

CHAPTER VIII

CONCEPT PLAN COMPARISON

This chapter compares the concept plans described in **Chapter VII** and identifies initial alternatives that should be further developed into detailed alternative plans in the Los Vaqueros Expansion Investigation (LVE).

CRITERIA AND COMPARISON

To help focus the plan formulation process and develop the most appropriate detailed plans to be considered for implementation, the concept plans in **Chapter VII** were compared against each other using four general criteria - completeness, effectiveness, efficiency, and acceptability – based on the Federal Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G). Below are descriptions of each criterion and how it was applied to the comparison. **Table VIII-1** compares the plans in terms of their ability to address each of the four criteria, with each plan assigned a relative ranking ranging from very low to very high. An overall relative ranking of the concept plans also is presented in the table, based on equal weighting of the rankings for the four criteria. This overall ranking was used, along with other information, to determine if a concept plan should be considered further in the LVE plan formulation process.

It is important to reiterate that there are many potential combinations and sizes of facilities that could be included in each concept plan described in **Chapter VII** and compared herein. Accordingly, the recommendations in **Table VIII-1** apply primarily to the combination of measures and facilities represented by each plan, with the assumption that appropriate facility sizes or applications will be refined in future studies. Similarly, it should be noted that the estimated costs and benefits of the concept plans presented in this chapter are based on previous studies and supplemented with other preliminary analyses. Additional tools and analyses will be developed in the next phase of the feasibility study to refine these preliminary cost and benefit estimates as detailed alternative plans take shape.

Completeness Criterion

Completeness is a determination of whether a plan includes all elements necessary to realize planned effects. It also is an indication of the degree that intended benefits of the plan depend on the actions of others. Completeness does not focus on the relative magnitude of plan benefits or accomplishments; rather, it indicates whether a plan has considered everything necessary to successfully implement the plan (without unmitigated adverse impacts) and reliably achieve the stated benefits.

TABLE VIII-1
CONCEPT PLAN COMPARISON SUMMARY

Concept Plans	Comparison Criteria			Further Development Status and Overall Ranking	
	Completeness	Effectiveness	Efficiency		Acceptability
Bay Area Water Supply Reliability Focus					
1 – Raise Los Vaqueros Dam In-Place for Bay Area Water Supply Reliability	Can be physically implemented with minimal impacts; would not require future elements; is consistent with study authorization; and addresses water supply reliability objective. <i>High</i>	Potential to provide nearly 30 percent reduction in 2020 drought period shortages for Bay Area water users. <i>Low</i>	Lowest implementation cost but lower drought period yield. Low cost per unit of output compared with other plans focused on water supply reliability. <i>Moderate</i>	Consistent with goals of CALFED. <i>High</i>	Although lower yield, identified for further development because of very low implementation cost. <i>Moderate</i>
2 – Enlarge Los Vaqueros Dam and Reservoir for Bay Area Water Supply Reliability	Can be physically implemented; would not require future elements; is consistent with study authorization; and addresses water supply reliability objective. <i>High</i>	Potential to provide almost 65 percent reduction of 2020 drought period shortages for Bay Area water users. <i>Moderate</i>	Moderate yield but higher cost per unit of output for water supply reliability than above concept plan. <i>Moderate</i>	Consistent with plan in CALFED ROD. <i>High</i>	Identified for further development because of potential to significantly address water supply reliability for Bay Area. <i>Moderate-High</i>
3 – Desalination with Storage (Enlarge Los Vaqueros Reservoir) for Bay Area Water Supply Reliability	Can be physically implemented; is consistent with study authorization; and addresses water supply reliability objective. Increased uncertainty relating to reliability and efficiency to implement and maintain desalination facilities and mitigate for brine disposal impacts. <i>Moderate</i>	Potential to provide about 75 percent reduction of 2020 drought period shortages for Bay Area water users. <i>Moderate</i>	Highest yield but also the highest cost per unit of output for water supply reliability. <i>Moderate</i>	Consistent with goals of CALFED. May be difficult to mitigate process byproducts (brine) to a level acceptable to other Bay Area water resources interests. <i>Moderate</i>	Not identified for further development as a stand alone alternative primarily because of highest cost per unit of water supply developed of any plan considered. <i>Low-Moderate</i>

Table VIII-1 (CONT.)

Concept Plans	Comparison Criteria			Further Development Status and Overall Ranking	
	Completeness	Effectiveness	Efficiency		Acceptability
EWA Replacement Supply Focus					
4 – Enlarge Los Vaqueros Reservoir with Dyer Canal Intertie for EWA	Can be physically implemented; would not require future elements; is consistent with study authorization; and addresses EWA replacement supply objective. <i>High</i>	Potential to replace over 60 percent of average annual EWA water acquisition target. <i>Low-Moderate</i>	Moderately high cost per unit of output for relatively low EWA replacement supply. <i>Moderate</i>	Consistent with goals of CALFED and potential for Federal interest in EWA replacement supply objective. <i>Moderate-High</i>	Identified for further development , although, at this time, does not appear to be as efficient as Concept Plan 5 (with intertie to Bethany Reservoir). Moderate
5 – Enlarge Los Vaqueros Reservoir with Bethany Reservoir Intertie for EWA	Can be physically implemented; would not require future elements; consistent with study authorization; and addresses EWA replacement supply objective. <i>High</i>	Potential to replace about 85 percent of average annual EWA water acquisition target. <i>Moderate-High</i>	Moderate cost per unit of output for EWA replacement supply and highest yield of the concept plans. <i>Moderate</i>	Similar to Concept Plan 4. <i>Moderate-High</i>	Identified for further development primarily because it would result in the largest potential EWA replacement supply. Moderate-High
Combined Objective					
6 – Water Supply / EWA Combination with Dyer Canal Intertie	Can be physically implemented; would not require future elements; consistent with study authorization; and addresses primary study objectives. <i>High</i>	Potential to provide over 20 percent reduction of 2020 drought period shortages for Bay Area water users and replace over 60 percent of average annual EWA water acquisition target. <i>Moderate</i>	Relatively low drought period yield and EWA replacement supplies with low to moderate cost per unit of output for both water supply reliability and EWA. <i>Moderate-High</i>	Consistent with goals of CALFED and potential for Federal interest in EWA replacement supply objective. <i>High</i>	Although relatively low yields, identified for further development because of low to moderate costs per unit of output for both supply reliability and EWA replacement supply. High

Table VIII-1 (CONT.)

Concept Plans	Comparison Criteria				Further Development Status and Overall Ranking
	Completeness	Effectiveness	Efficiency	Acceptability	
7 – Water Supply / EWA Combination with Bethany Reservoir Intertie	Can be physically implemented; would not require future elements; consistent with study authorization; and addresses primary study objectives.	Potential to provide about 15 percent reduction of 2020 drought period shortages for Bay Area water users and replace nearly 80 percent of average annual EWA water acquisition target.	Similar to Concept Plan 6.	Similar to Concept Plan 6.	Identified for further development primarily because it would result in the lowest cost for EWA replacement supply, and high potential for Federal interest.
8 – Water Supply / EWA Combination with Water Quality Improvements	<i>High</i> Can be physically implemented; would not require future elements; reduced certainty of improving water quality conditions under all circumstances; is consistent with study authorization; and addresses all study objectives.	<i>Moderate-High</i> Potential to provide nearly about 30 percent reduction of 2020 drought period shortages for Bay Area water users and replace about 40 percent of average annual EWA water acquisition target. Also provides a significant improvement in SBA water quality.	<i>Moderate-High</i> Overall highest cost per unit of water supply reliability and EWA replacement output of combination plans considered.	<i>High</i> Consistent with plan in CALFED ROD and potential for Federal interest.	<i>High</i> Identified for further development primarily because it is consistent with the plan in the CALFED ROD and balances study objectives.
KEY: CALFED = CALFED Bay-Delta Program EWA = Environmental Water Account ROD = Record of Decision SBA = South Bay Aqueduct <i>Moderate-High</i> <i>Moderate</i> <i>Low-Moderate</i> <i>High</i>					

Each concept plan was assigned a relative completeness ranking, from low to high, depending on the relative degree of completeness and considering the following completeness factors:

- **Authorization / Objectives** – A complete plan would be consistent with the basic study authorization and would address each of the major planning objectives, while providing opportunities to address other identified objectives or needs. For example, a plan that only addresses water supply reliability for San Francisco Bay Area (Bay Area) water users would rate lower for this sub-criterion because the plan did not significantly address all of the study objectives. Accordingly, the combination concept plans would generally rate higher for completeness than other concept plans.
- **Reliability** – A complete plan would be capable of providing the specific and sustained benefits for which it was formulated over the life of the project. Reliability reflects whether other projects, programs, or actions are necessary to implement the project and develop the full level of benefits for which the plan was intended, over and above identified operations and maintenance (O&M). For example, a plan that requires complex legal arrangements between multiple parties might have lower reliability due to the uncertainty associated with the ability to obtain these agreements. Concept Plan 3 ranked lower for completeness, partly because desalination technologies are relatively new and untested under long-term operating conditions.
- **Physical Implementability** – A complete plan can be physically constructed or implemented within the study area as described, with disclosure of any unusual construction challenges. For example, implementability might consider uncertainty regarding the ability to construct a project feature along a major, active earthquake fault. All of the concept plans are believed to have a high potential for physical implementation.
- **Environmental Resources** – A complete plan must either avoid potential adverse environmental impacts or successfully mitigate for unavoidable adverse impacts. All of the concept plans are believed to have a high potential to avoid or successfully mitigate environmental impacts, with the exception of Concept Plan 3 (due to potential environmental issues associated with brine disposal).
- **Water and Related Resources** – Completeness also considers whether or not a plan can be implemented to mitigate any unavoidable impacts to water, power, recreation, water quality, flood control, and/or related resources. All plans that include enlarging Los Vaqueros Reservoir could provide additional recreation and ecosystem restoration opportunities, and plans with an intertie to Bethany Reservoir have the potential to provide hydropower benefits.
- **Other Redirected or Adverse Impacts** – A complete plan would avoid or mitigate for other potential adverse or redirected impacts. These could include hydraulic impacts to area streams or Sacramento-San Joaquin Delta (Delta) waterways, historic or cultural resources, or water quality.

Effectiveness Criterion

Effectiveness is the extent to which a plan alleviates the identified problems and achieves study planning objectives. For the LVE, effectiveness of the concept plans was evaluated in three ways: (1) contribution to Bay Area water supply reliability, (2) potential Environmental Water Account (EWA) replacement supply, and (3) potential to improve water quality. Preliminary water supply yield and water quality estimates were derived from a "stand-alone" Los Vaqueros Reservoir model, developed using the CALSIM software. The stand-alone model uses pre-processed data from CALSIM II (availability of Delta Surplus) and DSM2 (water quality at Delta intakes). The stand-alone model is described in **Chapter IX**. When determining a plan's overall effectiveness ranking, water supply reliability and EWA replacement supply achievements were given greater consideration than water quality improvement.

- **Water Supply Reliability** - Because the greatest need for water in the study area is during dry and critically dry periods, a plan's contribution to Bay Area water supply reliability was measured using drought period yield (October 1986 through September 1992). As shown in **Table VIII-2**, the plans with the greatest water supply reliability yields were the Desalination and Los Vaqueros Enlargement concept plans focusing on water supply reliability. The combined objective concept plans provided significantly less supply reliability benefits.
- **EWA Replacement Supply** – Unlike water supply reliability, effectiveness of an EWA replacement supply was evaluated using average annual yield. This is because EWA actions are tied primarily to the presence of at-risk fish at the south Delta pumps, which occurs in all year types. It should be noted that modeling tools necessary to simulate integrated operation of EWA with the Central Valley Project (CVP) and State Water Project (SWP) are currently under development. Consequently, EWA yield estimates presented in **Table VIII-2** are preliminary and were developed using existing tools. Actual benefits may differ when an integrated operations model is completed that can consider EWA operations in relation to California's overall water management system. The greatest average annual replacement yield for EWA was achieved by Concept Plan 5, followed by Concept Plan 7.
- **Water Quality** – Although a detailed evaluation of water quality was not performed for the concept plans, Concept Plan 8 appears to have the greatest potential to provide significant water quality benefits.

As indicated in **Table VIII-1**, the concept plans that ranked highest in effectiveness were Concept Plans 5 and 7. These plans appear to have the greatest potential to provide a high EWA replacement yield. Several of the concept plans ranked moderate for effectiveness, but no plans appeared highly effective at meeting all three of the LVE planning objectives.

TABLE VIII-2
SUMMARY OF CONCEPT PLAN FEATURES, ACCOMPLISHMENTS, AND COSTS

Item	Bay Area Water Supply Reliability Focus			EWA Replacement Focus		Combined Objective Focus		
	1 Raise Los Vaqueros Dam In-Place	2 Enlarge Los Vaqueros Dam & Reservoir	3 Desalination w/ Storage (Enlarge Los Vaqueros)	4 Enlarge Los Vaqueros with Dyer Canal Intertie	5 Enlarge Los Vaqueros with Bethany Reservoir Intertie	6 Water Supply/EWA Combination w/ Dyer Canal Intertie	7 Water Supply/EWA Combination w/ Bethany Reservoir Intertie	8 Water Supply/EWA Combination w/ Water Quality
Concept Plan Features ¹								
Los Vaqueros Capacity (TAF)	125	500	500	500	500	500	500	500
Delta Pumping Capacity (cfs) ²	750	750	750	1,000	1,750	1,750	1,750	1,750
Los Vaqueros Delivery Intertie Location	Dyer Canal	Dyer Canal	Dyer Canal	Dyer Canal	Bethany Reservoir	Dyer Canal	Bethany Reservoir	Dyer Canal
Desalination Capacity (mgd)	-	-	20	-	-	-	-	-
Accomplishments ³								
Drought Period Yield (TAF/Year) ⁴	43	95	110	-	-	34	19	47
Drought Period Shortage Reduction ⁵	28%	63%	72%	-	-	22%	13%	31%
EWA Replacement Yield (TAF/year) ⁶	-	-	-	140	190	142	173	81
Contribution to EWA ⁷	-	-	-	62%	84%	63%	77%	36%
Decrease in Salinity (mg/L Cl) ⁸	11	15	13	16	16	17	15	44 ¹¹
Costs (\$ Millions) ⁹								
Total First Cost	470	1,050	1,260	1,170	1,470	1,540	1,470	1,540
Present Value Cost ¹⁰	720	1,640	2,270	1,590	2,010	2,160	2,040	2,160
KEY: Cl = chlorides	cfs = cubic feet per second		EWA = Environmental Water Account	mgd = million gallons per day	mg/L = milligrams per liter	TAF = thousand acre-feet		

1. Reservoir storage, pumping, conveyance, and desalination capacities are preliminary estimates, and except where noted in Chapter VII, are sized considering cost efficiency.
2. Includes existing diversion and pumping capacity at Old River to CCWD of 250 cfs.
3. Accomplishments of all concept plans (water supply reliability, EWA replacement, and water quality improvements) are in addition to the without-project conditions. Several without-project conditions include Los Vaqueros Reservoir at 100,000 acre-feet, 250 cfs Delta diversion at Old River, and all deliveries made to meet CCWD demands.
4. Drought period is defined as October 1986 through September 1992. Future modeling will redefine period to be identical with CALFED Common Assumptions metrics.
5. Based on preliminary estimate of 2020 average annual drought period shortage in the region of about 152,000 acre-feet. Future studies will better quantify shortages in the area.
6. EWA replacement supply is based on average annual yield.
7. Contribution to EWA based on average annual EWA acquisition target of 225,000 acre-feet, consistent with OCAP. EWA typically purchases 200,000 to 300,000 acre-feet per year.
8. Long-term average decrease in salinity for deliveries to the South Bay Aqueduct as compared to Clifton Court Forebay salinity values.
9. Preliminary cost estimates based on October 2004 pricing levels and rounded to nearest \$10 million.
10. Includes first cost; interest during construction; and annual operation, maintenance, major replacement allowance, and energy costs computed at a present value over a 100-year period of analysis at 5-3/8% interest rate.
11. Preliminary water quality accomplishments will be reviewed with improved operating logic in future studies.

Efficiency Criterion

The efficiency criterion is primarily the measure of how economically efficiently a plan can alleviate the identified problems while realizing specified objectives consistent with protecting the Nation's environment. Concept plans generally ranked high for this criterion if they provided a significant increase in water supply reliability and/or EWA replacement supply at a relatively low cost, while also contributing to the water quality objective.

Comparing the efficiency of concept plans is challenging for several reasons. The concept plans have not been developed to a high level of detail, operational simulations have not yet been refined to optimize benefits, and benefits are expressed differently for the water supply reliability objective (drought period yield) and the EWA replacement supply objective (average annual yield). **Table VIII-3** compares the relative efficiency of the concept plans within each plan category (water supply reliability, EWA replacement supply, or combined objective) using a relative comparison value. The relative comparison value represents a dimensionless measure of relative efficiency. It is the present value cost divided by the yield and then normalized using the sum of all three plans to the base 10. These preliminary calculations were performed to assess which concept might provide the greatest benefits at the lowest relative cost. The figures presented in the table are summarized below.

- **Bay Area Water Supply Reliability Concept Plans** – As can be seen from **Table VIII-3**, the drought period yield for each of the three water supply reliability concept plans varies from 43,000 to about 110,000 acre-feet per year with present value costs ranging from about \$720 million to approximately \$2.2 billion, respectively. From this information, a relative comparison value was developed. As can be seen, Concept Plans 1 and 2, even with significantly varying yields and costs, appear to result in similar efficiencies. In comparison, it is estimated that Concept Plan 3 would be significantly less efficient, as it would result in the largest cost per unit of water supply output (i.e., higher relative comparison values).

An analysis to estimate monetary benefits to assess the economic feasibility of enlarging Los Vaqueros Reservoir for water supply reliability will be accomplished in future phases of the feasibility study. However, it is believed that a new drought period supplemental supply for Bay Area water users, including enlarging Los Vaqueros Reservoir, would be highly reliable, result in significant incidental increases in water quality benefits, and significantly add to the overall water supply flexibility of the region. No other known new water source can provide these benefits as cost-efficiently as enlarging Los Vaqueros Reservoir.

- **EWA Replacement Concept Plans** – Similar to the above calculation, a relative comparison value was developed for the two EWA concept plans. As can be seen from **Table VIII-3**, it appears that Concept Plan 5 would be measurably more efficient than Concept Plan 4 even though it would have a higher present value cost. It is believed that the reason for the differences in efficiencies is primarily due to the restricted capacity of the SBA with respect to EWA replacement supplies and the relative cost savings due to the reduced need to pump all EWA water from Los Vaqueros Reservoir to the Dyer Canal.

**TABLE VIII-3
SUMMARY COMPARISON OF CONCEPT PLAN EFFICIENCY**

Concept Plans	Yield (1,000 acre-feet per Year)		Present Value Cost (\$ Millions)		Relative Efficiency	
	Supply Reliability ¹	EWA Replacement ²	Creditable to WSR	Creditable to EWA	Relative Comparison Value ³	Remarks
Bay Area Water Supply Reliability (WSR) Focus						
1	43	-	720	-	3.0	Lowest cost per unit of output (unit cost) of WSR concepts
2	95	-	1,640	-	3.2	Relatively low unit cost
3	110	-	2,270	-	3.8	Highest unit cost for WSR concepts
					Σ 10.0	
EWA Replacement Focus						
4	-	140	-	1,590	5.2	Highest unit cost of EWA concepts
5	-	190	-	2,010	4.8	Lowest unit cost of EWA concepts
					Σ 10.0	
Combination Plans						
6	34	142	520	1,640	3.0	Lowest unit cost of combination plans
7	19	173	390	1,650	3.3	Relatively low unit cost
8	47	81	520	1,640	3.8	Highest unit cost of combination plans
					Σ 10.0	
KEY: EWA = Environmental Water Account WSR = water supply reliability						

Notes:

- Drought period yield (October 1986 through September 1992).*
- Average annual EWA replacement supply.*
- The comparison values represent a dimensionless measure of relative efficiency, and can only be compared against the comparison values of other plans within the same group of concept plans. They represent the cost per unit yield of each plan divided by the sum of the cost per unit yields in that concept plan group, normalized to a base of 10. Using the plans focusing on EWA replacement as an example, the calculations are as follows:*

$$\text{Plan 4 } 1,590 / 140 = 11.4 \div 21.9 \times 10 = 5.2$$

$$\text{Plan 5 } 2,010 / 190 = \frac{10.6}{\Sigma 21.9} \div 21.9 \times 10 = \frac{4.8}{\Sigma 10.0}$$

The calculation is similar for the combination concept plans except the cost per unit yield is calculated for each purpose (water supply reliability and EWA) then multiplied before being summed and normalized to base 10. The lower the comparison value, the more efficient a plan is in meeting the stated objective(s) compared with other concept plans in that group.

One of the objectives of the LVE is to consider whether supplies developed in an expanded Los Vaqueros Reservoir could be used as a less-costly replacement for EWA supplies acquired through short-term transfers and water market purchases. Detailed economic evaluations will be conducted in the next phase of the LVE to estimate the potential cost of supplies on the water transfer market over the 100-year project life. These costs will be compared with the cost of EWA supplies developed by detailed alternative plans in order to fully quantify the potential benefits of a project.

- **Combination Plans** – Relative comparison values were also developed for the combination plans 6, 7, and 8. This was accomplished by first estimating the portions of the present value costs that could reasonably be creditable to the water supply reliability and EWA replacement objectives, respectively. This relative crediting was based on the ratio of system demands currently in the CALSIM II model for the two purposes. For a Dyer Canal intertie, the ratio was about 25 percent for water supply reliability and 75 percent for EWA. For the Bethany Reservoir intertie, the ratio was approximately 20 and 80 percent, respectively. Future studies using traditional cost allocation procedures will be needed to more accurately estimate these costs. The relative comparison value was then developed by taking the product of the cost per unit yield for each objective and dividing by the sum of the products normalized to the base 10. The comparison values for the combination plans indicate that the relative efficiencies of plans with an intertie to the Dyer Canal or an intertie to Bethany Reservoir would be similar.

The comparison values also indicate that the economic efficiency of a similarly sized reservoir enlargement plan that includes reoperation for water quality improvements (Concept Plan 8) would decline. However, chlorides in Concept Plan 8 decreased by up to about 44 mg/L over similarly sized plans without reoperation for water quality benefits. Future studies would be needed to determine if the cost savings associated with this improvement in water quality to SBA users would at least equal the value of the resulting reduction in water supply and EWA replacement yield.

Acceptability Criterion

Acceptability is the workability and viability of a plan with respect to acceptance by State and local entities and the public, and compatibility with existing laws, regulations, and public policies. Acceptability may be evaluated according to a plan's ability to be implemented within existing laws and policies; consistency with project planning principles; or the potential for broad-spectrum acceptance or support. Factors influencing local acceptance might include the financial burden of project implementation or the extent to which recreation opportunities are enhanced.

Another factor relating to acceptability by the local sponsor may include the extent to which Contra Costa Water District (CCWD) would retain control of the watershed and operation of the Los Vaqueros Project, as described in CCWD's Principles of Participation in **Chapter II**. Local acceptability may also depend on facility designs or operating constraints put in place to satisfy CCWD's principles, in particular that the project would provide for long-term environmental benefits in the Delta by supplying water for the EWA. Water could be supplied for the EWA through either reductions in Delta pumping to benefit fish, or replacing south of Delta EWA purchases. In addition, such a project could not be operated in conjunction with a peripheral canal or to increase the export of water from Northern California. Permit terms and conditions, as well as contractual arrangements, could be used to ensure that the CCWD principles are satisfied.

Chapter XI discusses several potential ownership and operation scenarios for an expanded Los Vaqueros Reservoir, but little is known at this time about the specific institutional arrangements that would apply to each of the concept plans. Similarly, it is difficult at this early stage in the feasibility study to gauge the ultimate likelihood for Federal agency acceptance, non-Federal sponsorship, and broad-spectrum support. Consequently, the likelihood for Federal interest, consistency with the CALFED Bay-Delta Program (CALFED) Record of Decision (ROD), and consistency with study planning principles are the primary factors used to assess potential acceptability of the concept plans.

Note that less weight is given to the acceptability criterion at this stage of the study primarily because the project has yet to receive public and agency review and details regarding project operation and institutional arrangements have not been identified. This criterion will become a much more dominating factor as the feasibility study progresses, especially with input from other agencies. For discussion purposes, however, the concept plans that ranked highest for this criterion include Concept Plans 2, 6, and 8. These plans appear to be most consistent with the goals of CALFED and have the highest potential for Federal interest and/or local support. Concept Plan 3 ranked lowest for this criterion, primarily because it has a high first cost for implementation, a lower potential for Federal interest, and may be opposed by environmental stakeholders because of issues associated with brine disposal.

INITIAL ALTERNATIVES

After comparing each concept plan to the planning criteria described above, as summarized in **Table VIII-1**, seven plans appear to warrant further investigation. Accordingly, these plans and the No-Action plan are identified for further development into detailed initial alternatives in the next phase of the LVE. Although Concept Plan 3 is not identified for further development as a stand-alone alternative, it is believed that desalination similar to other source water diversions and treatment facilities should be considered as potential future increments to any alternative. Combinations of various feature sizes likely will change in future studies, some alternatives may be dropped from further development, and other measures or combinations of measures may emerge that warrant further study. Based on results summarized in this report, the following plans are identified as initial alternatives:

- **No-Action** – No further action would be taken by the Federal government to resolve the identified water resources problems and needs in the study area.
- **1 - Raise Los Vaqueros Dam In-Place for Bay Area Water Supply Reliability** – Raise the existing Los Vaqueros Dam in-place with increased Delta diversion and conveyance capacity and an intertie with the SBA at the Dyer Canal, primarily to improve Bay Area water supply reliability during dry periods.
- **2 - Enlarge Los Vaqueros Dam and Reservoir for Bay Area Water Supply Reliability** – Reconstruct and enlarge Los Vaqueros Reservoir with increased Delta diversion and conveyance capacity and an intertie with the SBA at the Dyer Canal, primarily to improve Bay Area water supply reliability during dry periods.

- **4 – Enlarge Los Vaqueros Reservoir with Dyer Canal Intertie for EWA** – Reconstruct and enlarge Los Vaqueros Reservoir with increased Delta diversion and conveyance capacity and an intertie with the SBA at the Dyer Canal, primarily to develop EWA replacement supplies.
- **5 - Enlarge Los Vaqueros Reservoir with Bethany Reservoir Intertie for EWA** – Reconstruct and enlarge Los Vaqueros Reservoir with increased Delta diversion and conveyance capacity and an intertie with Bethany Reservoir, primarily to develop EWA replacement supplies.
- **6 - Water Supply / EWA Combination with Dyer Canal Intertie** - Reconstruct and enlarge Los Vaqueros Reservoir with increased Delta diversion and conveyance capacity and an intertie with the SBA at the Dyer Canal to improve Bay Area water supply reliability and develop EWA replacement supplies.
- **7 - Water Supply / EWA Combination with Bethany Reservoir Intertie** - Reconstruct and enlarge Los Vaqueros Reservoir with increased Delta diversion and conveyance capacity and an intertie with Bethany Reservoir to improve Bay Area water supply reliability and develop EWA replacement supplies.
- **8 - Water Supply / EWA Combination with Water Quality Improvements** - Reconstruct and enlarge Los Vaqueros Reservoir with increased Delta diversion and conveyance capacity and an intertie with the SBA at the Dyer Canal to improve Bay Area water supply reliability, develop EWA replacement supplies, and improve the quality of delivered water supplies.

It should be reemphasized that the concept plans are not complete alternative plans. Rather, they represent fundamentally different ways of combining the retained measures to address specific objectives. Concept plans retained for further consideration may significantly change during further analysis or be dropped completely. Through future public input and scoping, other measures or combinations of the measures may be identified. Further, some of the measures not carried forward may be reassessed and included in future plans. Future plan formulation will focus on refining the concepts into detailed alternative plans for inclusion in the feasibility report and supporting National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) documentation. In addition to more detailed development of alternative plans, much future emphasis will be on refining the acceptability criteria in **Table VIII-1**. As described in **Chapter XI**, emphasis will be on establishing Federal interest in the alternatives and on how they could be implemented. These efforts could in turn result in significant modifications to the concept plans above.