 3: Potable Water System Modeling" prepared by Kennedy/Jenks Consultants, dated March 2004.
(b) Calculated by dividing the Max Day Demand by the Max Day Demand Factor of 1.5
(c) Conversion of gpm to AF. 181 days were assumed for the winter season and 184 days for the summer season.
(d) From Table 2-2
(e) Supply minus Demand

per bi-monthly billing period) was also included. This increase equates to the 50 percent quality of life increase. Additionally, this quality of life increase allows for the same percent increase in commercial consumption or for future commercial growth. Thus, the projected annual water demand, with the 50 percent increase above baseline use and 1.66 persons per household, is 1,514 AF (for build-out Scenario 4) to 1,709 AF (for build-out Scenario 3). The dry season demands, with the same 50 percent increase above baseline and 1.66 persons per household, equate to 888 AF (Scenario 4) to 1,003 AF (Scenario 3), as shown in Table 2-7 provided below.

2.4 Projected Water Supply Requirements

Table 2-6 provides a comparison of the current water supplies and projected water demands. From this comparison, it is evident that to meet projected water demand an additional water source would be required during the dry season, regardless of which demand scenario is assumed. Alternatively, sufficiently large seasonal storage to meet supplemental dry season requirements, as well as evaporative losses and dead pool requirements, could be considered. For purposes of this report, the projected dry season supplemental supply required is assumed to be in the range of 602 AF (Scenario 4 with 50 percent demand increase) to 717 AF (Scenario 3 with 50 percent demand increase) as determined from Table 2-6. As shown, these values assume the total dry season production from the San Simeon basin at 286 AF and no production from the Santa Rosa basin. With this supplemental supply provided by an alternative source, dependence on the existing basins during the critical summer months would decrease. Tables 2-7 and 2-8 provide the supplement requirements for all the projected demand scenarios.

TABLE 2-6
PROJECTED WATER SUPPLY REQUIREMENTS

	Wet Season[(a)]	Dry Season[(b)]	Total
Total Supply Available[(c)]	944 AF	286 AF	1,230 AF
Projected Water Demand[(d)]	625 to 706 AF	888 to 1,003 AF	1,514 to 1,709 AF
Projected Supplemental Water Supply Requirements	+238 to +319 AF	-602 to -717 AF	-284 to -479 AF

Notes:
(a) Wet season estimated as extending January 1 to April 31 and November 1 to December 31
(b) Dry season estimated as May 1 to October 31.
(c) From Table 2-2.
(d) Assuming 1.66 people/household, 50 percent quality of life increase, and ranging between Scenario 3 and 4.

2.5 Water Supply Reliability Requirements

Reliability is "how much one can count on a certain amount of water being delivered to a specific place at a specific time" and depends on the availability of water from the source, availability of the means of conveyance and level and pattern of water demand at the place of delivery.[7] The recommend reliability objective focuses on the ability of an alternative to provide sufficient water to CCSD during period of drought, as well as during a conveyance disruption. Currently the reliability of CCSD's water supply is dependent upon the reliability of its groundwater supply.

Reliability criteria define the maximum acceptable level of supply shortage CCSD is willing to sustain during a drought. For this study, a reliability criterion has been used to evaluate water supply plans. The recommended criterion requires water supply to be sufficient to meet

[7] DWR, 2002

projected demands 95 percent of the time. In the remaining 5 percent of the time, it is assumed that the maximum allowable supply shortage will be 5 percent of the demand. This level is recommended because a 5 percent water demand reduction was anticipated to be attainable in CCSD's service area by voluntary conservation. Typically when a shortage occurs, water customers increase their awareness of water usage and voluntarily reduce water demands, avoiding water rationing. However with CCSD's service area, customers are already actively conserving water. Thus the potential to cut additional demand via conservation practices is small. However, if improvements are made to the current demand management practices, as discussed in Section 8.7, additional reduction in potable water demand may be obtained. If a further reduction in water demand can be obtained through voluntary conservation, then the reliability criteria for CCSD's water supply can be lowered by that amount. For example, if the additional water demand management practices can reduce water demand by an additional 5 percent, then the reliability criteria can be lowered to 90 percent.

Section 4: Potential Water Supply Alternatives

The following potential water supply alternatives have been compiled from discussions with CCSD staff, as well as a collection of studies conducted in the last twenty years identifying and evaluating potential sources of additional potable water for CCSD. A brief summary of each of the alternatives is provided below. In addition to the individual supply alternatives, combinations of these concepts to ultimately provide a long-term water solution for CCSD may also be feasible. For example, recycled water and demand management are not mutually exclusive. Section 5 describes the storage and conjunctive use alternatives. Section 7 describes the criteria used to evaluate the more viable alternatives described in this section as well the alternatives described in Section 5.

4.1 Additional Water Supply Alternatives

Depending upon the development scenario and percent quality of life increase pursued by CCSD as well as other factors outlined in Section 2, approximately 306 to 994 AF of a supplemental water source may be required to meet projected dry season water demand. However, for purposes of comparing alternatives within this report, a range of 602 to 717 AF of supplemental dry season production will be considered sufficient to meet CCSD's projected water supply requirements, as discussed in Section 2.4. Potential supplemental supplies, as determined from previous studies, would develop additional new water supplies and include:

- Seawater Desalination
- Surface Water from Lake Nacimiento
- Additional Santa Rosa Creek Groundwater Wells
- Arroyo De La Cruz Groundwater Wells
- Hard Rock Drilling
- Recycled Water
- Demand Management
- Basin Management

Each of these alternatives is briefly discussed in the following subsections

4.2 Seawater Desalination

This alternative was evaluated in the 1998 report entitled, "Desalination Project Management Services" (1998 report) by Kennedy/Jenks Consultants followed by an update in 2000 (2000 report) and a 2002 letter report. Following development of the 1998 report, CCSD staff recommended further consideration of the following:

- Use of more energy efficient pumps and pressure exchanger technology.
- Development of a dual use facility concept to allow for centralized water softening within the same facility.
- Use of alternate energy to offset power needs.

N
W E
S

0.1 0.05 0 0.1 0.2 Miles

Legend

- Highway Brine Discharge
- State Park Brine Discharge
- Highway Pipeline Route
- State Park Pipeline Route
- Directional Drilled Intake
- Slant Drilled Intake

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Seawater Desalination Pipeline Routes

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Figure 4-1

K/J File: g:/projects/2002/024602.10/arcview/Figure 5-1.mxd

- Further geotechnical study to assess the feasibility of using a collector well intake.

Evaluation of the geotechnical feasibility of a collector well intake at Leffingwell Beach identified an earlier 1998 geotechnical investigation conducted by Earth Systems Pacific. The four exploratory borings conducted as part of this investigation found that much of the subsurface stratum was clay with qualities that may not be conducive to collector wells. Besides the Leffingwell Beach area, CCSD performed a geo-physical study along the beach at San Simeon Creek during November 1997.[16] This past geo-physical study found the subsurface alluvium deposits in the area along the beach near the creek outlet to vary with depths to bedrock at approximately 60 to 70 ft deep, and a maximum depth of approximately 112 ft. However, no follow up borings were ever completed in this area to confirm whether or not a suitable stratum exists that would be conducive to a beach well. Therefore, the same offshore, subsurface intake developed for the 1998 report is assumed for cost estimating purposes.

In response to electrical cost increases following deregulation of the power industry in California, further emphasis was placed on investigating means to improve energy efficiency of the proposed desalination project. A draft report was developed for CCSD by Source California Energy Services that included conceptual alternatives for a solar photo-voltaic area to help offset annual electrical costs. Additionally, Kennedy/Jenks Consultants developed further information on the use of positive displacement feed pumps and a newer, pressure-exchanger technology to make the desalination process more energy efficient. A letter report entitled "Update of Cambria Desalination Project Costs," dated July 10, 2002, by Kennedy/Jenks Consultants summarized the use of alternative energy as well as more efficient energy recovery equipment for cost estimating purposes. This report evaluated alternatives that provided 300 gpm, 600 gpm, or 900 gpm of permeate flow (product water), with and without the use of solar power arrays. During the critical dry season, the amount of water produced depended upon the number of reverse osmosis (RO) units, the hours of operation, and number of days operated during the year. Costs for pumping and pipeline facilities to transport seawater into the desalination plant and brine discharge back to the exfiltration gallery were assumed to be similar to those summarized in the 30 percent design report by Kennedy/Jenks Consultants (dated April 13, 2000).

Based on the 2000 report, the desalination treatment process relies upon RO units to remove salinity. Sodium hypochlorite is planned for disinfection. The RO permeate could also be blended with groundwater. Carbon dioxide stripping would be used before distribution to the system. The brine concentrate would be pumped back along a pipeline route similar to the intake route. Brine discharge would be subsurface and diluted to acceptable levels prior to mixing with ocean water. The overall costs would depend on the number of RO units install hours of operation, as well as the outcome of the alternative energy study CCSD is currently completing. Figure 4-1 shows the proposed pipeline routes and intake locations.

Depending upon the output of the system, the connected power load of the desalination facility would be approximately 320 horsepower (hp) for one RO train (300 gpm, 300 AFY), 620 hp for two RO trains (600 gpm, 520 AFY), and 910 hp for three RO trains (900 gpm, 820 AFY). These loads include the power needed to pump treated water into the distribution system (i.e., distribution system pressure). The estimated annual fixed cost (2002 dollars) ranged from $583,000 to $944,000 per year and the estimated variable cost (2002 dollars) ranged from $680

[16] "Microgravity and Electrical Resistively Survey of Depth to Bedrock at Beach Sites Near Cambria, California," John P. Maas and Stephen K. Dickey, February 11, 1998.

to $900 per AF, not including any grant funding that may be available. Seawater Desalination is discussed in more detail in Section 8.2.

4.3 Surface Water from Lake Nacimiento

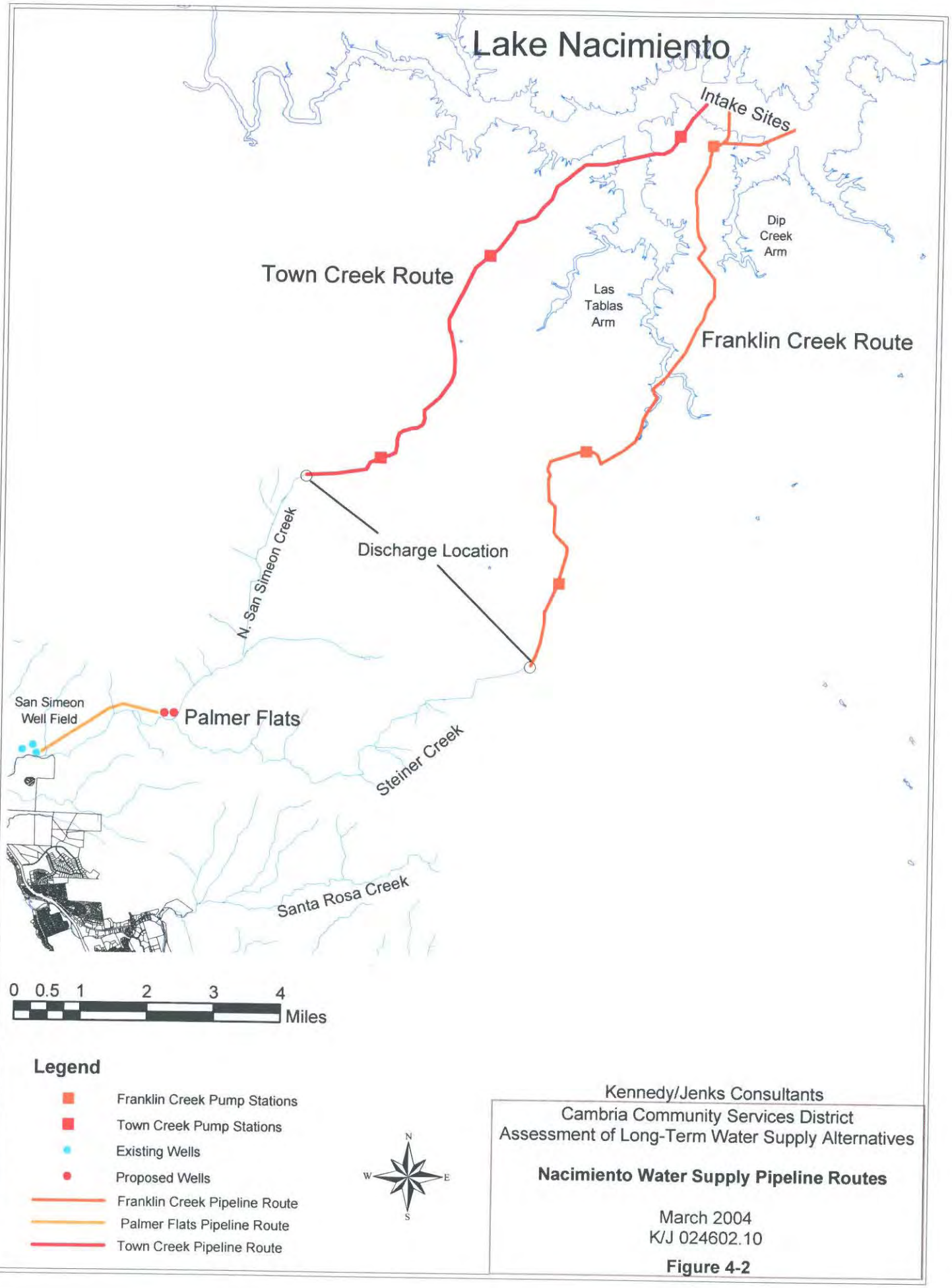
The Nacimiento Water Supply alternative would involve the use of surface water from Lake Nacimiento. Sources of the lake water include run-off from the surrounding watershed and water from the State Water Project. Although the Nacimiento Reservoir is located within San Luis Obispo (SLO) County, the dam and reservoir project was completed by Monterey County in 1957 as a means to recharge groundwater basins in the Salinas Valley. The Monterey County Water Resources Agency (MCWRA) controls operation of the reservoir and has annual rights to approximately 180,000 AF of stored water. SLO County has retained an annual right to approximately 17,500 AF of water within the reservoir. However, outside of communities adjacent to the reservoir (e.g., Heritage Ranch), little of the 17,500 AF has been used within SLO County. Additionally, there are recreational interests involved with the Nacimiento Reservoir and a desire to maintain minimum lake levels to allow for continuing recreational use.

To date of this report, there are two projects in various stages of planning and completion associated with the Nacimiento reservoir. The first of these projects is the Salinas Valley Water Project that has the Monterey County Water Resources Agency as lead agency.

The purpose of the proposed Salinas Valley Water Project (SVWP) is to prevent seawater intrusion into the Salinas groundwater basin. As part of that project, a re-operation of the lake is proposed, along with spillway modifications. The re-operation element could lower the reservoir further than what had been assumed in a 1993 CCSD study by Penfield and Smith (P&S) entitled "Preliminary Analysis, Long Term Water Supply Project, Pre-Final Design – Phase 1 Report." (1993 report) Therefore, further evaluation will be necessary in order to assess the impact of the proposed SVWP on the selection of the intake sites identified within the earlier 1993 report. Should the SVWP lower the reservoir levels further than the levels assumed in the 1993 report, both capital costs and annual operating costs will increase beyond the projections presented in this report.

Efforts to make use of SLO County's 17,500 AF Nacimiento entitlement have had a long and arduous history. During the early to mid-1990s, SLO County developed a regional pipeline concept that would serve Paso Robles, Templeton, Atascadero, the City of SLO, as well as SLO County. Existing pipelines between the City of SLO and Whale Rock reservoir would have allowed wheeling of Nacimiento water as far as Cayucos. During development of the 1990s project, CCSD requested a reservation of approximately 2,000 AF for an independent Nacimiento pipeline supply project.

In recent years, SLO County resurrected the Nacimiento pipeline project with an alternative alignment. SLO County has recently completed the revised project's Environmental Impact Report and is in the process of obtaining commitments from various agencies along that project's alignment. The City of SLO is the largest user to commit to the new pipeline project that would be past the Cuesta grade. Recently, the SLO City Council expressed their support for the project. For purposes of this report, any connection to a regional pipeline assumes the City of SLO remains part of the regional pipeline project and would therefore ensure the pipeline would extend up the Cuesta Grade.



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Nacimiento Water Supply Pipeline Routes

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Figure 4-2

To date, there are at least two basic options for CCSD to obtain Nacimiento water: an independent CCSD pipeline system, discussed below; and, use of the proposed SLO County project in addition to an independent CCSD pipeline from the regional system, discussed in Section 4.3.

An independent CCSD Nacimiento pipeline project would pump water from Nacimiento westerly and over the Santa Lucia mountain range. Once over the ridgeline, water would be discharged into one of the drainage basins supplying water to CCSD. Several independent pipeline alternatives were evaluated in the 1993 report. Screening of numerous pipeline alternatives resulted in a Town Creek alignment and a Franklin Creek alignment. The Town Creek alignment discharge enters the upper reach of San Simeon Creek after being pumped approximately 1,900 ft in elevation from Nacimiento Reservoir. The Franklin Creek alignment discharges into the upper reach of Steiner Creek after being pumped approximately 1,760 ft. After discharge to San Simeon Creek, the water would be pumped from Palmer Flats by two new extraction wells, to the production facility at San Simeon well field, where it would enter the distribution system.

For each alternative, a need for a new intake site with fish screens and filters, construction of a holding tank near the intake facility, 8 to 10 miles of pipeline, two new wells, and pumping facilities was identified. After exploring several options, including changes in pumping rates and energy alternatives, a 24-hour pumping schedule with one booster pumping station for either of the selected pipeline alternative routes was recommended. The recommended alignments would result in approximately 860 to 1160 pounds per square inch (psi) discharge pressure at the main booster pump station. Approximately 800 connected hp would be required at the booster pump station. The proposed pipeline routes and location of relevant facilities are provided on Figure 4-2.

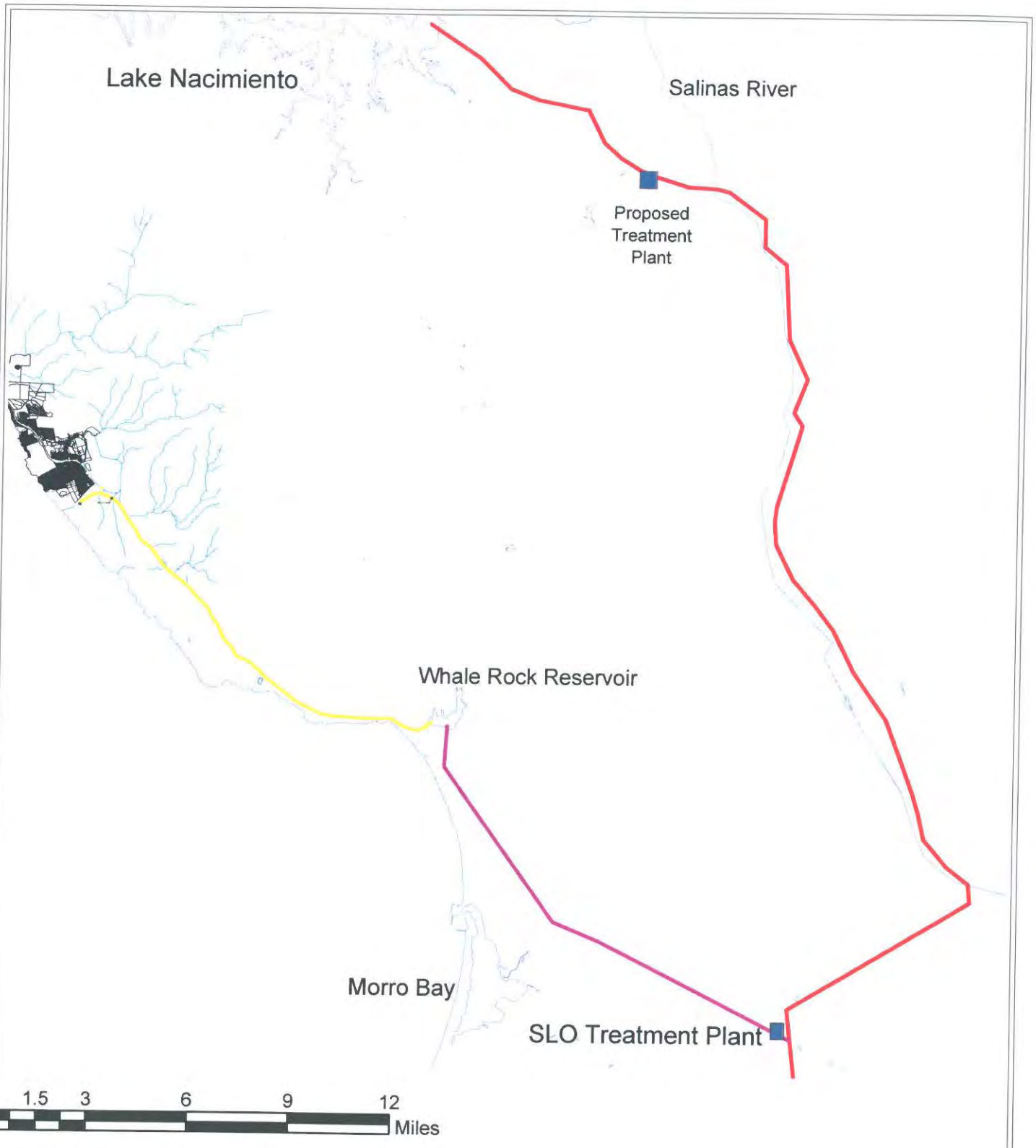
Since completion of the 1993 report, the MCWRA has announced their intention to modify the Nacimiento dam spillway. Because this may result in lowering the water surface by approximately 28 ft, further review of the intake placement is needed to assess potential cost impacts to the independent pipeline alternative. The estimated annual fixed cost (2002 dollars) ranged from $1,183,000 to $1,241,000 and the estimated variable cost (2002 dollars) ranged from $580 to $560 per AF for the Town Creek and Franklin Creek pipeline routes, respectively. The Nacimiento Water Supply is discussed in more detail in Section 8.3.

4.4 Whale Rock Exchange

The Whale Rock Exchange would involve an exchange of Nacimiento water for water from Whale Rock Reservoir and would utilize the regional Nacimiento pipeline discussed in the previous section. The source of the Whale Rock water is run-off from Santa Rita and Cottontail Creeks that is captured by the Whale Rock Dam. The water would require treatment prior to distribution, because CCSD intends to use the water directly in its distribution system.

Two exchange capacities have been evaluated in previous studies, either 700 AFY or 1,000 AFY. It would consist of the regional Nacimiento pipeline, 13.1 miles of pipeline from Whale Rock to CCSD, a treatment facility, and pumping station; the size and number of each of these structures is dependent upon the supply capability. The pipeline construction from Whale Rock to CCSD would involve extensive pavement replacement along Highway 1.

The regional Nacimiento pipeline, as it originally pertained to CCSD, consisted of either utilizing an existing Exxon/Mobil oil pipeline from San Ardo Field to Estero Bay or constructing a new



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Regional Nacimiento Pipeline Routes

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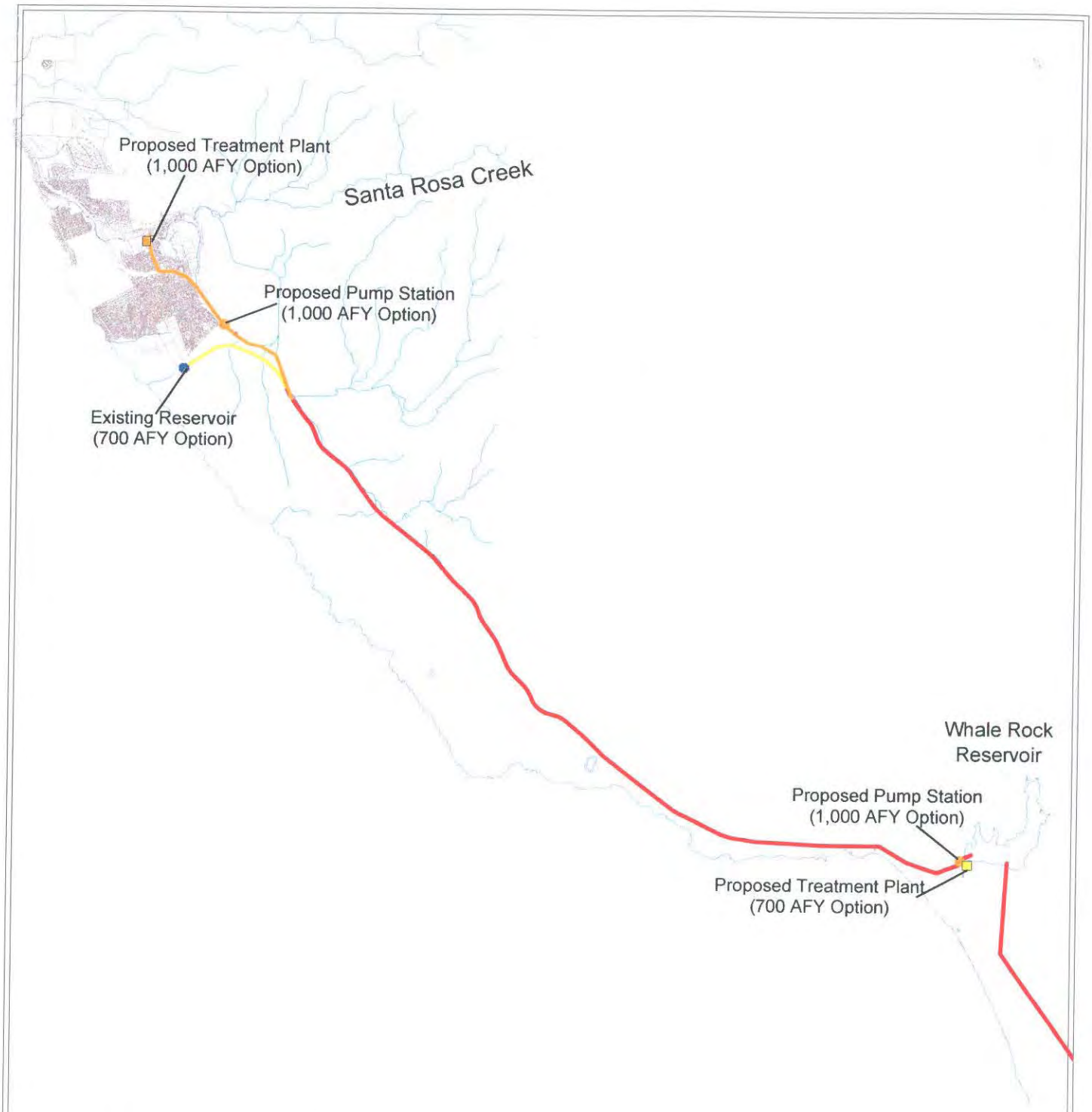
Figure 4-3



0 0.5 1 2 3 4 Miles

Legend

- Proposed Pipeline
- 700 AFY Option
- 1000 AFY Option

N W E S

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Whale Rock Pipeline Routes

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Figure 4-4

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pipeline along the oil easement. CCSD would receive water from a new 4-mile pipeline along Highway 46, which would discharge into Santa Rosa Creek. Additional groundwater wells with iron and manganese treatment at the wellhead would be required. After a feasibility study prepared by Boyle Engineering in a 1998 letter report entitled "Nacimiento Alignment Alternative: San Ardo to Estero Bay Oil Easement," utilizing the existing oil pipeline and easement was not recommended due to hydraulic limitations, high costs, and the possible environmental issues associated with the potential for oil spills. It was determined that the existing oil pipeline (10 cfs) could only sustain approximately 40 percent of the necessary capacity (27 cfs). Additionally, line pressures may reach 500 psi and it was not anticipated that the existing pipeline could withstand this pressure. Construction of a new pipeline within the oil easement, although hydraulically feasible, was not recommended due to the high costs and environmental impacts. Although exact costs were not determined, high costs were anticipated to result from the operation and installation of the necessary high horsepower pump stations and the use and size (18 inches) of high pressure rating pipe material. As such, a revised regional pipeline route was considered. Accordingly, for purposes of this report, use of the existing oil pipeline and oil easement is not included in this alternative.

The revised regional Nacimiento pipeline route would transport water from Lake Nacimiento to the City of SLO. Using the existing Chorro Valley pipeline, the water would be transported to Cayucos through the Whale Rock Reservoir. The pipeline route begins at an intake near the dam and continues in a southeastern direction. After crossing the Salinas River, it would turn south and parallel the river to Atascadero. From there, it would re-cross the Salinas River and head southwest to the City of SLO Water Treatment Plant through the Cuesta Tunnel. From the Cuesta Tunnel, it would also connect with an existing pipeline leading to Whale Rock Reservoir. Figure 4-3 shows the proposed regional pipeline route.

The City of SLO, the State of California Men's Colony, and California Polytechnic State University currently receive water from Whale Rock. The entities that would be involved in the exchange are SLO County and the City of SLO.

The primary challenge of this alternative is the lack of any apparent benefit to the City of SLO to agree to the exchange. The estimated annual fixed cost (2002 dollars) ranged from $287,000 to $1,703,000 and the estimated variable cost (2002 dollars) ranged from $1,920 to $2,210 per AF for the 700 AFY and 1,000 AFY supply options, respectively. This latter amount may be reduced if other coastal communities agree to share the set-up costs for the treatment plant, which was designed to handle more flow than required by CCSD. Figure 4-4 shows the proposed pipeline route and the structures required from Whale Rock Reservoir to CCSD. This alternative is discussed in more detail in Section 8.4.

4.5 Additional Santa Rosa Creek Groundwater Wells

This alternative, as evaluated in the Engineering Science report entitled, "Comparative Analysis of Potential Long-Term Water Supply Projects for the District," dated 1991 (1991 report), consists of the construction of two new extraction wells located in the lower part of the Upper Santa Rosa Basin. Water quality of the upper basin is significantly better than that in the lower basin and treatment other than filtration and disinfection is not likely. This alternative would require the purchase of 350 acres of irrigated farmland, which would be fallowed and its rights transferred to CCSD. The CCSD would also need to modify its appropriative water rights permit. In order to ensure this alternative would yield long-term benefits, an adjudication of the aquifer may also be needed to precede such an approach. Otherwise, intensification of use by remaining riparian

water consumers could ultimately limit the long-term benefit of purchasing riparian water rights from specific properties. In concept, the purchase of irrigated farmland and addition of wells, could introduce an additional 700 AFY of extraction rights to CCSD. However, the amount available during the dry period would still need to be assessed along with potential habitat needs. Furthermore, pumping may be further reduced during drought periods.

The environmental impacts of additional Santa Rosa Creek groundwater wells are not anticipated to be as major as those associated with alternatives involving construction of a dam or reservoir. However, there could be secondary cost impacts to agriculture if crops are taken out of production. In certain cases, a benefit towards the environment could result if farmland were fallowed (e.g., conversion to a conservation easement, wetlands restoration, etc.). Negotiations for land purchase on this alternative are expected to be difficult, reducing the feasibility of this alternative. Additionally, an adjudication process could take many years and incur significant costs in legal fees and supporting studies. Not including adjudication costs and assuming riparian rights could eventually be converted to appropriative rights, the estimated annual fixed cost (2002 dollars) was $252,000 and the estimated variable cost (2002 dollars) was $20 per AF. Due to the difficulty in negotiations for the water rights transfer, the potential environmental impacts, potential habitat needs, as well as lengthy and costly legal adjudication process, this alternative is not considered for further evaluation.

4.6 Arroyo De La Cruz Groundwater Wells

This alternative, as evaluated in the 1991 report, would involve the construction of groundwater wells in Arroyo de la Cruz and approximately 14 miles of 8-inch pipe to transport the water to the existing well field at San Simeon Creek. The Arroyo de la Cruz Basin spans a 36.5 square mile area and has an average of 31-inches of rain a year. The basin supports several endangered and threatened plants and animals. The Hearst Corporation has riparian rights and an appropriative permit for Arroyo de la Cruz. Associates of the Hearst Corporation have stated that they will vigorously oppose this alternative, which could be a significant obstacle because a majority of the right-of-way agreements would need to be made with the Hearst Corporation. More recently, the Hearst Corporation and American Land Conservancy have tentatively agreed to enter into a conservation easement that would further preclude the appropriation of water from the area. Of environmental concern is the abundance of rare species and habitat found in the area. Seven-hundred (700) AFY is the expected yield for this alternative. A minimum of five years of monitoring could be required to determine the impact to groundwater levels in the aquifer. The estimated annual fixed cost (2002 dollars) is $287,000 and the estimated variable cost (2002 dollars) is $100 per AF. Due to the difficulty in negotiations to obtain right-of-way and the potential environmental impacts, this alternative is not considered for further evaluation.

4.7 Hard Rock Drilling

Hard rock drilling would involve developing groundwater supplies from fractured bedrock, which has typically not been explored for potential water supplies. Typically, developing groundwater supplies from fractured bedrock consists of three phases of development. Phase 1 involves reviewing the subsurface geology, evaluating yield, identifying potential locations for exploration, acquiring permits for test bores, and drilling test bores to predict actual production capacity. Phase 2 includes test pumping and evaluating water quality of test bores to predict actual production capacity. Phase 3 includes drilling of production wells and delivery of water to the customer's distribution system. A key concern in using fractured bedrock is whether the initial

supply of water is mined water, or truly a long-term supply. If the fracture were not adequately recharged, the initial production of mined water would diminish with time. Fractured bedrock may also be hydraulically connected to either the San Simeon or Santa Rosa aquifers. Accordingly, the water rights could be subject to an appropriative permitting process.

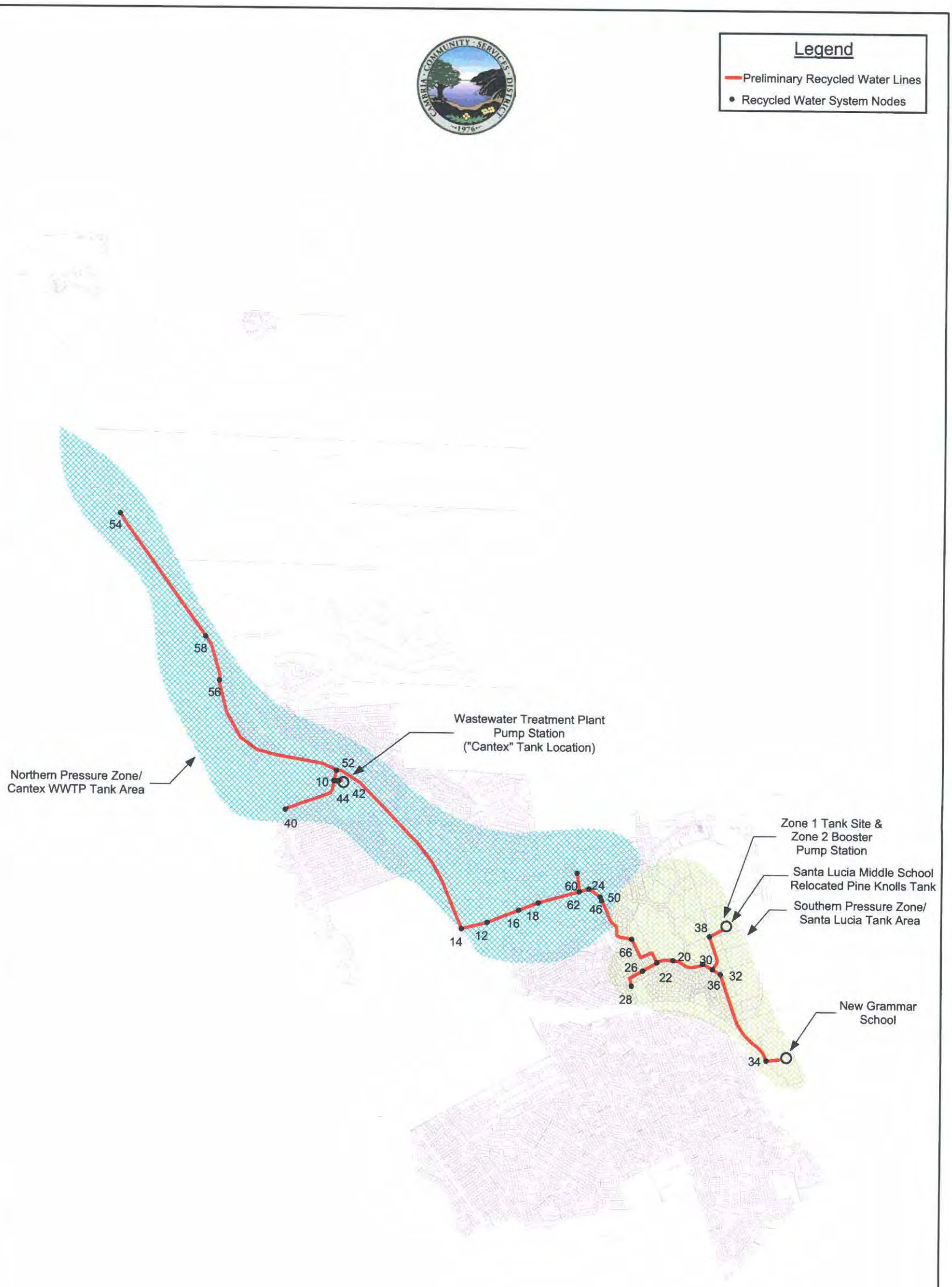
In 1993, Samda, Inc. started Phase 1 activities to evaluate potential fractured bedrock supplies in the Cambria area. An agreement with CT Ranch and CCSD was made whereby exploratory holes would be drilled and any sources found and developed would be used by CCSD. Any new development of groundwater from CT Ranch thereafter would then be subject to a separate agreement among the three entities. In June 1993, several wells were drilled, however, the location did not appear to have sufficient potential to provide a viable source of groundwater and exploration activities were stopped. Before exploration activities ceased, an area near a sandstone ridge was found to yield 100 to 200 gpm. This area was not on CT Ranch property, but located to the south.

This alternative would involve pursuing a new hard rock drilling location by exploring the four square mile area just north of Santa Rosa Creek westward to the coast. Amendments to the existing SWRCB permit may be required to obtain the additional appropriative water rights. The current viability of Samda, Inc. as a water developer could not be verified. Typical costs for groundwater produced by hard rock drilling is approximately $1,000 per AF. However, this cost is dependent upon the costs for other local water sources. This alternative is discussed in more detail in Section 8.5.

4.8 Recycled Water

This alternative would involve utilizing recycled water for irrigation purposes at various locations within Cambria. The use of recycled water to meet non-potable demands would enable CCSD to reduce its potable water demand. CCSD operates a 1.0 million gallon per day (MGD) extended aeration wastewater treatment plant (WWTP), which provides treatment to wastewater from Cambria and the San Simeon State campgrounds. Currently, the treated wastewater effluent is percolated into the ground between the San Simeon well field and the Pacific Ocean to provide a "mound" of fresh water that prevents the San Simeon Creek aquifer from flowing into the sea.

The amount of water required to perform this function varies seasonally. During the dry months, the water level within the San Simeon well field is drawn down by pumping to supply the potable water system. In order to maintain a minimum of 0.9 ft of hydraulic head between the upstream well field and the downstream percolation ponds, groundwater at the percolation ponds is lowered by pumping. This ensures CCSD is abiding by the requirements of its waste discharge permit that are directed towards preventing potential cross contamination. The pumped water from the percolation pond area ultimately flows towards the San Simeon Creek lagoon. The lagoon also serves as habitat for the endangered Tidewater Goby and may have young-of-the-year steelhead fry as well as smolt-sized steelhead during the dry season. Therefore, further hydrologic study would be needed in order to determine how much of the pumped percolation pond groundwater could be diverted into a recycled water system. In some cases, the creation of an artificial habitat from wastewater effluent has prevented or restricted its use elsewhere (e.g., the City of San Luis Obispo). Because of this, recycled water projects may need to be phased into two categories; those that merely replace an existing potable use with recycled water (and would therefore not effect the net aquifer balance); and, recycled water projects intended to supply future demands (e.g., the new community park being planned in the currently non-irrigated East Ranch property). The latter group of projects may need to follow the outcome



Kennedy/Jenks Consultants

Engineers & **Scientists**

Cambria Community Services District
Assessment of Long-Term Water Supply Alternatives

Preliminary Recycled Water Distribution System

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K/J 024602.10

Figure 4-5

of further hydrologic study in order to fully address regulatory agency concerns. Alternatively, seasonal storage of recycled water during the wet periods in areas that are not subject to the same habitat concerns as the lagoon could avoid potential environmental impacts. During the dry months, it has been estimated by CCSD operations department[17] that 250,000 gallons per day (gpd) is required to be percolated into the ground between the well field and ocean in order to maintain an adequate hydraulic mound between the fresh water in CCSD's upstream potable well field and the ocean. Assuming a minimum dry weather flow of 650,0000 gpd out of the WWTP, approximately 400,000 gpd of recycled water could conceivably be available.

The WWTP currently provides secondary treatment. If the effluent were used for unrestricted irrigation, disinfected tertiary treatment would be required as a minimum in order to meet current Department of Health Services Title 22 requirements. In order to offset concerns related to potential groundwater degradation from higher TDS as well as emerging contaminants of concern, further polishing of the effluent above disinfected tertiary treatment could be required. For example, nanofiltration and advanced oxidation systems could be employed that may currently go beyond the requirements of Title 22. The list of potential users for such highly treated recycled water and demand associated with its use is relatively small, approximately 161 to 184 AFY. However, demands during the peak irrigation months and peak day need to be compared against whatever flow is deemed to be available after further hydrologic analysis of the aquifer-percolation mound, and lagoon habitat requirements. A detailed analysis of the recycled water distribution system, including system improvements, pipes, pumps, and reservoirs is presented in the report entitled, "Task 3: Recycled Water System Modeling" dated March 2004 by Kennedy/Jenks Consultants. Based on this report, a total of 308 gpm (approximately 444,000 gpd) is estimated as a maximum daily demand. Of this amount, approximately 221 gpm is from new projects that are not already irrigated by potable water. The estimated annual fixed cost (2002 dollars) is $369,000 and the estimated variable cost (2002 dollars) is $810 per AF. Figure 4-5 shows the proposed recycled water distribution system. A more detailed discussion of this alternative is provided in Section 8.6.

4.9 Water Demand Management

Although CCSD's current conservation practices have already reduced the average CCSD per capita water consumption well below the state average, more efficient water demand management practices were investigated for further reduction in water consumption. CCSD currently requires any new water connections into its system to achieve twice the new connection's estimated water demand through conservation measures. The 2 to 1 conservation goal relies upon the CCSD's Retrofit Program and a Water Conservation Program. Under the Retrofit Program, construction of a new home requires a given number of retrofit points be obtained by performing water-saving retrofits to older homes and businesses or in lieu fees ($550 per point) paid. The Water Conservation Program defines stages of water shortage and their corresponding restrictions.

An evaluation of the existing Retrofit Program was prepared in a 1999 report entitled, "Water Conservation and Reuse Study," by Boyle Engineering. Proposed modifications included the promotion of front load washers, meter replacement, and the addition of landscape moisture sensors to the Retrofit Program. Furthermore, a modification of the Water Conservation Program to include promotion of a reduction in landscape irrigation was recommended. More recently, CCC has expressed concerns over reducing landscaping demands in the development

[17] Personal communication with Mr. Brian Bode, CCSD Operations Manager

of recommendations as part of its periodic review of San Luis Obispo County's Local Coastal Program (Recommendation 2.15). Additionally, the Coast Unified School District has been developing plans oriented towards on-site storage and root zone irrigation of its playing fields in order to further reduce their existing irrigation demands at the Santa Lucia Middle School as well as their future elementary school (currently under construction). Demand management is described in more detail in Section 8.7.

4.10 Basin Management

In order to provide long-term protection of its existing water rights from the San Simeon aquifer, CCSD recently investigated an adjudication of the San Simeon aquifer. The adjudication process could take several years to complete and may involve a lengthy legal process, various supporting studies, as well as negotiations and mediations with the area's riparian users and environmental community. One outcome of an adjudication process could be the appointment of a watermaster that will administer and manage future use of the basin. One of the major uncertainties associated with this process is how much of the aquifer capacity will ultimately need to be reserved for habitat needs. Most likely, a balanced use for the aquifer will be shared between CCSD customers, agricultural users, and habitat needs. To date, it is also not certain how the Coastal Act will relate to the adjudication process. In view of the various unknowns related to adjudication, it is not being pursued as a means to secure any additional water capacity by CCSD. However, without adjudication, CCSD's ability to withdraw water during the summer months could be placed in peril by the propagation of more water-intensive agricultural practices within the basin.

Additionally, there could be some potential for additional water marketing within the basin through future fallowing agreements between CCSD and agricultural irrigators. One such agreement was entered into during 2001. Other possibilities may also arise should future agricultural property owners decide to no longer plant irrigable crops. Options such as habitat and conservation easements could further reduce demands within the basin. Because of the significant level of uncertainties related to potential costs, habitat needs, a potentially lengthy legal process, and coordination with Coastal Act priorities, basin management via adjudication was not considered further as a long-term supply alternative.