
CHAPTER 2

SUMMARY OF ALTERNATIVES FORMULATION

This section summarizes the results of plan formulation efforts to date, including the identification of planning objectives, criteria, and constraints; project baselines; and the LVE plan formulation approach.

PLANNING OBJECTIVES

LVE study objectives were developed based on identified problems and opportunities in the study area and specific direction in the study authorization, and are consistent with the Federal *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G)(WRC, 1983) and other Reclamation guidance.

The three objectives identified for the LVE focus on using an expanded Los Vaqueros Project to accomplish the following:

- *Increase drought period water supply reliability for municipal and industrial water providers within the study area.*
- *Develop a less costly replacement water supply for the long-term Environmental Water Account.*
- *To the extent possible through pursuit of the water supply reliability and Environmental Water Account replacement supply objectives, improve the quality of water deliveries to municipal and industrial customers in the study area.*

The planning objectives help clarify the identified problems and opportunities and narrow the focus of study efforts. Although the objectives focus on enlarging Los Vaqueros Reservoir, this has not limited which measures or alternatives should be considered to address each of the objectives.

The first study objective speaks to the need to improve Bay Area water supply reliability during drought periods, when water supplies for urban uses are needed most. During recent droughts, Bay Area water agencies have experienced substantial cutbacks in water supplies despite aggressive conservation programs, storage in local reservoirs and groundwater basins, and water transfers. Shortages in dry and critically dry years are expected to increase in the future, while competition for the State's finite water supplies will intensify and affect the ability of Bay Area water providers to acquire water on the open market to supplement their local and contract supplies. An increasing need remains to improve dry-year water supply reliability for Bay Area providers and the State as a whole, particularly into the future beyond 2020.

The second planning objective directs the study to determine whether an expansion of Los Vaqueros Reservoir could provide a less costly water supply for the EWA. Such a supply would replace all or a portion of the water the EWA currently acquires through transfer market water purchases.

Although not a specific LVE objective, an expanded Los Vaqueros Reservoir also could provide dedicated storage and conveyance capacity for EWA water supplies. The EWA currently relies on surplus storage space in reservoirs such as San Luis Reservoir, and available pumping capacity at Banks and Tracy pumping plants to move EWA water south of the Delta. An expansion project also could provide the opportunity for the EWA to divert Delta supplies via more efficient screened intakes, further reducing impacts to Delta fisheries.

The last objective highlights the opportunity to improve delivered water quality while addressing the objectives of water supply reliability and EWA replacement supply. This objective does not direct the study to identify ways to improve delivered water quality independent of the first two objectives; rather, alternatives formulated to address the first two study objectives could be refined, modified, and/or enhanced, as appropriate, to improve the quality of delivered water supplies from the project.

CRITERIA AND CONSTRAINTS

Fundamental to the plan formulation process is identifying and developing basic constraints specific to this investigation. Major constraints in formulating and ultimately implementing a plan to address LVE study objectives include study authorization and applicable laws, regulations, and policies. Other considerations in the planning process include the CALFED Record of Decision (ROD) (CALFED, 2000b) and the CCWD Board of Director's Principles of Participation. Criteria and constraints related to Federal study guidance and CCWD's Principles of Participation are described below.

Federal Study Guidance

The Omnibus Appropriations Act of 2003 authorized the Secretary of the Interior when carrying out CALFED-related activities to undertake feasibility studies for enlarging Los Vaqueros Reservoir. Congress restated authorization for the Secretary to conduct planning and feasibility studies for enlarging Los Vaqueros Reservoir in the October 2004 Water Supply, Reliability, and Environmental Improvement Act (PL 108-361).

The CALFED ROD includes program goals, objectives, and projects primarily to benefit the San Francisco Bay/Sacramento – San Joaquin River Delta system. The multiagency adoption of the ROD recognized that each agency would exercise its respective authority over only those portions of the ROD relevant to its existing Federal or State authority. While signatories may individually support programs and planning consistent with their specific authorities, it is believed that all projects, especially those directly affecting the Delta, should be in harmony with the ROD and the Preferred Program Alternative it supports.

CCWD Principles of Participation in LVE

The CCWD Board of Directors' Principles of Participation and voter approval represent an agreement between one of the potential non-Federal sponsors and its constituents. The CCWD Board of Directors on April 19, 2000, adopted seven principles to inform and guide identification of a locally supportable project involving the expansion of Los Vaqueros Reservoir:

“Contra Costa Water District will not support a proposal involving the existing Los Vaqueros Project or use of the Los Vaqueros or Kellogg reservoir sites without the following assurances:

- The project improves water quality and reliability for CCWD
- The project enhances the Delta environment
- The project protects and enhances the fisheries and terrestrial species benefits provided by the existing Los Vaqueros Project
- The project preserves and increases the recreation opportunities of the Los Vaqueros Project
- CCWD must retain control of the watershed and operation of the reservoir
- The project protects and reimburses the financial investment made by the CCWD customers, who financed the existing \$450 million Los Vaqueros Project
- The proposal would be placed before the voters of the Contra Costa Water District”

On June 25, 2003, the Board adopted Resolution No. 03-24, in which the Board found that “the District will not participate in or support the CALFED Bay-Delta Program proposal for expansion of Los Vaqueros Reservoir unless the Board determines that the CALFED Bay-Delta Program proposal meets the following conditions:

1. Improves drinking water quality for CCWD customers beyond that available from the existing Los Vaqueros Project;
2. Improves the reliability of water supplies for CCWD customers during droughts;
3. Enhances Delta habitat and protects endangered Delta fisheries and aquatic resources by installing state-of-the-art fish screens on all new intakes and creating an environmental asset through improved location and timing of Delta diversions and storage of water for environmental purposes;
4. Increases the protected land and managed habitat for terrestrial species in the Los Vaqueros Watershed and the surrounding region;
5. Improves and increases fishing, boating, hiking, and educational opportunities in the Los Vaqueros Watershed, consistent with the protection of water quality and the preservation of the watershed and the watershed’s unique features;
6. CCWD continues as owner and manager of the Los Vaqueros Watershed;
7. CCWD maintains control over recreation in the Los Vaqueros Watershed;
8. CCWD continues as operator of the Los Vaqueros Reservoir system;
9. CCWD will be reimbursed for the value of the existing Los Vaqueros Project assets shared, replaced, rendered unusable or lost with the expansion project and said reimbursement will

be used to purchase additional drought supply and water quality benefits or reduce debt on the existing Los Vaqueros Project;

10. Water rates for CCWD customers will not increase as a result of the expansion project.”

In accordance with the CCWD Principles of Participation, continued participation in the LVE was brought before CCWD voters in Measure N and approved on March 2, 2004. Hence, the language of the ballot measure, provided below, has also been observed for study purposes.

Shall Contra Costa Water District work with public water agencies to expand Los Vaqueros Reservoir, at no cost to District ratepayers, to: (1) increase water supplies for drought protection; (2) improve drinking water quality; and (3) protect endangered fish in the Delta, on condition that: (a) CCWD water rates will not increase; (b) no water will be exported to Southern California or a peripheral canal; and (c) CCWD will still operate the expanded reservoir?

The CCWD Principles of Participation provide insight into the conditions under which CCWD would be willing to participate in an expansion project. Elements of the principles of particular importance to plan formulation include facility ownership and operations, and no export of water developed by the project to Southern California.

PROJECT BASELINES

Representative existing and future project baselines are under development for the LVE consistent with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). Predicting future changes to the physical, biological, social, and economic environments in the study area is complicated by ongoing programs and projects, including those related to CALFED, the CVP, and SWP. Although they may not yet meet the conditions generally required for projects to be included in the NEPA No Action Alternative and/or CEQA No Project Alternative (authorized, funded, and permitted, or under construction at this time), some of these projects are likely to be implemented over the 100-year LVE planning horizon.

Major assumptions and potential projects that could affect conditions in the primary study area, and planning efforts for the LVE, include the following:

- **Long-Term EWA Environmental Impact Statement / Environmental Impact Report** - An important without-project condition is that the EWA, or a similar water acquisition program, will continue into the long-term future. The EWA program received authorization through 2010 under the Water Supply, Reliability, and Environmental Improvement Act (2004), and the corresponding Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) (currently under preparation) is evaluating a planning horizon through 2030. However, it is likely that CVP and SWP pumping at Banks and Tracy will increase in the future to meet south-of-Delta demands, resulting in greater impacts to Delta fisheries and water quality and the potential for more frequent pumping curtailments. Consequently, the EWA, or a similar program, will likely continue in the long-term future to promote fish recovery without interrupting deliveries to south-of-Delta and Bay Area water users.

However, it is unclear at this time whether a long-term EWA would operate comparably to the current, short-term program. Currently, the EWA relies primarily on short-term water transfers to provide water for EWA actions, but the long-term EIS/EIR is considering other measures to make up water supplies interrupted by pumping curtailments. These may include additional water use efficiency (agricultural and/or urban) and conservation measures, desalination, or surface storage. The long-term EWA EIS/EIR is scheduled for completion in fall of 2007.

- **CVP/SWP Operations Criteria and Plan** – Numerous actions contained in the 2004 revision to the 1992 Operations Criteria and Plan (OCAP) may be implemented to address how the CVP and SWP will operate in the future as new projects come online and as water demands increase. These new actions were included in OCAP for the purpose of pre-consultation, and have not undergone environmental review and approval. This includes increasing south Delta pumping at Banks to 8,500 cubic feet per second (cfs) as part of the South Delta Improvements Program (SDIP).
- **South Delta Improvements Program** – Reclamation and DWR are responsible for implementing the SDIP. The proposed project under the SDIP has a physical/structural component and an operational component. The physical/structural component incorporates dredging and the installation of permanent, operable gates at four locations in the south Delta. The operational component addresses increasing the allowable SWP Delta export limit to 8,500 cfs during certain periods. The Final EIS/EIR, and the associated ROD and Notice of Determination, will decide upon the physical/structural component only. A subsequent public process is planned to address the operation component. An order recently passed by the State Water Resources Control Board (SWRCB) requires Reclamation and DWR to remove a threat of not complying with water quality standards in the south Delta by July 1, 2009. The physical/structural components of the SDIP are the means for meeting this order, and to meet the deadline, the ROD/Notice of Determination must be issued in August 2006. A strong likelihood exists that both the physical/structural and operational components will be implemented during the LVE planning horizon.
- **Freeport Regional Water Project** – The Freeport Regional Authority (comprising the Sacramento County Water Agency and East Bay Municipal Utility District (EBMUD)), in coordination with Reclamation, is developing a joint regional water supply project involving construction of a new Sacramento River intake near Freeport. A Final EIS was filed and an EIR was certified in April 2004. As part of this project, CCWD is implementing an intertie between the EBMUD Mokelumne Aqueduct and the CCWD Los Vaqueros Pipeline, which will enable up to 3,200 acre-feet of CCWD's water to be diverted from the new Freeport intake. The Mokelumne-Los Vaqueros Pipeline intertie (scheduled to begin operating by 2007) is being considered in engineering and planning studies for the LVE.
- **Alternative Intake Project** – CCWD and Reclamation are evaluating the benefits of a new intake in the central Delta to protect and improve water quality for CCWD's customers by accessing better source water quality. The proposed action could include a new intake and fish screen, pumping plant, and associated pipeline from the new intake to CCWD's Old River Pumping Plant. A Draft EIS/EIR for the project was released in May 2006. LVE engineering and planning studies are considering how an expansion project could operate in conjunction with the Alternative Intake Project (AIP).

CALFED Common Assumptions Process

Efforts are underway primarily by Reclamation and DWR to establish a series of Common Assumptions for use in developing each of the CALFED storage projects. These Common Assumptions would be used to develop without-project conditions, a critical element in the plan formulation process. The various Common Assumptions workgroups are meant to establish recognized baseline conditions, including (1) period of analysis, (2) evaluation levels (for existing and future conditions), (3) water supply demands, (4) water supply system facilities and operations, (5) regulatory standards, including minimum flow and temperature requirements, and (6) likely foreseeable actions. The primary analytical tool being used for establishing baseline assumptions for water supply budgeting is the joint Reclamation/DWR simulation model for the CVP/SWP system, or CALSIM-II. This mathematical model also is used for studying water supply impacts of various potential alternative system operations and project modifications. In addition, CALSIM-II is used in conjunction or coordination with other models and tools to perform analyses related to the storage programs, including the following:

- DWR's Delta Simulation Model (DSM2) is used in conjunction with CALSIM-II to evaluate water quality conditions in the Delta under existing and future conditions.
- Reclamation's Central Valley Production Model (CVPM) is an economic model that estimates market prices for California crops, accounting for crop production costs in different areas of the Sacramento and San Joaquin valleys and water supply availability.
- DWR's Least Cost Pricing Simulation Model (LCPSIM) estimates municipal and industrial water (M&I) supply costs.

These are some of the tools available to the LVE and other CALFED storage project investigations. The Common Assumptions Economic Workgroup (CAEWG) has proposed using CALSIM-II, CVPM, and LCPSIM to help identify the cost of future EWA water supplies. Work on this methodology is ongoing; initial results of the CAEWG are included in the economic analysis in this report, as appropriate.

PLAN FORMULATION

The planning process for the LVE, which is consistent with the Federal P&G, was separated into three major phases:

- **Initial Plans Phase** (documented in the September 2005 IAIR (CALFED 2005b)) – Identify without-project future conditions; define resulting resource problems and opportunities; define a specific set of planning objectives; identify the constraints and criteria in addressing the planning objectives; identify potential resource management measures to address planning objectives; and formulate, coordinate, and compare a set of concept plans. From these concept plans, identify a set of initial alternatives for further development in the next phase of the study.
- **Alternative Plans Phase** – From the initial alternatives, formulate specific alternative plans to address the planning objectives; evaluate, coordinate, and compare the plans; and identify a plan for tentative recommendation.

- **Recommended Plan Phase** – Complete the development of a tentatively recommended plan and prepare, coordinate, and process supporting decision documentation.

The IAIR documented the formulation of a set of initial alternatives to address the planning objectives identified for the LVE. The planning approach for this initial phase of the feasibility study was not to develop an exhaustive list of alternatives or to optimize outputs; rather, the purpose was to (1) explore the range of different strategies to address the planning objectives, constraints, and criteria and (2) identify plans that may warrant further development into more detailed, comprehensive alternatives.

This report provides an interim update of progress on the current phase of the LVE, the Alternative Plans Phase. This phase of the study focuses on formulating and evaluating more complete or comprehensive alternative plans, from which a plan will be tentatively selected for implementation.

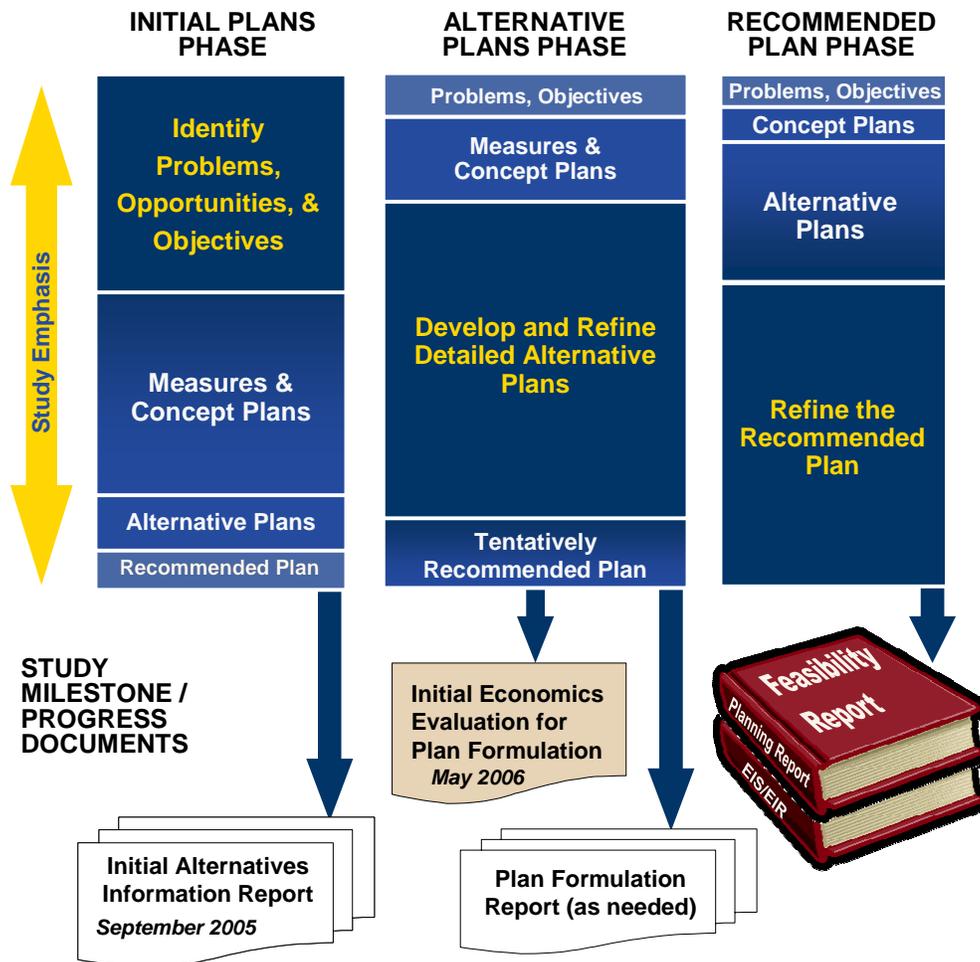


FIGURE 2.1 – LVE FEASIBILITY STUDY PHASES

In the final phase of the study, the Recommended Plan Phase, the tentatively recommended plan would be developed to a feasibility level in terms of engineering and designs, environmental impacts and mitigation, economics, and implementation. The recommended plan would be

displayed in the Draft Feasibility Report and accompanying environmental documentation (EIS/EIR), for public review and comment.

Concept Plans Considered

Over 30 measures were identified in the IAIR to address the planning objectives of the LVE; based on their ability to address the objectives consistent with the criteria and constraints, several measures were selected for further consideration and potential inclusion in concept plans. These included the following:

- Enlarging Los Vaqueros Reservoir by raising the existing dam 10 to 15 feet (in-place) to achieve about 25,000 acre-feet of additional storage
- Enlarging Los Vaqueros Reservoir by construction of a new dam to achieve up to 400,000 acre-feet of additional storage
- Increasing Delta water diversion capacity
- Constructing a new delivery pipeline from Los Vaqueros Reservoir to the South Bay Aqueduct (SBA), tying in to either Bethany Reservoir or the Dyer Canal segment of the SBA
- Desalination
- Reoperating an expanded Los Vaqueros Reservoir to improve delivered water quality

Eight concept plans were formulated from the retained management measures, representing an array of different strategies to address the planning objectives. The concept plans are not considered complete alternative plans for various reasons, but primarily because facility sizes have not been refined and specific impacts and mitigation measures have not been identified.

The concept plans were compared against four general criteria: completeness, effectiveness, efficiency, and acceptability. Because many potential combinations of facility sizes (reservoir and pump station capacity, for example) exist, the comparison primarily considers the combination of measures and facilities represented by each plan, with the assumption that appropriate facility sizes will be refined in future studies. Based on this comparison, and the ability of plans to address LVE study objectives, the No Action plan and seven concept plans were identified in the IAIR for further consideration as initial alternatives in the LVE, and one plan that was not carried forward:

- **Concept Plan 1 - Raise Los Vaqueros Dam In-Place for Bay Area Water Supply Reliability** – This plan includes a small raise (15 to 20 feet) of the existing dam to create an additional 25 thousand acre-feet (TAF) of storage, which would be operated primarily to provide Bay Area supply reliability benefits.
- **Concept Plan 2 - Enlarge Los Vaqueros Dam and Reservoir for Bay Area Water Supply Reliability** – This plan includes reconstruction of Los Vaqueros dam to form a new reservoir with 300 TAF to 500 TAF total capacity, and construction of a new delivery intertie from the reservoir to the SBA Dyer Canal. It would be operated primarily for Bay Area water supply reliability, while providing some EWA replacement supplies.

- **Concept Plan 3 - Desalination with Storage for Bay Area Water Supply Reliability** – This plan focused on increasing water supply reliability through construction of a regional desalination facility in the Bay Area that would operate in conjunction with an expanded Los Vaqueros Reservoir. Desalinated supplies in excess of base demands would be stored in the reservoir for later delivery to Bay Area water users during dry periods. This concept plan was not carried forward as formulated, although desalination was retained as a potential measure for further consideration.
- **Concept Plan 4 - Enlarge Los Vaqueros with Dyer Canal Intertie for EWA** – This plan would be similar to Concept Plan 2, but the additional capacity would be operated primarily to provide an EWA replacement supply. Some Bay Area water supply reliability would also be provided.
- **Concept Plan 5 - Enlarge Los Vaqueros Reservoir with Bethany Reservoir Intertie for EWA** – This plan is similar to Concept Plan 4, except water supplies from the reservoir would be delivered to Bethany Reservoir (rather than directly to the SBA at the Dyer Canal), providing some additional operational flexibility.
- **Concept Plan 6 - Water Supply/EWA Combination with Dyer Canal Intertie** – This plan is similar to Concept Plans 2 and 4, but the reservoir would be operated to balance the EWA replacement supply and Bay Area supply reliability objectives.
- **Concept Plan 7 - Water Supply/EWA Combination with Bethany Reservoir Intertie** – This plan is similar to Concept Plan 6, except supplies from the reservoir would be delivered to Bethany Reservoir rather than to the SBA Dyer Canal.
- **Concept Plan 8 - Water Supply/EWA Combination with Water Quality Improvements** – This concept plan is similar to Concept Plans 6 and 7, but the reservoir would be operated to enhance the quality of water supplies delivered from the reservoir (at the expense of other project benefits).

Los Vaqueros develops EWA replacement supplies by delivering water to the SBA that would otherwise have been delivered via Banks Pumping Plant and the South Bay Pumping Plant; space made available at Banks is then used to pump EWA supplies to San Luis Reservoir, for later use by EWA when pumping is curtailed. In this manner, EWA supplies stored in San Luis Reservoir as a result of Los Vaqueros deliveries would replace EWA purchases south of the Delta.

The primary differences between the initial alternatives concern (1) the magnitude of reservoir expansion, (2) the location of the delivery intertie, and (3) the operational focus (emphasis on developing EWA replacement supplies or providing Bay Area supply reliability). The influence of these elements on plan formulation is described briefly below.

Preliminary engineering studies determined that the existing dam could not be raised more than about 10 to 15 feet without fully dewatering the reservoir and reconstructing the dam and spillway facilities, likely just upstream from the existing dam. A small, 10- to 15-foot raise would provide an additional 20 to 25 TAF storage, whereas a new, larger dam would be capable of increasing storage by up to 400 TAF (to a total of 500 TAF). The IAIR considered alternatives with both the small (20 to 25 TAF) and large (up to 400 TAF) reservoir expansion scenarios. However, recent engineering studies indicate that a moderate raise, capable of accommodating up to about 275 TAF (total

storage), could be accomplished by reconstructing portions of the existing dam core and cross section in-place. This moderate expansion scenario would still require dewatering during construction, but portions of the existing dam and inlet/outlet facilities could be reused, resulting in a cost savings over larger expansion scenarios. Engineering and design analysis for the moderate expansion scenario is ongoing.

In each of the initial alternatives, a new pipeline is required to deliver supplies from the expanded reservoir to potential project beneficiaries. Two options for the delivery intertie have been identified: a pump station and pipeline to deliver supplies from the reservoir to the SBA at the Dyer Canal, or a gravity pipeline that would deliver supplies to Bethany Reservoir. Engineering analyses are underway to determine which intertie option would be more cost effective from a design standpoint. The Bethany intertie also may provide additional flexibility in operation of the reservoir.

Alternatives Currently Under Development

The current phase of the LVE is focused on developing detailed alternatives for comparison and evaluation in the Draft Feasibility Report and EIS/EIR. The initial alternatives described previously are the starting point for developing these detailed plans, with input from ongoing technical studies, and agency and stakeholder coordination. Technical studies are focused on refining operations, facility sizes, and facility locations.

Two additional alternatives have been identified since completion of the IAIR, as summarized below:

- **Moderate In-Place Dam Raise** – Previous plan formulation efforts considered major reservoir expansion (up to 500 TAF total capacity), which would require demolition of the existing dam and construction of a new dam a short distance upstream (also requiring dewatering of the existing reservoir). However, recent engineering studies and analyses indicate it may be possible to use the existing dam core and structure to achieve a moderate reservoir expansion of up to about 275 TAF (total capacity). This alternative has the potential for cost savings because portions of the existing dam structure, inlet/outlet, and associated facilities could be preserved. Dewatering of the reservoir would be required. It should be noted that enlarging the reservoir to capacities greater than 275 TAF is still believed to require construction of a new dam at a different location.
- **Desalination Without Storage** – This alternative would involve constructing a new brackish water desalination plant near Mallard Slough. To meet its water quality goals, CCWD would use high quality water from the desalination plant in lieu of receiving water supplies from Los Vaqueros. Desalinated supplies would be blended with other CCWD supplies in a manner similar to existing conditions. Storage space in Los Vaqueros Reservoir that would have been exercised to meet CCWD water quality objectives would instead be used to contribute to the EWA replacement supply and Bay Area water supply reliability objectives of the LVE. The reservoir and other existing Los Vaqueros Project facilities would not be enlarged or modified, but a new intertie pipeline would be constructed to deliver supplies to other project beneficiaries.

These potential alternatives will be developed and evaluated further over the course of the feasibility investigation.

Alternative Evaluated in This Report

For the purpose of this initial economic evaluation, a single alternative was selected for economic analysis. To select this alternative, operational model simulations were performed for two potential reservoir sizes: 275 TAF and 400 TAF (total capacity). These reservoir sizes were selected because they appeared to be most cost effective in previous operational analyses. Preliminary operational modeling was performed to determine the most efficient Delta intake and conveyance facility sizes associated with the two reservoir sizes. In these model simulations, the expanded reservoir was operated exclusively to provide EWA replacement supplies via the SBA; no deliveries were made from the expanded reservoir to increase SBA or CCWD water supply reliability, and no additional storage space was dedicated to supply reliability. In addition, no physical changes were made to project configuration or facility sizes to improve water quality (at the cost of other benefits). Simulated operations/configurations also are consistent with CCWD's Principles of Participation.

These simplifying assumptions were made for several reasons. First, although SBA water agencies have expressed interest in the LVE, none have committed to participating in an expansion project; should one or more agencies agree to participate, the degree to which these agencies might be willing to participate financially also is uncertain. Second, of the currently formulated LVE objectives, the EWA replacement supply objective has a high potential for Federal interest because the current EWA has existing Federal authorization. It is believed that a project with an established Federal interest has the greatest chance for local financial participation and implementation.

Based on current modeling results and preliminary engineering analyses, a 275 TAF reservoir alternative was selected for further analysis in this report because it appears to be more cost effective than a 400 TAF reservoir, under the above noted formulation conditions. This alternative includes the following major facilities:

- Reconstruct the existing Los Vaqueros Dam in-place to create a reservoir with a total capacity of 275 TAF
- Expand the existing Old River intake and pumping plant by 170 cfs to a total capacity of 420 cfs (note that the existing facility has a current capacity of 250 cfs and a planned buildout capacity of 320 cfs, total)
- Construct a new 350 cfs pipeline from the expanded Old River intake to the existing Transfer Facility (paralleling the existing 320 cfs pipeline to provide total conveyance of 670 cfs from the Delta to the Transfer Facility)
- Replace the existing Transfer Facility balancing reservoir with a larger, 8-million-gallon (MG) reservoir
- Construct a new 470 cfs pump station at the Transfer Facility and replace pumps in the existing 200 cfs transfer pump station, for a total transfer capacity of 670 cfs to the expanded reservoir
- Construct a new 670 cfs pipeline from the Transfer Facility to Los Vaqueros Reservoir

- Construct a new 175 cfs pump station and new pipeline to convey water from Los Vaqueros Reservoir to the SBA at the Dyer Canal

The pipeline that would deliver LVE supplies to the SBA was sized to maximize its use; in other words, to deliver a relatively constant supply to the SBA. This delivery capacity was initially targeted by comparing EWA south-of-Delta purchase targets by year type with SWP Table A deliveries to SBA users, shown in **Figure 2.2**. An initial replacement supply target of just under 125 TAF per year was selected because it could be delivered to the SBA to replace the EWA’s purchased south-of-Delta supplies in all but the driest years. Adjusted for deliveries SBA agencies typically make to San Joaquin Valley groundwater banks, this volume amounts to about 105 TAF per year, and corresponds to a delivery pipeline with a capacity of about 150 cfs.

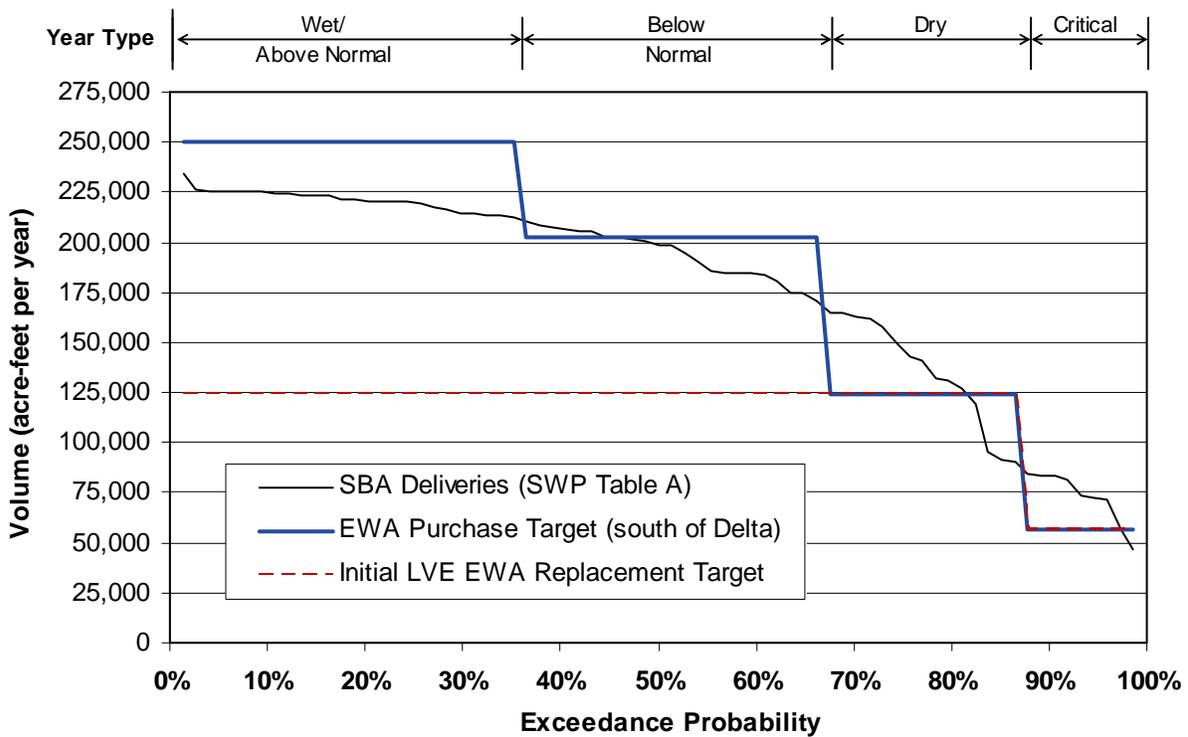
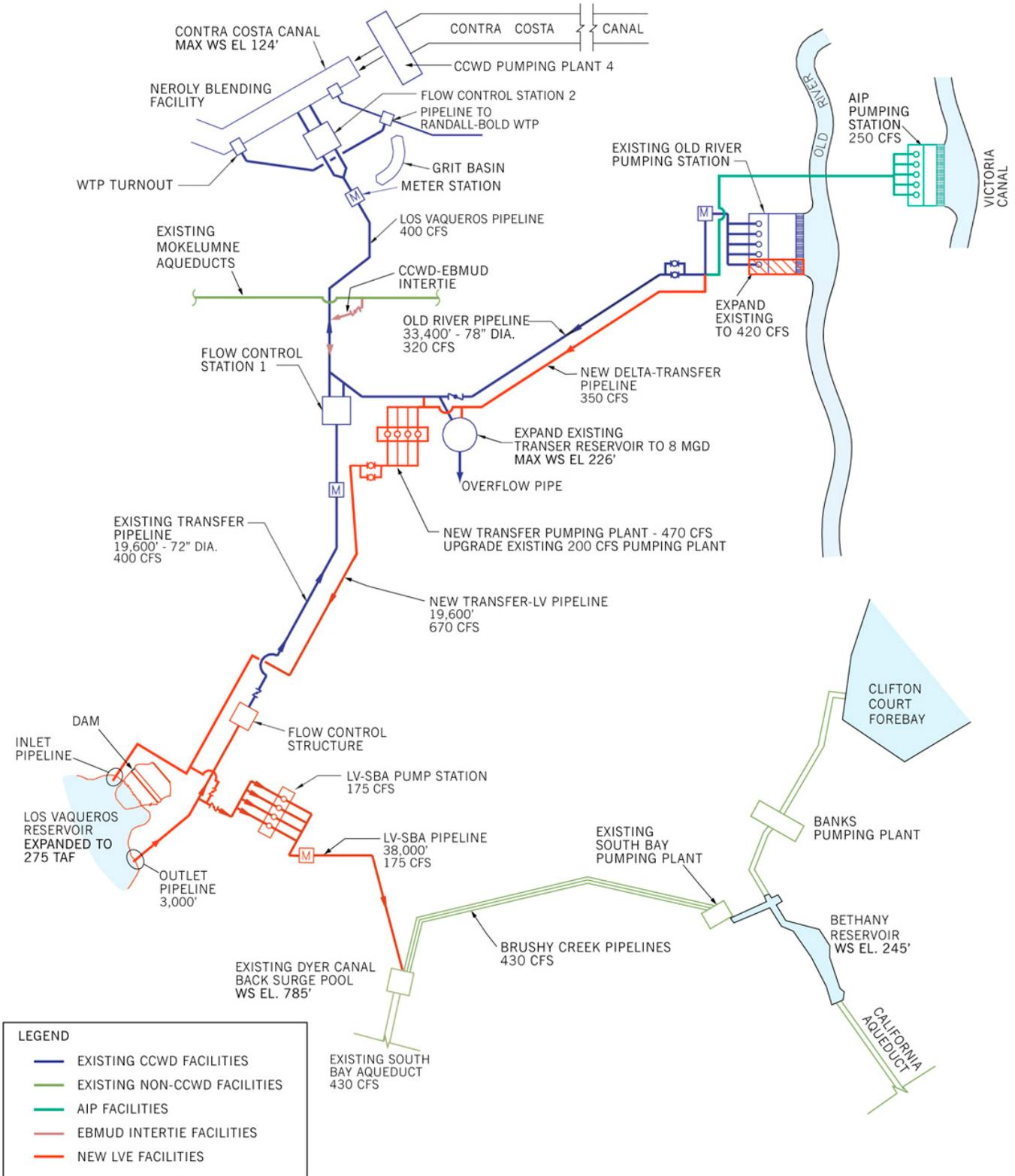


FIGURE 2.2 – DEVELOPMENT OF EWA REPLACEMENT SUPPLY DELIVERY TARGET FOR ALTERNATIVE EVALUATED IN THIS REPORT

An iterative modeling approach was then used to determine Delta intake capacity and size conveyance and other facilities, and to refine the size of the delivery pipeline to maximize use of available reservoir storage. The resulting facility sizes are summarized in **Table 2.1**, and facility configuration is illustrated in **Figure 2.3**

**TABLE 2.1
SUMMARY OF FACILITIES INCLUDED IN THE
ALTERNATIVE EVALUATED IN THIS REPORT**

Facility Description	Capacity or Size
Dam and Appurtenances	
Expand Los Vaqueros Reservoir (reconstruct dam in-place)	275 TAF (total)
Dam Outlet Pipeline	132 in diam; 3,000 LF
Balancing Reservoir	4,000,000 gallons
Delta Intake and Conveyance Facilities - Delta to Transfer Facility	
AIP (assumed to be in-place on Victoria Canal)	250 cfs
Expanded Old River Intake	<u>420 cfs</u>
Total Intake Capacity	670 cfs
Existing Delta Pipeline (Intake to Transfer Facility) - 320 cfs	78 in diam; 34,700 LF
New Delta Pipeline (Intake to Transfer Facility) - 350 cfs	96 in diam; 34,700 LF
Transfer Pumping and Conveyance - Transfer Facility to Reservoir	
Existing Transfer Pump Station (replace pumps)	200 cfs
New Transfer Pump Station	<u>470 cfs</u>
Total Transfer Capacity	670 cfs
Expanded Balancing Reservoir at Transfer Facility	8,000,000 gallons
New Transfer Pipeline (Transfer to Reservoir) - 670 cfs	132 in diam; 19,600 LF
Delivery Facilities - Reservoir to SBA (near Dyer Canal)	
New SBA Delivery Pipeline (Reservoir to SBA) - 175 cfs	66 in diam; 43,800 LF
New SBA Pump Station	175 cfs
KEY: AIP = Alternative Intake Project in = inch SBA = South Bay Aqueduct cfs = cubic feet per second LF = linear feet TAF = thousand acre-feet diam = diameter	



**FIGURE 2.3 – EXPANSION PROJECT CONFIGURATION
 SELECTED FOR ANALYSIS IN THIS REPORT**

The stand-alone CALSIM-II model, developed to simulate a Los Vaqueros Reservoir expansion, was used to estimate EWA replacement supply yield for the alternative. Future without-project conditions and other parameters related to the CALSIM-II modeling are summarized below:

- The stand-alone CALSIM-II model does not integrate the operation of Los Vaqueros Reservoir with that of the CVP and SWP systems. Future modeling analyses using the Common Assumptions Model Package will be required to verify project yield and identify any potential impacts to the water management system.
- Model simulations assume the AIP is constructed and operating with a capacity of 250 cfs.
- Because of the changing nature of what is believed to be necessary to protect fish and wildlife in the Delta, adaptive management was assumed to be a part of the operational requirements. No biological or export/import (E/I) restrictions were simulated in the monthly operations model with respect to deliveries to the reservoir from Old River; however, results were reviewed to verify that Delta pumping capacity and operations were flexible enough to accommodate a variety of biological protection measures.
- No assessment was made of potential water quality impacts in the Delta. Previous studies with larger intakes and reservoir sizes indicate that potential impacts can be managed to less than significant levels. Future modeling analyses will assess potential impacts of alternative plans on Delta hydrodynamics and water quality.
- Direct delivery of water from Old River to the SBA (bypassing the reservoir) was allowed during certain conditions of Delta surplus, reservoir storage, and Delta water quality.
- Deliveries from the reservoir to the SBA are generally limited by the lesser of (1) SBA demands by year type, (2) EWA demands by year type, and (3) Los Vaqueros-SBA delivery pipeline capacity.
- An in-reservoir water quality target of 50 milligrams per liter (mg/L) chlorides was used to preserve the current water quality function of the reservoir for CCWD.

Simulated yield by year type (EWA replacement supplies only) for the alternative evaluated in this report is summarized in **Table 2.2**.

Model simulations also were used to evaluate potential improvements in the quality of water delivered to the SBA. On average, deliveries from Los Vaqueros Reservoir to the SBA were about 33 mg/L lower in total dissolved solids (TDS) than deliveries that would otherwise have been made from Bethany Reservoir, with reductions as high as 150 mg/L during some periods. In general, water quality in the SBA (representing blended supplies from both Los Vaqueros and Bethany Reservoir) was about 16 mg/L lower in TDS than under the without-project conditions.

This alternative is being used only for the purpose of preliminary economic analysis in this report to determine if a potentially feasible alternative exists under current formulation parameters.

TABLE 2.2
SIMULATED EWA REPLACEMENT SUPPLY YIELD
FOR ALTERNATIVE EVALUATED IN THIS REPORT

Year Type¹	Yield² (acre-feet per year)
Wet	121,500
Above Normal	118,900
Below Normal	112,700
Dry	99,400
Critical	55,700
Average Annual	104,200

Notes:

1. Year types based on 40-30-30 Sacramento River index.
2. Values represent yield from expanded reservoir for EWA purposes only, for the modeling conditions documented above; excludes supplies used by CCWD to achieve or meet existing Los Vaqueros Project purposes of water quality and emergency storage. No new yield or storage space was dedicated to other purposes.