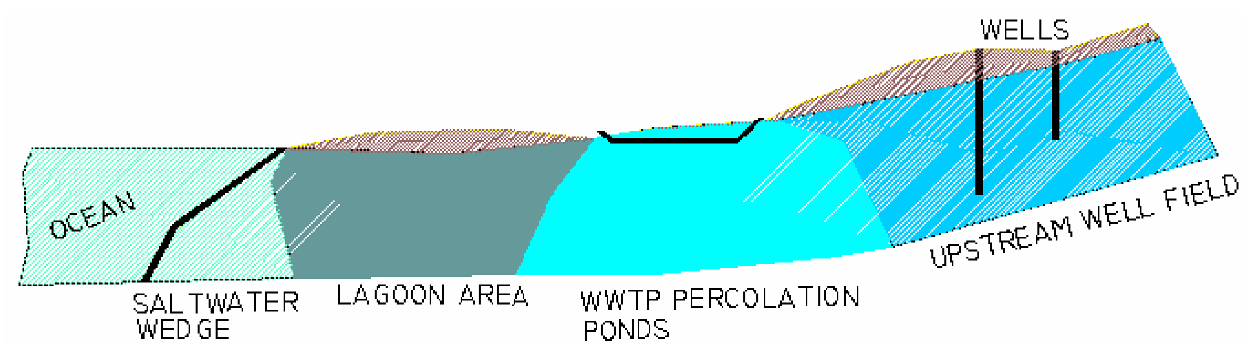
Section 2: Recycled Water Supply and Demand Projections

This section discusses projected recycled water supply and demands utilized in the recycled water system model for the evaluation of reservoir and pumping facilities. Additional storage options are discussed to address habitat concerns. Related to this discussion, more efficient irrigation methods are being considered for the new community park and elementary school to reduce demands on the aquifers.

2.1 Recycled Water Supply

CCSD operates a one million gallon per day (MGD) extended aeration wastewater treatment plant (WWTP) located southwest of the intersection of Windsor Boulevard and State Highway 1. The WWTP provides treatment of wastewater from Cambria as well as from the State operated campground at San Simeon Creek. The current dry weather flow of the plant is approximately 650,000 gallons per day (gpd). Presently, the treated wastewater effluent is percolated into the ground between the San Simeon well field and the Pacific Ocean to create a hydraulic barrier that slows the fresh water underflow in the San Simeon Creek aquifer. This mound of fresh water also prevents seawater intrusion into the up-gradient potable groundwater aquifer, and maintains down-gradient surface flows. Figure 2-1 illustrates the overall concept being used in the San Simeon aquifer.

FIGURE 2-1
SEAWATER INSTRUSION CONCEPT FOR CCSD



Cross Sectional View Of San Simeon Creek

Based upon the empirical observations of key CCSD operating personnel, the amount of water required to maintain the hydraulic mound varies seasonally. During dry months, the water table within the up-gradient San Simeon well field is drawn down to meet with the increased dry season demand. Consequentially, CCSD operating staff occasionally need to pump down the hydraulic mound to maintain the positive flow differential between the two fields (i.e. maintain flow moving from the up-gradient well field to the down-gradient percolation ponds). This procedure, as required to meet the WDR, prevents potential cross contamination with the up-gradient potable well field. Such operations are normally required late in the summer months when the up-gradient San Simeon well field is at its lowest level. When the need occurs, CCSD operators run an existing non-potable well located within the center of the percolation ponds. This non-potable well pumps into the CCSD's Van Gordon surface storage reservoir, with any overflows going into the creek and downstream lagoon.

Because of the lowered potable well-field levels during the dry season, down-gradient percolation of the entire wastewater effluent flow may not be desired or necessary. Accordingly, a portion of the wastewater effluent may be available for recycled water use. Plant operations staff have estimated that during the dry season months, approximately 250,000 gpd may be required to be percolated into the aquifer to maintain the hydraulic barrier. This assumption allows for a conservative estimate of barrier needs and recycled water availability. Based on a dry weather flow of 650,000 gpd, approximately 400,000 gpd of wastewater effluent would be available for recycled water use during the dry months. However, this number may require further refinement through subsequent study due to potential habitat concerns within the downstream lagoon area.

In certain communities, the City of San Luis Obispo for example, a portion of the treated wastewater plant effluent was deemed necessary to support critical habitat. Although not a natural source of water, precedents have also been set elsewhere within the state that limit the diversion of treated effluent from streams where an artificially created habitat supports endangered species. Due to similar potential habitat concerns, this report developed two categories of potential recycled water users: (1) existing sites where potable water use would simply be converted to recycled water and have no net impact on the balance of water within the San Simeon watershed; and, (2) future recycled water demand sites that could increase water withdrawn from the San Simeon watershed.

Potential habitat concerns may also be further addressed by seasonal off-stream storage of recycled water and innovative water conservation measures. Seasonal storage of recycled water would involve storing recycled water during the wet season for dry season use. Despite the need to constantly supply the mound with 250,000 gpd of effluent, more water is available for recycled water use during wet months due to the higher plant flow (1 mgd) and reduced impacts to the down-gradient stream flows. Innovative water conservation being considered includes a sub-surface irrigation method similar to hydroponics technology, as well as harvesting and storing local storm water runoff at future project sites. Seasonal storage of recycled water is further discussed in Section 2.3 and in the Task 4 report on long-term supply options. Additionally, subsequent study of the habitat issues and related geohydrology could further validate the empirical observations and opinions expressed by operating staff on the volume of recycled water available during the summer irrigation season.

2.2 Projected Recycled Water Demand

Recycled water demand was determined by multiplying the irrigable acreage from the potential recycled water users by a recycled water application rate. This application rate was calculated for turf-type vegetation because the recycled water will be mainly used for irrigation of turf.

2.2.1 Potential Recycled Water Users

Potential recycled water users were identified by CCSD staff. The potential users are existing non-residential potable water users who have significant irrigable area. Irrigable acreage was determined by CCSD staff from aerial photos and geographical information system (GIS) data.

Because of potential habitat concerns, recycled water users were divided into existing customers that are likely to use recycled water, future customer sites, and existing customers that are less likely to convert to recycled water. Potential recycled water users and their irrigable areas are shown in Table 2-1. Figure 2-2 presents the locations of the potential recycled water users.

Residential customers were not included in the estimate for recycled water due to their relatively low demand when compared with the high cost to install distribution piping. Additionally, the use of recycled water on residential customers creates a risk of cross connection with the potable water system. This concern stems from a greater potential for amateur plumbers to interconnect potable and non-potable pipes. Larger irrigation customers are more likely to have trained staff or licensed contractors perform on-site plumbing modifications. Having fewer larger customers on recycled water also limits the number of monitoring requirements for backflow prevention testing and cross connection tests. For these reasons, agencies planning recycled water have not included the residential customers. Where recycled water has been planned for residential areas, it is generally in larger-scale, new developments on front yards where landscaping is tightly controlled and maintained by a homeowners association.

While planning its last WWTP upgrade in 1990, the CCSD also investigated the use of recycled water on agricultural lands among other alternatives. This was followed up with pilot testing, but was ultimately canceled following opposition from the agricultural community. Other alternatives considered during the early 1990s included direct recharge of the aquifer using recycled water. For example, the Orange County Water District has an indirect recharge of its aquifer system using recycled water. Conversely, other agencies, such as the Dublin San Ramon Services District, have abandoned their attempts at similar direct recharge approaches due to public opposition. Due to past opposition from the agricultural community and the contentious nature of direct recharge systems, this report did not include agricultural users outside of the CCSD's services boundary. Determination of Application Rate

Recycled water demands were calculated using irrigable acreage of each potential user and an application rate for turf-type vegetation. Turf grass is the most prevalent type of landscaping for the potential recycled water users. An estimate for irrigation demands was based on the following formula:

$$\textit{Irrigation demand (inches)} = \{[k_c(ET_o) - P] \times LR\} / IE$$

Where:

- k_c= a crop coefficient factor of 0.8 for warm weather grasses[1]
- ET_o= reference crop evapotranspiration[2]
- P= precipitation in inches[3].
- LR= leaching rate past the root zone.
- IE= irrigation efficiency.

For conventional irrigation systems, approximately 25 percent of precipitation is lost to run-off, an additional 10 percent is needed to pass salts through the root zone, and irrigation efficiency is 70 percent. Thus the equation simplifies to:

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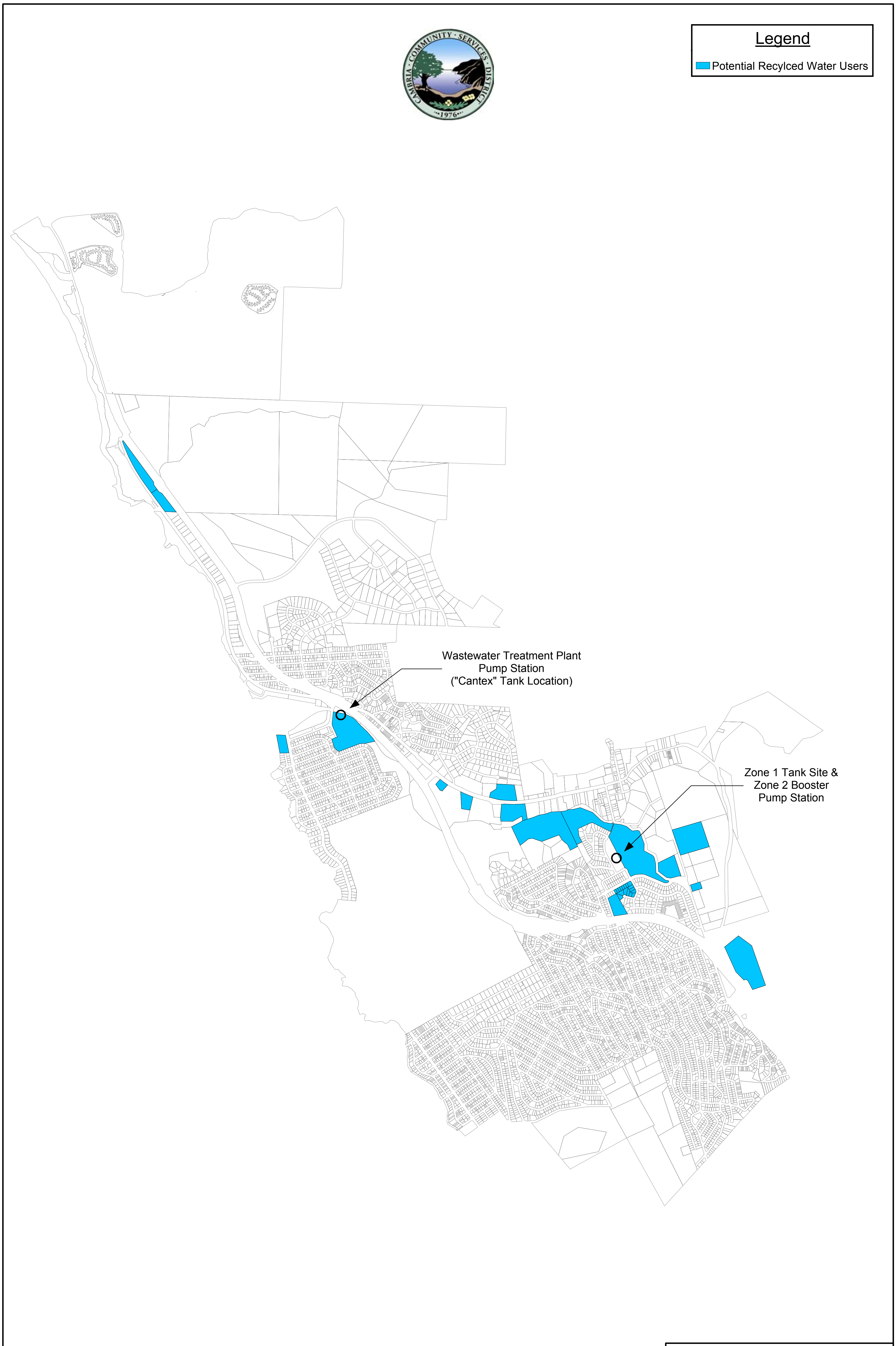
[1] DWR Bulletin 113-3.
[2] 1998 USGS Report 98-4061, Yates & Von Konyenburg, Table 5, p.53
[3] Average of monthly values from WWTP gage, 1974 through 1992

$$\textit{Irrigation demand (inches)} = \{[0.8(ET_o) - (P \times 0.75)] \times 1.10\} / 0.70$$

The Table 2-2 provides the average irrigation demand per month for a conventional irrigation system. The development of this table used evapotranspiration and precipitation data from a United States Geological Survey (USGS) report entitled, “Hydrogeology, Water Quality, Water Budgets, and Simulated Responses to Hydrologic Changes in Santa Rosa and San Simeon Creek Ground Water Basins,” conducted by Yates and Konyenburg, dated 1998.



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Cambria Community Services District
Recycled Water System Modeling

Potential Recycled Water Users

K/J 024602.00

Figure 2-2

TABLE 2-1
POTENTIAL RECYCLED WATER USERS

Potential Recycled Water User	Total Acreage	Percent Irrigable[(a)]	Irrigable Acreage
Likely Recycled Water Sites			
A. Existing Potable Water Irrigation Sites			
Existing WWTP site	12.51	6%	0.75
Mid State Bank	0.93	7%	0.07
Santa Rosa Catholic Church	2	20%	0.40
Tamson Dr. commercial areas	9.5	5%	0.48
Cambria Grammar school (as CUSD offices)	5.07	22%	1.12
Cambria Pines Lodge	23.4	35%	8.19
CCSD Fire Station	1.4	30%	0.42
Presbyterian Church	2.98	35%	1.04
Cambria Nursery	4.35	45%	1.96
Santa Lucia Middle School	10	40%	4.00
St. Paul's Episcopal Church	0.87	40%	0.35
Subtotal			18.76
B. Future Recycled Water Irrigation Sites			
CCSD vacant lot across from Vets Hall	1.45	15%	0.22
Future CCSD Community Park	26.03	50%	13.02
Main Street Landscaping	1.42	70%	0.99
Future Elementary School	12	35%	4.20
Future Vineyard Church site	3.53	15%	0.53
Subtotal			18.96
Subtotal of Likely Recycled Water Sites			*37.72*
Less Likely Recycled Water Sites			
C. Riparian Well Services			
Shamel Park	2.04	85%	1.73
Coast Union High School	13.94	60%	8.36
Subtotal			10.10
D. Low Priority Sites Due To Distance From Main Recycled Water Pipeline			
Cambria Cemetery	12.18	90%	10.96
San Simeon Pines Motel	7.3	70%	5.11
San Simeon State Camp Grounds	25	25%	6.25
Subtotal			22.32
Subtotal of Less Likely Recycled Water Sites			*32.42*
Total Irrigable Acreage of Likely & Less Likely Sites			**70.14**

Note: (a) Percent irrigable land determined from land coverage estimates from aerial photos and GIS data.

TABLE 2-2
ESTIMATED IRRIGATION DEMAND FOR CCSD USING A CONVENTIONAL SYSTEM

Month	Reference ET_o[(a)]	Crop Coefficient[(b)]	Average Precipitation (Inches)[(c)]	Average Irrigation Demand (Inches)[(d)]	Monthly Peaking Factor[(e)]
January	1.86	0.8	3.53	0.00	0.00
February	2.22	0.8	3.70	0.00	0.00
March	2.93	0.8	4.37	0.00	0.00
April	3.54	0.8	1.19	3.05	1.16
May	4.15	0.8	0.20	4.98	1.90
June	4.49	0.8	0.10	5.53	2.10
July	4.76	0.8	0.02	5.96	2.27
August	4.27	0.8	0.12	5.23	1.99
September	3.54	0.8	0.63	3.71	1.41
October	3.05	0.8	0.94	2.73	1.04
November	2.03	0.8	1.88	0.34	0.13
December	1.64	0.8	2.98	0.00	0.00
Annual Demand (Inches)				**31.53**	
Annual Demand (Feet)				**2.63**	

Notes:
(a) From 1998 USGS Report 98-4061, Yates & Von Konyenburg, Table 5, p.53.
(b) k_c value of 0.8 based on warm weather turf grass, see DWR Publication 113-3.
(c) Average of monthly values from WWTP gage, 1974 through 1992.
(d) Irrigation Demand = [k_c x ET_0 - (P x 0.75)] x LR x (1/IE).
(e) Divided monthly value by monthly average.

In addition to conventional system, the Coast Unified School District has started constructing a unique subterranean irrigation system and storm water collection and storage system for its new grammar school. This system is also under consideration for the Santa Lucia middle school. The system under construction at the middle school is a proprietary "Evaporative Control Systems, Inc." (ECS) irrigation system that irrigates plants from the root zone upward. The system consists of subterranean pans and pipes placed under turf grass, with sand and top soil placed above the distribution system. Appendix A contains further information on the ECS system being constructed. For an ECS system, no precipitation is lost to run-off, no additional water is required to pass salts through the root zone, and irrigation efficiency is assumed to be 100 percent. Thus the earlier irrigation demand equation simplifies to:

$$\textit{Irrigation demand (inches)} = \{[0.8(ET_o) - (P \times 1.0)] \times 1.0\} / 1.0$$

The Table 2-3 provides the irrigation demand for an ECS irrigation system when using evapotranspiration and precipitation data from the 1998 USGS report.

TABLE 2-3
ESTIMATED IRRIGATION DEMAND FOR CCSD USING AN ECS SYSTEM

Month	Reference ET_o[a]	Crop Coefficient[b]	Average Precipitation (Inches)[c]	Average Irrigation Demand (Inches)[d]	Monthly Peaking Factor[e]
January	1.86	0.8	3.53	0.00	0.00
February	2.22	0.8	3.70	0.00	0.00
March	2.93	0.8	4.37	0.00	0.00
April	3.54	0.8	1.19	1.64	1.03
May	4.15	0.8	0.20	3.12	1.97
June	4.49	0.8	0.10	3.49	2.20
July	4.76	0.8	0.02	3.79	2.39
August	4.27	0.8	0.12	3.30	2.08
September	3.54	0.8	0.63	2.20	1.39
October	3.05	0.8	0.94	1.50	0.95
November	2.03	0.8	1.88	0.00	0.00
December	1.64	0.8	2.98	0.00	0.00
Annual Demand (Inches)				**19.04**	
Annual Demand (Feet)				**1.59**	

Notes:
(a) From 1998 USGS Report 98-4061, Yates & Von Konyenburg, Table 5, p.53.
(b) k_c value of 0.8 based on warm weather turf grass, see DWR Publication 113-3.
(c) Average of monthly values from WWTP gage, 1974 through 1992.
(d) Irrigation Demand = $[k_c \times ET_0 - P] \times LR \times (1/IE)$.
(e) Divided monthly value by monthly average.

From Table 2-3, the average irrigation demand could be as low as 19 inches per year with the ECS system compared to the 31.5 inches calculated for a conventional irrigation system. Besides the new grammar school, the ECS system and its lower irrigation demands could be a candidate for the Santa Lucia middle school as well as the future community park. The values in Table 2-3 do not account for additional savings that could occur from a localized water harvesting system, such as the system under construction at the new grammar school.

The 19.66-inch annual precipitation total from Table 2-3 is close to the 19.04 annual irrigation demand when using the ECS System. This suggests that in a normal rainfall year, the ECS System will conceivably meet all irrigation demands by collecting stormwater from the area being irrigated. For drier years, more storm water collection area and on-site storage is needed. Alternatively, and in conjunction with the ECS subterranean irrigation system, recycled water could be supplied to minimize the amount of on-site storm water storage and collection that may otherwise be needed. Additionally, recycled water will provide further protection against the loss of mature landscaping should a multiple year drought occur. Therefore, recycled water is being planned as a back up to the new grammar school's innovative ECS System as well as other larger scale irrigation sites.

2.2.2 Potential Recycled Water Demand Peaking Factors

Demands for recycled water are seasonal, with the highest demands occurring during the summer months. Additionally, demand fluctuates during the day, with most irrigation demand occurring at night. Accordingly, maximum daily and peak hour demand factors were developed to accommodate the diurnal seasonal demand patterns. Peaking factors were applied to average daily demands to estimate water demands for maximum day and peak hour demand scenarios. The peaking factors used to develop maximum day and peak hour demands are presented in Table 2-4. Lower peaking factors could also apply if the ECS system were ultimately utilized at the future community park, and existing middle school. However, for master planning purposes, the more conventional peaking factors below are recommended. Peaking factors were derived from recycled water planning criteria for comparable areas.

TABLE 2-4
MAXIMUM DAY AND PEAK HOUR FACTORS

Condition	Peaking Factor
Maximum Day	2.70
Peak Hour	5.76

2.2.3 Average Daily Demand

Average daily demands were calculated by multiplying the annual demand (in feet) as calculated in Table 2-2 by the total amount of irrigable land (total for likely and less likely recycled water sites, per Table 2-5).

Based on this approach and assuming conventional irrigation methods, the estimated average daily demand for the recycled water system is 114 gallons per minute (gpm) or 184 AFY. Using ECS for irrigation and the Annual Demand (in feet) developed in Table 2-3 for the future community park, the future elementary school, and the existing Santa Lucia middle school, the total average daily demand would be approximately 100 gpm (162 AFY). This later number assumes there would be either a multiple year drought scenario with no rainfall during one rainfall season, or no local water harvesting occurring at these sites. If storm water runoff was captured and stored (i.e., harvested) at these sites, the average daily demand would be reduced by the total irrigation demand of these sites (33 AFY, with ECS) and lowered to approximately 80 gpm (129 AFY) with ECS. Table 2-5 provides a summary of the individual user irrigable demand, with and without an ECS system. Further detail for individual users average day, maximum day and peak hour demands for conventional and ECS irrigation systems, are provided in Appendix B.

2.3 Seasonal Storage Opportunities

As discussed in Section 2.1, effluent from the WWTP is currently discharged to percolation/evaporation ponds. Studies beyond the scope of this report would be required to prove whether any reduction to the hydraulic mound recharge would impact the habitat within the lagoon. These studies would most likely include detailed geo-hydrological modeling and biological assessments. As recycled water demand is highest in the summer and lowest in the winter, seasonal storage may mitigate potential impacts to the downstream lagoon and enable additional recycled water supply to be available during high water use months. Additionally, seasonal storage could be used to offset any increase in basin demand.

TABLE 2-5
PROJECTED RECYCLED WATER DEMAND (AFY)

Potential Recycled Water User	Irrigable Demand (AFY)	Irrigable Demand W/ECS (AFY)
Likely Recycled Water Sites		
A. Existing Potable Water Irrigation Sites		
Existing WWTP site	1.97	1.97
Mid State Bank	0.17	0.17
Santa Rosa Catholic Church	1.05	1.05
Tamson Dr. commercial areas	1.25	1.25
Cambria Grammar school (as CUSD offices)	2.93	2.93
Cambria Pines Lodge	21.54	21.54
CCSD Fire Station	1.10	1.10
Presbyterian Church	2.74	2.74
Cambria Nursery	5.15	5.15
Santa Lucia Middle School	10.52	6.36
St. Paul's Episcopal Church	0.92	0.92
Subtotal	49.35	45.19
B. Future Recycled Water Irrigation Sites		
CCSD vacant lot across from Vets Hall	0.57	0.57
Future CCSD Community Park	34.23	20.69
Main Street Landscaping	2.61	2.61
Future Elementary School	11.05	6.68
Future Vineyard Church site	1.39	1.39
Subtotal	49.85	31.95
Subtotal of Likely Sites	**99.21**	**77.14**
Less Likely Recycled Water Sites		
C. Riparian Well Services		
Shamel Park	4.56	4.56
Coast Union High School	22.00	22.00
Subtotal	26.56	26.56
Cambria Cemetery	28.83	28.83
San Simeon Pines Motel	13.44	13.44
San Simeon State Camp Grounds	16.44	16.44
Subtotal	58.71	58.71
Subtotal of Less Likely Sites	**85.26**	**85.26**
Total of Likely & Less Likely	**184.47**	**162.41**

2.3.1 Seasonal Supply and Demand Balance

Due to the need to maintain a hydraulic mound to prevent salt water intrusion, differences in monthly production and use of recycled water affect total annual use. The WWTP produces effluent at a more or less uniform rate throughout the year, however, the amount of effluent available for recycled water use will vary depending on the season. Additionally, since the recycled water will be used for irrigation, demand will peak during the summer months and be significantly less to near zero during the winter months. As a result, recycled water production may not be adequate to meet demands in summer months, while in winter months, surplus effluent may exist. Due to potential habitat concerns and the desire to maintain no net increase to the aquifer during the summer seasonal storage of recycled water may be required. Projected recycled water demand and available supply are shown in Table 2-6 and in Figure 2-3. Demand includes all potential recycled users and a conventional irrigation system. Based on this analysis, seasonal storage would not be required. However, if the hydraulic mound requires more water than empirical observation suggests, CCSD may not be able to meet recycled water demand. Accordingly, it would be desirable to provide seasonal storage to ensure sufficient supply and to avoid any potential habitat concerns at the down-stream lagoon.

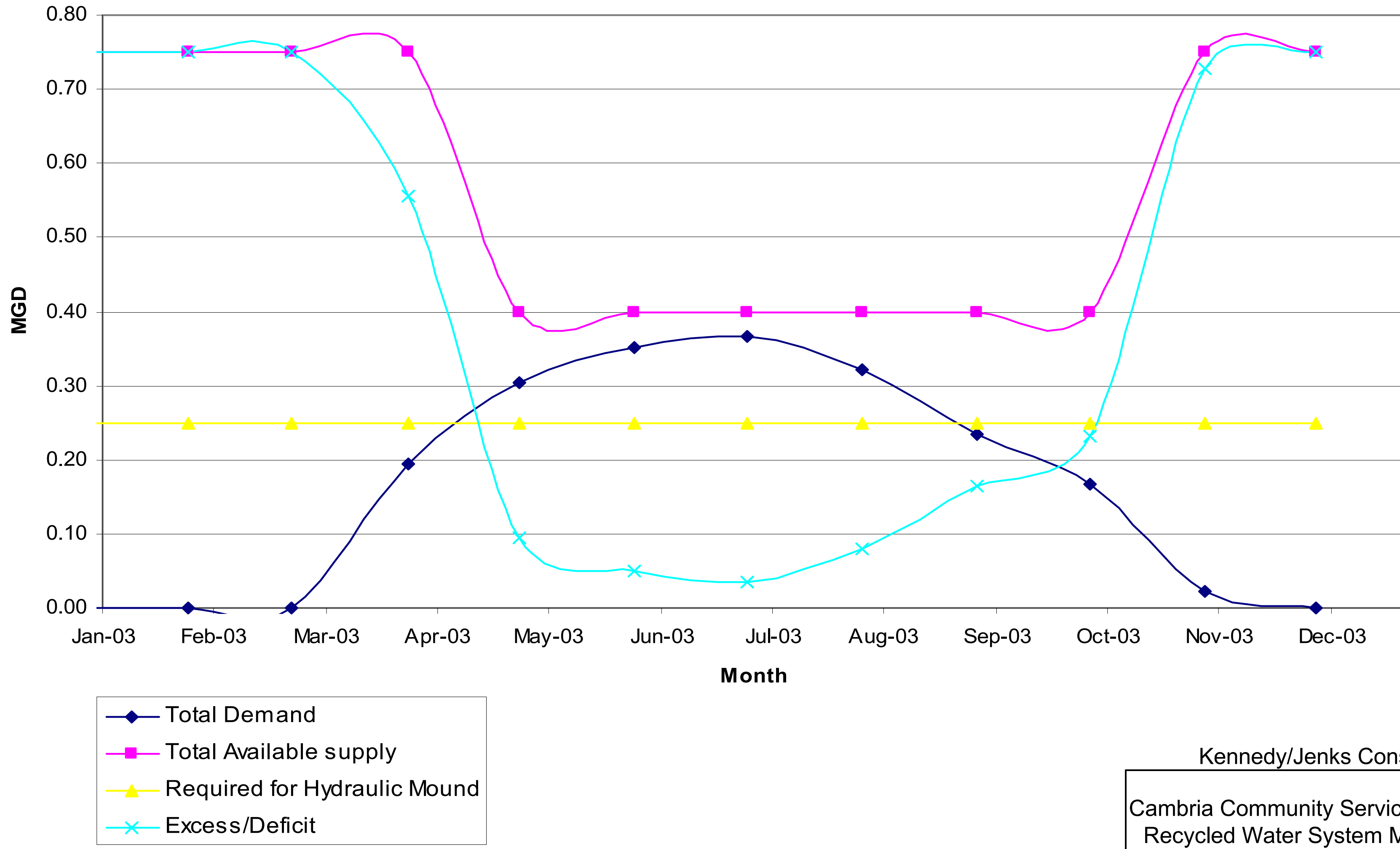
TABLE 2-6
PROJECTED RECYCLED WATER DEMAND VS. SUPPLY

Month	Required For Hydraulic Mound (mgd)[(a)]	Available Supply (mgd)[(b)]	User Demand (mgd)	Excess (+) / Deficit (-) (mgd)
January	0.25	0.75	0.00	+0.75
February	0.25	0.75	0.00	+0.75
March	0.25	0.75	0.00	+0.75
April	0.25	0.75	0.19	+0.56
May	0.25	0.40	0.31	+0.09
June	0.25	0.40	0.35	+0.05
July	0.25	0.40	0.37	+0.03
August	0.25	0.40	0.32	+0.08
September	0.25	0.40	0.23	+0.17
October	0.25	0.40	0.17	+0.23
November	0.25	0.75	0.02	+0.73
December	0.25	0.75	0.00	+0.75
Average	0.25	0.52	0.16	+0.36

Notes:
(a) During the winter, the basins normally fill during November and may remain full though May or June. Therefore, the mound requirement could be zero during the rainy season depending upon the timing of rainfall events and the amount of rain.
(b) Available supply is total supply minus flow required for hydraulic mound. Assuming 1.0 mgd during wet season and 0.65 mgd during the dry season.

2.3.2 No Net Change Concept

Due to the potential impact of the percolated water on down-gradient stream flow, an appropriative water rights diversion permit may be required to allow alternate use of recycled water that is currently percolated into the San Simeon Creek aquifer. Accordingly, regulating agencies may require proof that the down-gradient habitat is not being impacted. Therefore,



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Kennedy/Jenks Consultants

Cambria Community Services District
Recycled Water System Modeling

Seasonal Recycled Water Supply vs. Demand

June 2003
K/J 024602.00

Figure 2-3

several approaches were considered. One approach is to conduct a detailed geo-hydrological study to prove there would be no impact to the downstream habitat from the additional diversion of recycled water to future demand sites. Another approach is to prevent any increased diversion on the watershed from the existing potable water diversions. This later approach may involve combining the more water efficient ECS irrigation system with recycled water use, or perhaps harvesting and storing storm water on each site. With the collection of storm water, there would be more risk to landscaping if a multi-year drought were to occur, and greater tank storage needs. Therefore, a combined system using the ECS irrigation system with a recycled water supply was considered. The ECS system was evaluated for use at the Santa Lucia Middle School, the future elementary school site, and a small portion of the existing grammar school site. The future park site may also be a candidate for an ECS system, but costs would need to be assessed further. Moving the irrigated playing fields to the San Simeon basin's (e.g., the old Molinari Ranch area currently being acquired by CCSD and the American Land Conservancy) was also considered as a means to further reduce potential impacts on the hydraulic mound and lagoon system. Relocating the irrigated park playing fields to the Molinari Ranch area would result in approximately 30 percent of the applied water being returned to the hydraulic mound via underflow through the groundwater. Besides these concepts, CCSD may also develop a larger seasonal storage system for all of its future recycled water demands. Seasonal storage would provide water during the peak summer months to ensure no reduction of flow into the lagoon area. It should be noted that with the implementation of an additional long-term potable water supply as evaluated in the Task 4 would provide an additional supply not dependent on the basin. Thus, less potable water would be pumped form the basin. Accordingly, recycled water diversion for the future sites should be offset by the reduction in potable water production, resulting in a no net change of basin demand. However, since at this time, the time frame for implementation of a long-term water supply is unclear, an alternate method of reducing basin demand should be evaluated.

2.3.3 Above Ground Seasonal Storage

A seasonal recycled water reservoir would provide storage for excess recycled water produced during winter months without affecting the aquifer balance during the dry season. However, above ground storage of recycled water in an open reservoir may offer significant operational challenges. During the many months when the reservoir is full, algae have the opportunity to grow, creating potential water quality problems and odors. Filtration, disinfection, or other treatment may become necessary, further increasing both capital and operational cost. Additional cost may result from required infrastructure to convey the recycled water to the storage facility.

Assuming an ECS system would be utilized at the Santa Lucia middle school, future grammar school, and future community park, the future recycled demand would be 32 AFY. However, it has been recently proposed to move the irrigated play fields of the future community park to the Molinari Ranch property located within the San Simeon Basin near the lagoon. As per the 1998 report, 30 percent of the recycled water applied to the play fields would be returned to the basin. Additionally, approximately 5.6 AFY or irrigation return flow would be returned to the San Simeon basin from the recycled water use at WWTP and San Simeon State Camp Grounds. The existing CCSD surface reservoirs at Van Gordon near the spray fields and flow equalization basins at the WWTP could provide seasonal storage of the recycled water to further offset demand increases. Furthermore, due to recent delays in the development of the future community park, it is unlikely that it would be developed prior to implementation of a new long-term potable water supply. Accordingly, it is assumed that any increase on basin demand from the community park would be offset by the reduction of potable demand from the basin due to the new potable water source. This would result in a no net change in basin demand. Table 2-7 summarizes the basin demand balance concept.

TABLE 2-7
BASIN DEMAND BALANCE

Reason for Change	Net Change in Basin Demand (Increase (+)/Decrease (-)
Future Recycled Water Users (w/ECS system)	*+32 AFY*
Irrigation Return Flow from Future Community Park play fields at Molinari Ranch to San Simeon Basin	-6.3 AFY
Irrigation Return Flow to San Simeon Basin from the WWTP and State Camp Grounds	- 5.6 AFY
Storage at Existing CCSD Van Gordon Surface Reservoir	- 9.0 AFY
Storage at Existing WWTP Equalization Basins	-1.5 AFY
Reduction in San Simeon Potable Demand from New Long-Term Potable Supply	-9.6 AFY
Total Net Change	**0 AFY**

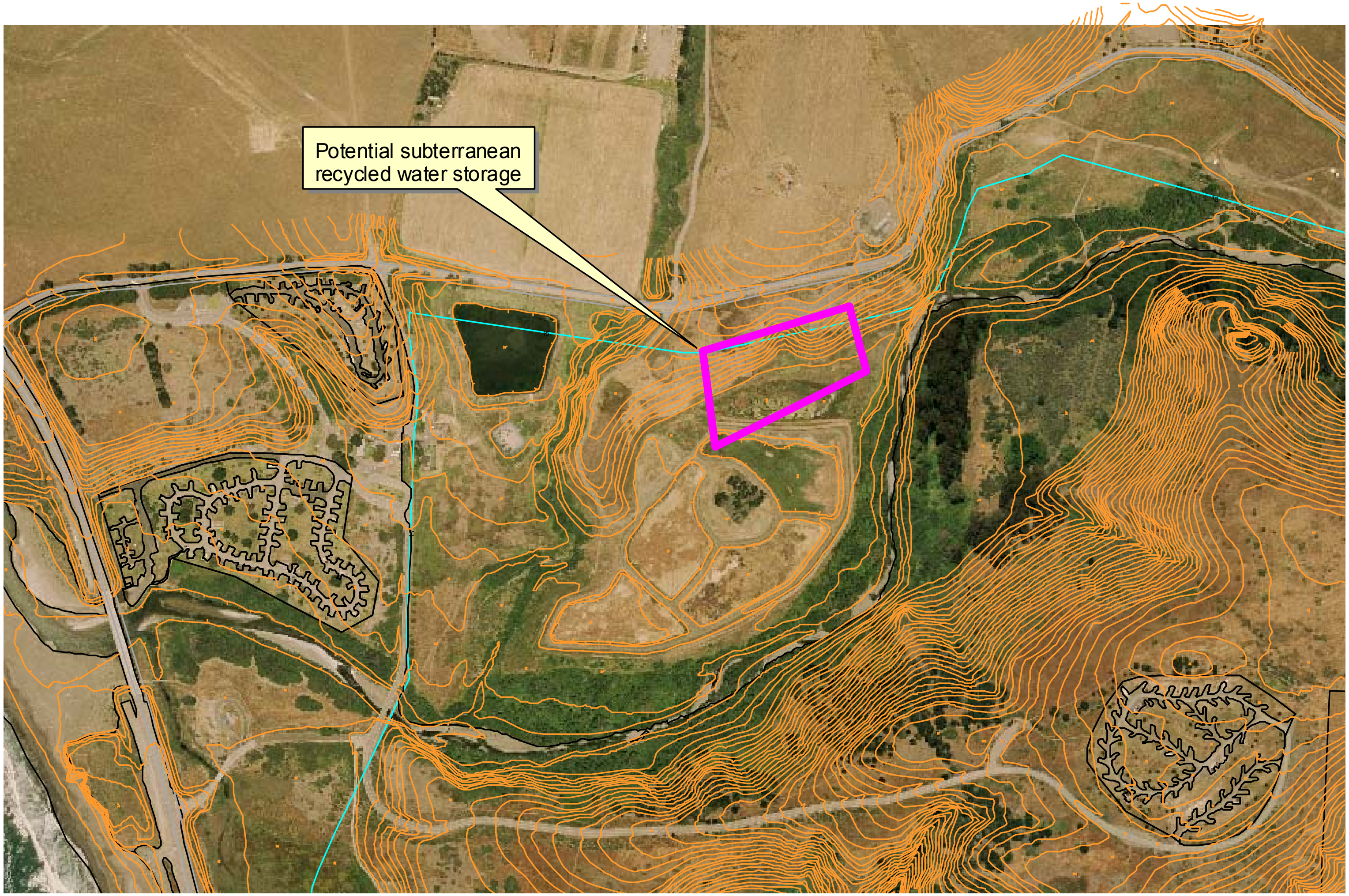
However, if the community park is developed prior to the long-term potable supply, CCSD could provide an above ground seasonal storage reservoir or subterranean storage (as discussed below) to offset the change in basin demand. Additionally, a detailed hydrologic and biological study of the downstream lagoon area could be conducted to determine the impacts to the habitat from the change in mound volume. Above ground storage of recycled water is difficult to implement because sites must be close to the proposed recycled water system, but sufficiently distant from existing and planned development. One potential location for the seasonal storage area is the 3.5-acre storm water detention pond near Highway 1 and Cambria Drive (the old Mid-State Bank property). Assuming 4 feet of depth, the pond may provide 14 AF of storage. Surface storage would need to be further assessed with regard to treatment needs due to potential algae blooms, as well as potential environmental issues.

2.3.4 Subterranean Storage in the San Simeon Basin

As an alternative to relying on the implementation of the future potable water supply, the community park demand could be offset by the construction of a subterranean storage site. This approach would consist of a subterranean cut-off walls outside of the riparian corridor in the vicinity of the CCSD's percolation ponds. Three walls would be constructed, two of which would be perpendicular to the bedrock that forms the channel below the alluvium. A third wall would parallel the channel formed by the bedrock. This concept is a modification to the subterranean dam, as presented in a draft proposal entitled, "Methods for Improving San Simeon Creek Water Storage Conceptual Proposal," dated 2003 prepared by W.C. Bianchi and K. Renshaw. By staying out of the creek and riparian areas, certain environmental issues could be avoided or minimized. However, further detailed geotechnical investigations would also be needed to ensure other potential hydraulic pathways, such as fractured rock seams, were not present.

The site considered for the side channel storage system is shown in Figure 2-4. The side channel storage system would consist of slurry walls extended into underlying bedrock and key into the bedrock as it slopes up and to the north from the main channel. As determined by the 1998 report, the bedrock profile slopes downward towards the main channel. Additionally the useful storage out of the contained area would need to be below the low summer time well levels in order to maintain a positive gradient from the upstream well field. Typically, the summer time well levels bottom at around 4 to 5 feet above, mean sea level. Assuming a 4.9-acre surface area as shown, 30 feet of depth and a storage coefficient of about 0.1 (1998 report) the volume in the subterranean storage is about 14.7 AF.

A prime advantage of an off-channel subterranean storage system over an underground dam, would be the avoidance of some of the andramodous fish impacts commonly associated with dams. Further, evaporative losses are minimal due to storage being below ground. Construction costs are anticipated to be between $10 per square foot. Assuming walls that total 2,000-feet in length and 30-feet in depth, the estimated capital cost (2002 dollars) is approximately $600,000.



Kennedy/Jenks Consultants

Cambria Community Services District
Recycled Water System Modeling

Location of Proposed Subterranean Storage

June 2003
K/J 024602.00

Figure 2-4

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