Section 5: Seasonal Storage and Conjunctive Use Alternatives

The previous section described potential projects that would develop additional new water supplies for CCSD. Because water supplies are generally more available and water demands are lower during winter months, seasonal storage and conjunctive use opportunities also provide potential alternatives to address CCSD's water supply requirements. This section describes these potential alternatives. Figure 5-1 shows the locations of each of the storage alternatives discussed below.

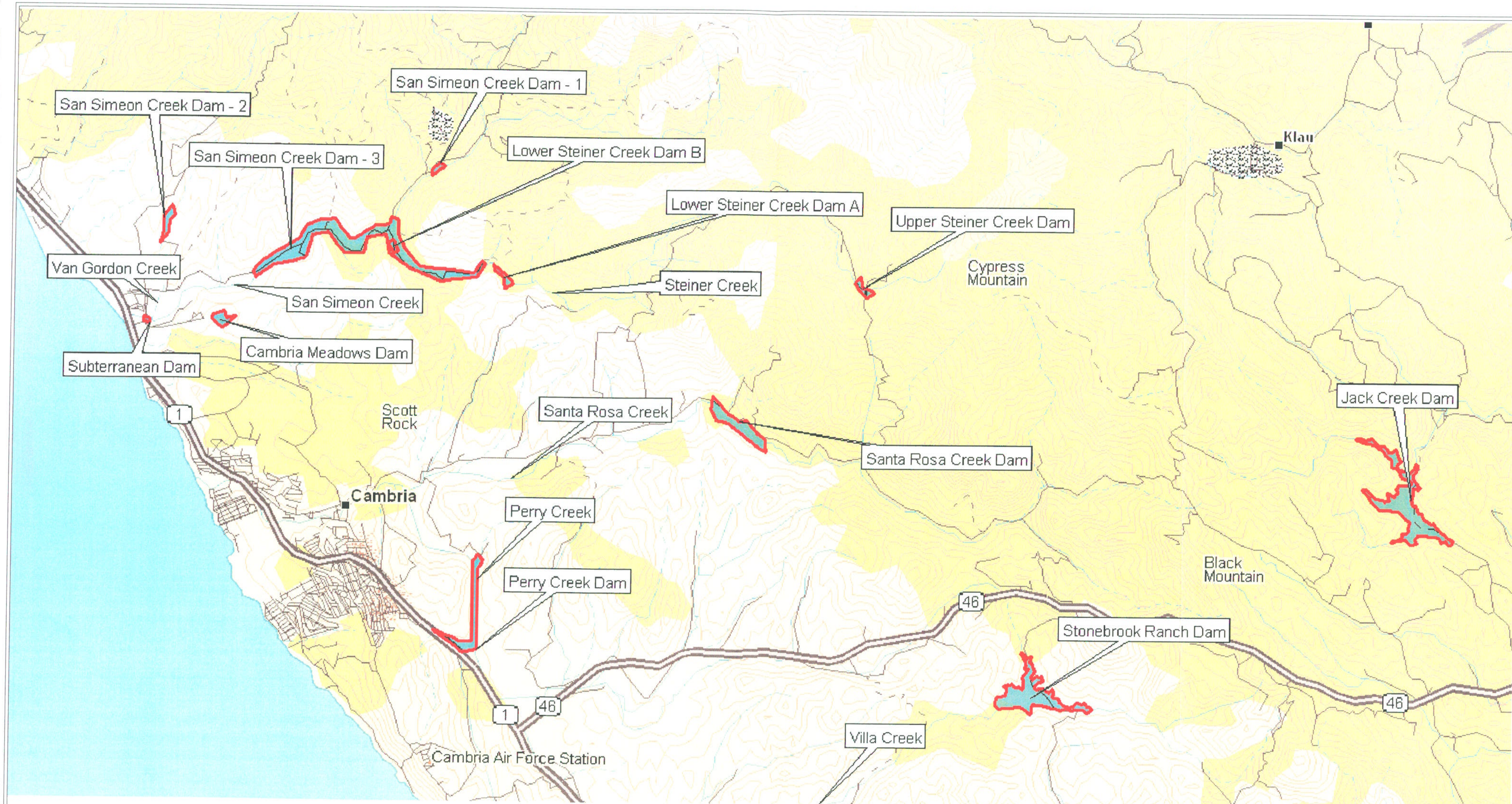
5.1 Seasonal Storage for Groundwater Recharge

Seasonal storage alternatives could store water available during the wet season for groundwater recharge and increased pumping during the dry season. Most involve the collection of natural run-off from the surrounding watershed. Except for subterranean storage, most involve the construction of an above-ground dam and reservoir. Each alternative has its associated environmental concerns. The storage capacity for each of the alternatives was designed to be greater than the expected yield to provide additional capacity for periods of high rainfall. Because each of these alternatives involves groundwater recharge, state grant funding may be available through Proposition 13. The alternatives described in this section were derived from the following studies:

- Coastal Valley Engineering, Inc., "Cambria County Water District Engineering Report on Proposed Water System Improvements and Master Plan," 1976. (1976 report)
- Boyle Engineering Corporation, "Economic Analysis of Alternative Water Resources Development," 1987. (1987 report)
- Engineering-Science, Inc., "Comparative Analysis of Potential Long-Term Water Supply Projects for the District," 1991. (1991 report)
- Engineering-Science, Inc., "Preliminary Design and Evaluation of Long Term Water Supply Projects," 1992. (1992 report)
- Penfield and Smith, "Preliminary Analysis Long Term Supply Project Pre-Final Design-Phase 1 Report," 1993. (1993 report)
- W.C. Bianchi & K. Renshaw, "Draft - Methods for Improving San Simeon Creek Water Storage Conceptual Proposal," 2003. (2003 report)

The potential seasonal storage alternatives identified in these studies include:

- Cambria Meadows
- San Simeon Dam and Reservoir
- Steiner Creek Dam
- Stonebrook Ranch Dam
- Jack Creek Dam



0 3,875 7,750 15,500 23,250 31,000 Miles

Reservoirs boundaries are not drawn to scale

N W E S

Kennedy/Jenks Consultants

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

Seasonal Storage Alternatives

March 2004
K/J 024602.10

Figure 5-1

K/J: g:\Projects\2002\024602.10\arcview\Figure 6-1.mxd

- Subterranean Dam

Each of these alternatives is briefly described in the following subsections.

5.1.1 Cambria Meadows Alternative

The Cambria Meadows alternative consists of diverting run-off and stream-flow during the wet season to an off-stream reservoir on Cambria Meadows. Stored water from the reservoir would be used to recharge to the San Simeon Basin during the dry season followed by an increase in pumping equal to the recharged amount. In the 1993 report, this alternative was compared to the Nacimiento alternative. The open reservoir would be created with the use of an inflatable barrier and have a storage capacity of 3,500 AF and a safe yield of 1,000 AFY. Safe yield refers to the maximum amount of water available to meet CCSD's needs, other riparian users, and transit losses without overdrawing the source. About 1,000 AF from run-off and stream-flow diversion of San Simeon Creek would be stored at the reservoir. Additional storage capacity is provided for periods of increased rainfall. Water from the reservoir would be discharged to San Simeon Creek and extracted down gradient at the existing well field.

The project includes a surface diversion facility at San Simeon Creek and a continuous diversion rate of 18 cfs to the reservoir. Potential environmental concerns include impacts to Steelhead migration and increased salinity in the lagoon, which supports habitats for listed species such as the California Red-Legged Frog, Southwestern Pond Turtle, Two Striped Garter Snake, Tidewater Goby, Threespine Stickleback, Sculpin, and Pacific Lamprey. Also of concern is the potential introduction of warm water fish species, which could be detrimental to the habitat in the downstream creek and lagoon. The 1992 report demonstrated the complexity in obtaining public support for the dam, particularly because it would be located on private property owned by the CT Ranch. This alternative was abandoned as a result of controversy raised within the community as well as the significant environmental concerns. The estimated annual fixed cost (2002 dollars) is $1,763,000 and the estimated variable cost (2002 dollars) is $120 per AF.

5.1.2 San Simeon Dam and Reservoir

Previous studies have evaluated three different dam and reservoir alternatives located on San Simeon Creek. All would involve releases to San Simeon Creek and extraction at the existing well field. Of the three alternatives proposed, the Van Gordon site shows the most potential as a future water supply alternative because it has the lowest cost and appropriate supply capacity.

5.1.2.1 Upper San Simeon Site (San Simeon Creek Dam-1)

For this alternative discussed in the 1987 report, the dam site is located on upper San Simeon Creek, upstream of the confluence with Steiner Creek. It would involve the construction of a 123 foot (ft) high earth-filled dam for the collection of storm water from the watershed. The reservoir would have a storage capacity of 2,000 AFY and a safe yield of 500 AFY. After transit losses and upstream pumping, only 250 AFY would be available for CCSD use. This alternative would have limited reliability and require the relocation of one house and 2.5 miles of San Simeon Creek Road. The estimated annual fixed cost (2002 dollars) is $1,145,000 and the estimated variable cost (2002 dollars) is $0 per AF.

5.1.2.2 Van Gordon Site (San Simeon Creek Dam-2)

The proposed dam site evaluated in the 1991 report was located at the Van Gordon tributary (originally the dam site was located at Art's Gully). The reservoir would have a storage capacity of 1,000 AF and is expected to provide 700 AFY to CCSD. This alternative differs from the others in that instead of the collection of run-off, this reservoir would be filled with the remaining wet season entitlement from San Simeon and Santa Rosa groundwater basins. This supply would be achieved by constant pumping of the San Simeon and Santa Rosa wells during the wet season. The amount not needed to meet immediate demands would be pumped to the reservoir for storage. Approximately 500 AF is currently available for storage; however, in the future this number would drop to approximately 200 AF. However, at this time, this reduction would not affect the ability of this alternative to meet projected demand. The water would be released into Van Gordon Creek during the dry season, where it would recharge the aquifer. The intensified pumping of the San Simeon groundwater wells may draw down the aquifer. The estimated annual fixed cost (2002 dollars) is $559,000 and the estimated variable cost (2002 dollars) is $100 per AF. This alternative is discussed in more detail in Section 8.8.

5.1.2.3 State-Proposed Site (San Simeon Creek Dam-3)

This alternative, evaluated in the 1987 report, as proposed by the Department of Water Resources (DWR), would involve the construction of a 213 ft high earth-filled dam, located two miles inland from the coast and a half-mile from the existing well field near San Simeon Creek. This State-proposed dam would have a reservoir with a 60,000 AF storage capacity and a safe yield of 18,500 AFY. The relocation of three homes, relocation of four miles of San Simeon Creek Road, slope stabilization, and a high fish ladder would be required. Although this alternative would potentially provide recreational fishing opportunities, the initial costs would be high and the dam would hinder migration of steelhead. The estimated annual fixed cost (2002 dollars) is $7,507,000 and the estimated variable cost (2002 dollars) is $0 per AF. This alternative would produce a yield well beyond CCSD needs. Because this project would be State sponsored, funding would most likely be available as well as the potential to share costs with other agencies in the area. In order for this alternative to be feasible, the State would need to pursue this alternative in the near future and identify other potential users.

5.1.3 Steiner Creek Dam

As with the San Simeon Creek Dam and Reservoir, this alternative also has three options. There is also a variation of the Upper Steiner Creek alternative.

5.1.3.1 Lower Steiner Creek - A

In the 1991 report, this alternative was evaluated as a conventional on-stream dam and reservoir located on lower Steiner Creek. The reservoir would collect natural run-off (estimated at about 4,460 AFY) from the tributary watershed. Approximately 1,800 AF of water would be provided, 700 AFY for CCSD use and the rest to account for losses and other users. Thus, a reservoir with a 5,400 AF storage capacity and a 155 ft high dam would be needed. Water would be released to San Simeon Creek for extraction at the existing well field. Although the area surrounding the proposed dam site was available in 1991, it may now be difficult to purchase the land. This alternative would face substantial environmental challenges due to the habitat at the dam site and downstream. The estimated annual fixed cost (2002 dollars) is $619,000 and the estimated variable cost (2002 dollars) is $0 per AF.

5.1.3.2 Lower Steiner Creek – B

According to the 1987 report, this alternative would utilize a similar dam location to the alternative described above. For this alternative, the dam site would be located a quarter of a mile upstream from the confluence of San Simeon Creek and Lower Steiner Creek. This dam would also be earth filled but only 135 ft high with a storage capacity of 5,400 AF and a safe yield of 2,200 AFY (designed for CCSD use of about 1,000 AFY). The reservoir would collect flood flows from the surrounding watershed for release during the dry season for recharge of the aquifer. Benefits of this dam are excellent water quality and isolation, which reduces the visual impacts. Disadvantages include the need for a high fish ladder, location within a historic landslide area, the need for considerable slope stabilization, and the need for extensive foundation preparation. The estimated annual fixed cost (2002 dollars) is $1,090,000 and the estimated variable cost (2002 dollars) is $0 per AF.

5.1.3.3 Upper Steiner Creek

This alternative, which was evaluated in the 1987 report, is similar to its counterparts discussed above; however, the dam site would be located on upper Steiner Creek. It would consist of the construction of a 150 ft high earth-filled dam and reservoir on Upper Steiner Creek, five miles east of confluence of Steiner and San Simeon Creeks. The storage capacity for the reservoir is estimated to be between 5,800 and 6,000 AF with a safe yield of 2,620 AFY (designed for CCSD use of 1,000 AFY). Benefits of this project include excellent water quality, an isolated area, which would again reduce the visual impacts, and no identified major environmental issues. However, the site cannot be accessed without crossing through private property, requiring acquisition of an easement or another arrangement for construction and maintenance. Additionally, construction of the necessary pipeline would be difficult and costly, due to steep terrain. The estimated annual fixed cost (2002 dollars) is $917,000 and the estimated variable cost (2002 dollars) is $0 per AF.

5.1.3.4 San Simeon Basin Option

This alternative, as evaluated in the 1987 report, is the same as the Upper Steiner Creek Alternative but with the addition of five new wells located upstream of the existing production well field to pump the additional water from the dam. The additional wells are expected to minimize conveyance losses. The estimated annual fixed cost (2002 dollars) is $1,049,000 and the estimated variable cost (2002 dollars) is $20 per AF.

5.1.4 Stonebrook Ranch Dam

As evaluated in the 1991 report, this alternative involves construction of an 80 ft high dam located on Villa Creek. The reservoir would have a storage capacity of 4,000 AF with CCSD utilizing 700 AFY. This alternative would collect the average run-off of 2,990 AFY from the watershed. Releases would occur through a pipeline to Perry Creek, where it would recharge the aquifer. Perry Creek is thought to be a source of the water quality issues associated with the Santa Rosa Basin, thus water quality may be poor even after treatment. Extraction would occur at the Santa Rosa Creek groundwater wells. Additional groundwater wells with filtration and disinfection treatment would also be required. The estimated annual fixed cost (2002 dollars) is $690,000 and the estimated variable cost (2002 dollars) is $100 per AF. This alternative was locally unpopular when originally proposed and thus approval may be difficult to obtain.

5.1.5 Jack Creek Dam

This alternative, evaluated in the 1991 report, consists of the construction of a 95 ft high on-stream dam located in Dover Canyon. The reservoir would have a storage capacity of 4,705 AF. The watershed has an average run-off of 1,655 AFY. Releases would need to be pumped over the divide, which separates Dover Canyon and Santa Rosa Creek, and then released to Santa Rosa Creek. The estimated annual fixed cost (2002 dollars) is $587,000 and the estimated variable cost (2002 dollars) is $200 per AF. All flow of Dover Canyon during the dry season would be released to Jack Creek and therefore to Santa Rosa Creek, increasing the reliability of this alternative. This alternative is discussed in more detail in Section 8.9.

5.1.6 Subterranean Dam in the San Simeon Basin

This alternative, would consist of the construction of a subterranean dam in the San Simeon Basin near the existing well field to prevent the intrusion of saltwater and to retain and store groundwater flow during the wet season to ensure a full basin at the start of the dry season, and to provide yield during the summer months. Subterranean storage dams can be direct physical barriers or hydraulic barriers. CCSD currently employs a hydraulic barrier by percolating treated wastewater effluent at the base of San Simeon Creek. The mounded groundwater from this practice serves as a hydraulic barrier against potential saltwater intrusion towards its potable well field, and slows the loss of aquifer flow towards the ocean boundary. Even with this practice in place, a 1998 USGS report[18] still estimated a loss of approximately 320 AFY at the San Simeon Creek ocean boundary. However, subsequent discussions with Mr. Gus Yates, one the 1998 report's principal authors, indicated this loss occurred primarily during the wet season.

In order to obtain annual carry-over yield from the subterranean dam concept, the aquifer would need to be drawn below sea level during the dry season. This would contrast significantly with the current practice of maintaining a positive hydraulic differential between the upstream well field and downstream wastewater percolation ponds. Additionally, a reverse gradient would also create more of a potential for saltwater intrusion into the aquifer should the barrier malfunction.

Although a direct physical barrier could provide a more positive means to slow aquifer loss at the ocean boundary, creation of a substantial reverse gradient from the wastewater percolation pond area towards the potable water well field would lead to significant concerns from regulatory agencies. Multiple barriers and remote monitoring and alarms could be devised to help offset potential cross-contamination and public health concerns. However, further detailed geotechnical investigations would also be needed to ensure other potential hydraulic pathways, such as fractured rock seams, were not present.

Besides the hydraulic issues, substantial lowering of the groundwater table behind such a barrier could impact the riparian corridor by eliminating the source of water to various root zones. If this were to occur, it would most likely be construed as a taking of listed species supported within the riparian corridor (e.g., red-legged frogs, southwestern pond turtle, etc.). This, in turn, could trigger the need for a Habitat Conservation Plan, in order to address the taking issue.

[18] Yates and Van Konyenburg. 1998. 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. USGS Report 98-4061, Table 4.

Subterranean direct-physical barriers can be constructed in a variety of methods depending upon specific conditions. For example, an underground curtain wall could be constructed of slurry cement using dragline or auguring methods. Pressure grouting could also be evaluated.

A draft proposal entitled, "Methods for Improving San Simeon Creek Water Storage Conceptual Proposal," dated 2003 prepared by W.C. Bianchi and K. Renshaw describes the potential use of a subsurface dam in the San Simeon Basin. The proposal includes consideration of the dam as a 2 to 5 foot wide vertical trench filled with a bentonite and water mixture. In order to take advantage of yield provided by a subsurface dam, CCSD's existing SWRCB permit would also need to be amended. A prime advantage of an underground dam would be the avoidance of some of the anadromous fish impacts commonly associated with surface impoundments. Further, evaporative losses are minimal due to storage being below ground. Construction costs are anticipated to be between $5 and $7 per square foot. Assuming a 1,000 foot long and 40 ft deep dam, the estimated capital cost (2002 dollars) is $280,000.

Construction of a direct physical-barrier has inherently more risk than the hydraulic barrier currently being used by the CCSD due to its permanence of location and construction. For example, a physical barrier would be very difficult and costly to remove, if it was found to entrap salt water from a tidal surge. Additionally, environmental impacts would be unmitigatable and could result in a permanent loss of the riparian habitat. Before this alternative could be considered, a focused hydrogeologic study of the area would be required. This study would need to determine the effects of the subsurface dam on the surrounding habitat and the potential gain in groundwater supply. Potential leakage around a physical barrier from fractured rock or similar strata would also need further assessment. CCSD may also benefit from further evaluation of the effectiveness of the current hydrologic dam, created by the percolated effluent, in preventing saltwater intrusion and in retaining groundwater flow prior to construction of a subsurface dam. Because the subterranean dam concept poses significant health risks, and could cause substantial environmental impacts to the riparian corridor that supports several listed species, the alternative is not evaluated in Section 8. However, further study of the area's hydrogeology could benefit the District towards assessing and possibly refining its current hydraulic mound operation.

5.2 Seasonal Storage for Direct Use

This section discusses dam and reservoir alternatives that would not involve groundwater recharge; instead the water from the reservoir would be used directly. The identified alternatives include:

- Santa Rosa Creek Dam
- Perry Creek Dam

Each of these alternatives is evaluated in the following subsections.

5.2.1 Santa Rosa Creek Dam

This alternative, as evaluated in the 1987 report, was also proposed by DWR and consists of the construction of 188 ft high earth-filled dam and reservoir at Santa Rosa Creek, located 3.8 miles east of the Coast Union High School. The reservoir would have a capacity of 15,000 AF to provide a safe yield of 6,640 AFY, of which CCSD would utilize about 1,000 AFY. Advantages include flood protection, increased long-term stream-flow, enhanced flow for spawning grounds, water conservation, and better quality than groundwater. Problems include highway relocation, construction of a fish ladder, considerable slope stabilization, high cost, and purchase of the run-off basin, including eleven homes and one business. There also numerous environmental issues associated with this project. This alternative, unlike the others already mentioned, would require a treatment plant because this alternative involves direct use of the reservoir water. Thus, a 3.8 MGD treatment plant with a 2.2 million gallon (MG) storage tank was proposed. This alternative would provide more yield than CCSD would need, allowing for the possible opportunity to share the cost and yield of this alternative if other users could be identified. The estimated annual fixed cost (2002 dollars) is $2,539,000 and the estimated variable cost (2002 dollars) is $890 per AF.

5.2.2 Perry Creek Dam

As evaluated in the 1987 report, this alternative consists of a 50 ft high earth-filled dam with 6,000 AF storage located one mile south of the Coast Union High School. A 3.8 MGD treatment plant would also be required because the reservoir water would be directly used for potable purposes. The expected safe yield for this alternative is 3,500 AFY, of which CCSD would utilize 1,000 AFY. Advantages include flood protection, water conservation, and the introduction of recreational facilities. Problems that may arise include possible swamping of the reservoir, cattle and human contamination, flooding on Highway 1, poor water quality, and high evaporation rates. The estimated annual fixed cost (2002 dollars) is $1,513,000 and the estimated variable cost (2002 dollars) is $890 per AF.

5.3 Preliminary Evaluation of Seasonal Storage Alternatives

After a screening-level evaluation of the alternatives, there are several which were eliminated without additional evaluation. The seasonal storage options commonly have complex environmental issues and face public opposition. Therefore, of the storage alternatives, only the San Simeon Creek Dam-Van Gordon Site and the Jack Creek Dam alternative are discussed in Section 8 due to the reduced environmental issues and public opposition associated with their construction. Table 5-1 summarizes the seasonal storage options with their corresponding evaluation factors.

5.4 Potential Conjunctive Use Opportunities

In addition to seasonal storage alternatives, there appears to be several conjunctive use opportunities that can be considered by CCSD. These opportunities include:

- Hard Rock Drilling/Groundwater Storage
- Seasonal Storage of Recycled Water
- Centralized Water Softening at the Proposed Seawater Desalination Plant

Each of these opportunities is briefly described in the following subsections.

TABLE 5-1

EVALUATION OF SEASONAL STORAGE ALTERNATIVES FOR CCSD[d]

Alternatives	Storage Capacity	Safe Yield	Designed CCSD use	Require Treatment	Reliability	Capital Cost	Annual Capital Cost [a]	Fixed O&M Cost [b]	Total Annual Fixed Cost	Total Variable Cost [c]	Environmental Issues	Eliminating Factor
Units	*AF*	*AFY*	*AFY*			*mill $*	*$/Yr*	*$/Yr*	*$/Yr*	*$/AF*		
Cambria Meadows	1,200	1,000	700	N	medium	$29.2	$1,688,000	$75,000	$1,763,000	$120	high	High capital cost; Abandoned in 1989
San Simeon Dam and Reservoir-1	2,000	500	250	N	low	$19.0	$1,097,000	$48,000	$1,145,000	$0	medium	High cost, low reliability, and insufficient supply
San Simeon Dam and Reservoir-2	1,000	840	700	N	low	$8.7	$500,000	$59,000	$559,000	$100	high	Carried Forward
San Simeon Dam and Reservoir-3	60,000	18,500	1,000	N	medium	$127.7	$7,384,000	$123,000	$7,507,000	$0	high	High capital cost; high yield
Lower Steiner Creek Dam-A	5,400	1,800	700	N	medium	$10.1	$586,000	$33,000	$619,000	$0	medium	Substantial Environmental concerns for downstream lagoon
Lower Steiner Creek Dam-B	5,400	2,200	1,000	N	medium	$18.0	$1,042,000	$48,000	$1,090,000	$0	medium	Substantial construction challenges at dam site
Upper Steiner Creek Dam	6,000	2,620	1,000	N	medium	$16.1	$871,000	$46,000	$917,000	$0	medium	Difficult site access and pipe construction
Stonebrook Dam	4,000	1,340	700	Y	medium	$10.1	$586,000	$104,000	$690,000	$100	medium	Difficulty for approval due to negative public opinion
Jack Creek Dam	4,705	1,535	700	Y	low	$8.4	$483,000	$104,000	$587,000	$200	high	Carried Forward
Subterranean Dam	unknown	unknown	unknown	N	low	$0.3	$16,000	$26,800	$43,000	$0	high	Lack of information and potential environmental effects
Santa Rosa Dam	15,000	6,640	1,000	Y	medium	$41.4	$2,394,000	$145,000	$2,539,000	$890	high	High capital cost and high O&M cost for the Treatment Plant
Perry Creek Dam	6,000	3,500	1,000	Y	low	$23.8	$1,377,000	$136,000	$1,513,000	$890	high	Potential for swamping, fecal contamination, and flooding of highway

Notes:

(a) Determined using 4 interest rate and 30 year time span.

(b) Fixed O&M cost were determined under the following assumptions:

Dam: 0.1 percent of capital cost and 3 man hrs/day

Pipeline: 0.1 percent of capital cost and 1 man hr/day

Wells: 0.1 percent of capital cost and 1 man hr/day

Pump Station: 1.0 percent of capital cost and 2 man hr/day

Treatment Plant: 8 man hrs/day

Packaged Filtration/Chlorination Plant: 4 man hrs/day

Labor: $34/hr and 260 days per year, hrs/day determined by summing number of hours per infrastructure required

(c) Variable O&M Costs were determined under the following assumptions:

Treatment Plant: 4.0 percent of the capital cost, includes chemical cost

Packaged Filtration/Chlorination Plant: 2.0 percent of capital cost, includes chemical cost

Power: $0.15/kw-hr, 80 percent motor efficiency, 90 percent pump efficiency,

(d) All costs are expressed in 2002 dollars.

5.4.1 Hard Rock Drilling/Groundwater Storage

Preliminary studies evaluating the potential of hard rock drilling identified a gravel deposit, located on the eastern CT Ranch border and the northern border of the Monterey Pines Area, which may provide the potential for groundwater storage. The gravel deposit is roughly a quarter of a square mile in area and 20 ft thick. A test well located within the gravel deposit had a 30 to 40 gpm capacity.[19] During the wet season, excess water supply not required to meet CCSD's water demand would be pumped into the gravel deposit for injection and storage. During the dry season, stored water would be used to supplement the groundwater supplies. Utilization of this potential conjunctive use opportunity would allow for more efficient use of CCSD's existing water supplies. Further investigation would be required to determine the extent of the storage and extraction capacities, potential leakage into the surrounding alluvial deposits and containing strata and methods to isolate the storage stratum at its boundaries.

5.4.2 Seasonal Storage of Recycled Water

Task 3 of the Water Master Plan Update identified potential recycled water users, estimated recycled water demands, and developed a recycled water distribution system. Because recycled water is related to the overall hydrologic balance of the aquifer, two categories of recycled water sites were identified in the Task 3 report: users that simply replace potable water use with recycled water and, therefore, have no net change to the aquifer balance; and, future users that will create new demands and could increase the net outflow from the aquifer (i.e., the recycled water serving the new project sites would not be percolated into the hydraulic mound at the base of San Simeon Creek).

To fully address regulatory agency concerns with regard to downstream lagoon flows, further hydrogeologic study may be required. In certain cases, the discharge of treated wastewater effluent has created artificial habitat for endangered or listed species. In these cases, the use of recycled water has been restricted due to regulatory concerns brought forth by the Endangered Species Act. To address this concern, seasonal storage of recycled water could be required. Such storage would be on a smaller scale than potable water storage alternatives. However, depending upon the storage method used, similar environmental constraints could apply.

Seasonal storage of recycled water should be isolated from potential potable water sources in accordance with State Title 22 guidelines. In conjunction with other supply alternatives, recycled water would further serve as an additional source in meeting projected demands. Although most of the other potable-water storage options are expected to provide sufficient supply, they are limited in reliability due to their dependence on weather conditions. Conjunctive use with recycled water is independent of weather conditions and would increase reliability of the seasonal storage alternatives.

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.

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[19] Conservations with Mr. Tim Giles, who participated in Phase 1 of previous hard rock drilling project.

Additional cost may result from the required infrastructure to convey the recycled water to the storage facility.

5.4.3 Centralized Water Softening at the Proposed Seawater Desalination Plant

Another possible conjunctive use would be to co-locate a centralized water softening facility at the desalination facility. The water softening equipment could share common elements such as being housed within the same building, as well as sharing motor control centers and control systems. The water softening process would normally operate during the wet season when the desalination plant may not be operated. During the dry season, blending of desalinated water with non-softened aquifer water would essentially accomplish the same effect as softening due to the lack of minerals in the desalinated water. This approach would maximize CCSD's investment into a desalination facility while also providing improved water quality.