

4. THE RECOMMENDED PLAN

General

This Chapter presents information on the tentatively Recommended Plan. This includes descriptions of the major project features associated with construction of the project, real estate requirements, and operation and maintenance requirements. Information is also presented on project construction and maintenance costs, benefits of the project, and an economic analysis. This chapter also summarizes the environmental impacts determined in accordance with the required procedures to comply with the National Environmental Policy Act and California Environmental Quality Act, as well as other regulatory requirements.

Plan Description

The plan formulation process resulted in the selection of Alternative Plan 4b as the Recommended Plan. This plan will best contribute to the primary study ecological restoration objective to restore the Matilija Creek and Ventura River ecosystem, while maintaining downstream water supply operations and flood protection along the Ventura River. The Recommended Plan is expected to result in significant benefits to the ecosystem. From an adverse environmental impact analysis standpoint, temporary adverse impacts will occur during construction as well as during the period sediment from the reservoir area is transported downstream. The Recommended Plan includes measures to mitigate these adverse impacts related to increases in downstream flood damage potential and adverse impacts to water supply facilities. Details of the design of the Recommended Plan are presented in the Design, Hydrology and Hydraulics, and Geotechnical Appendices. The major components of the Recommended Plan are shown in Figure 4-1 and described below.

Site Preparation

Prior to any earthmoving activities, the perimeter of the reservoir area, and the delta and upstream sites will be stripped of most of the existing vegetation, particularly the large stands of giant reed (*Arundo donax*). Other native vegetation will also be removed because it has been overwhelmed by, and is intertwined in the giant reed. One stand of oak trees that is in the Upstream Channel area, but has not been subject to significant amounts of sediment deposition, will be protected in place. Current assumptions for giant reed removal at the dam site include a combination of mowing with a flail mower, removal of the cut biomass from the site, and application of high concentrations of glyphosate or similar herbicide. Other non-native invasive species, such as Tamarisk, will be removed from the area.

Removal of 'Reservoir Area' Sediments

The 'Reservoir Area' sediment, approximately 2.1 million cubic yards of mostly silt, underlying the existing lake behind Matilija Dam will be slurried to a designated downstream disposal site, allowing for removal of the dam.



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Prior to initiation of the slurry operation, a relocation plan will be implemented for sensitive species such as the California red-legged frog and the southwestern pond turtle. An eradication program for bullfrogs, crayfish and green sunfish will also be pursued, as recommended by the U.S. Fish and Wildlife Service, to prevent downstream relocation.

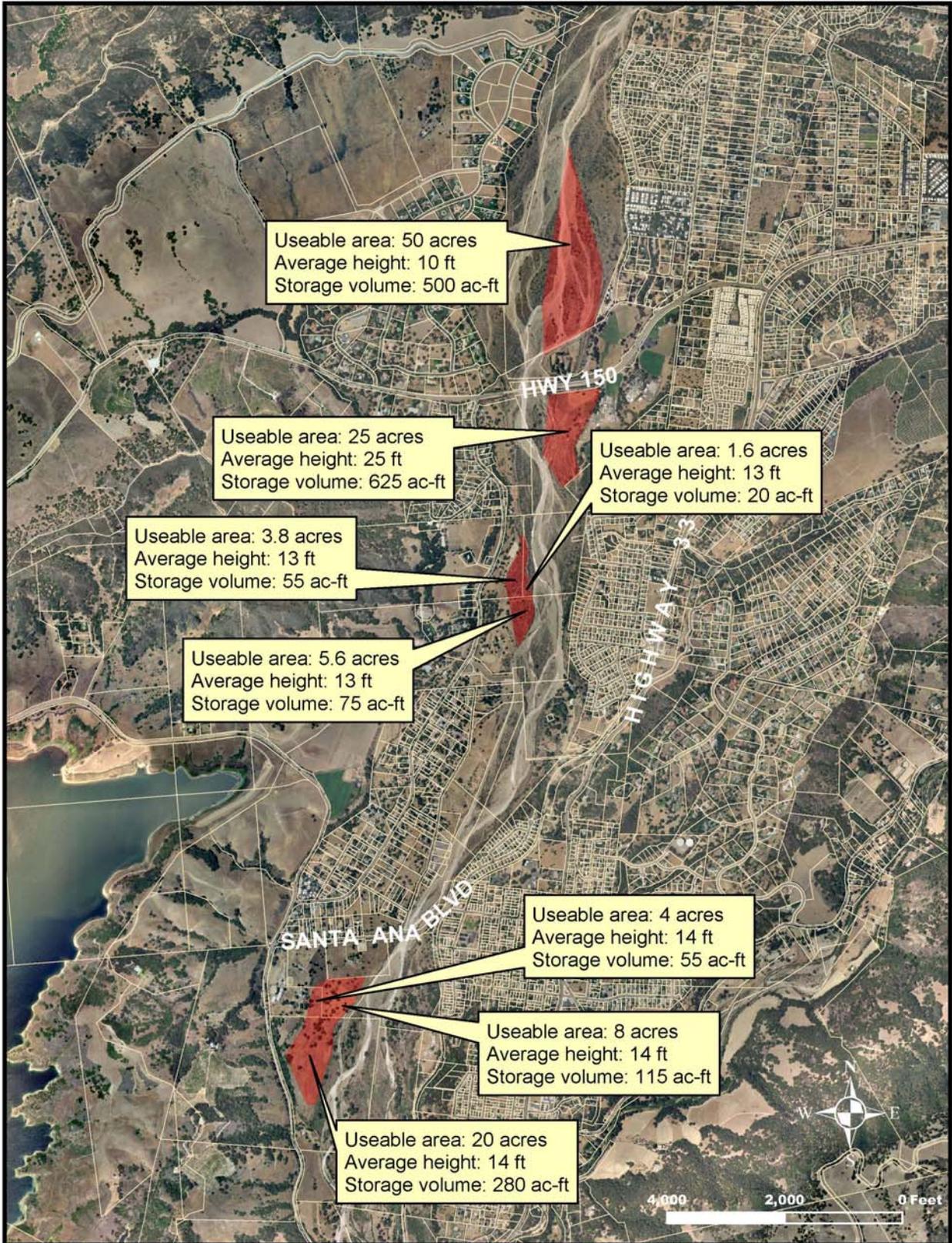
Two 12-inch cutter head suction dredges working 24 hours a day, 7 days a week will be utilized to slurry the 2.1 million cubic yards of fine sediment in approximately 9 months. Fresh water from Lake Casitas (4,500 acre-feet) will be used for the slurry media. The slurry will then pass through a stationary screen to eliminate any coarse material and enter a thickener. The thickener will be used to increase the solids concentration of the slurry and recycle water for the dredging operation. A make-up water pump will be required to pump water back to the dredges. The slurry will then be transported by pipeline to disposal areas located downstream.

A single 400-horsepower pump will be required at the dam to maintain slurry velocity in the pipeline. An 8-mile long fresh water pipeline and pumping system will be needed from Lake Casitas. The fresh water pipeline will be carbon steel and the slurry pipeline will be high-density polyethylene (HDPE). Additionally, a 90,000-gallon water storage tank will be placed at the left abutment to provide surge capacity. The thickener overflow can be fed directly into the storage tank if sufficient elevation difference between the thickener and storage tank is made available.

Slurried materials will be deposited within several areas in proximity of the Highway 150 (Baldwin Road) Bridge. The areas, comprising 118 acres in the floodplain, are both upstream and downstream of the bridge and are distant from 3.6 to 6.3 miles downstream of Matilija Dam. The locations of the slurry disposal areas are shown in Figure 4-2. The thickness of the required placement will vary by area and range between 10 and 25 feet. Earthen containment dikes will be constructed to contain the slurried materials. The dikes will be constructed of sands and gravels obtained from required on-site excavation and grading. Slopes on the basin side will be 2H:1V; slopes on the outside of the basin are assumed to be 3H:1V. The heights of the containment dikes will likely range between 10 and 30 feet, with an average of approximately 20 feet. Interior dikes will be constructed during slurry placement to enhance stability and separation of the fines from the water. Following dewatering of the slurried materials, the return effluent would be permitted to return to stream flow. Prior to placement, the area will be cleared of vegetation to enhance percolation. Additional features, such as collection systems, settlement ponds, observation and pumping wells, could be added to enhance collection of water.

For the upstream-most slurry disposal site located just north of the Highway 150 Bridge, slope protection will be required and will consist of riprap stone of approximately 2-foot diameter, imported from a local quarry located in the vicinity of the damsite. The stone will be placed on the outside dike slopes to an elevation that will provide a 5- to 10- year level of protection. The three other disposal areas, downstream of the bridge, are located mostly on low floodplain terraces and would be subjected to less frequent flows. Stone protection for these areas to a limited height may consist of boulders obtained from excavation activities for the construction of the dikes. Willows may also be planted on the side slopes to provide soil stabilization during larger storm events. Once the slurried materials are sufficiently dewatered, the disposal areas can be revegetated using native plants.

FIGURE 4-2: SLURRY DISPOSAL SITE



Management of ‘Delta’ and ‘Upstream Channel’ Area Sediments

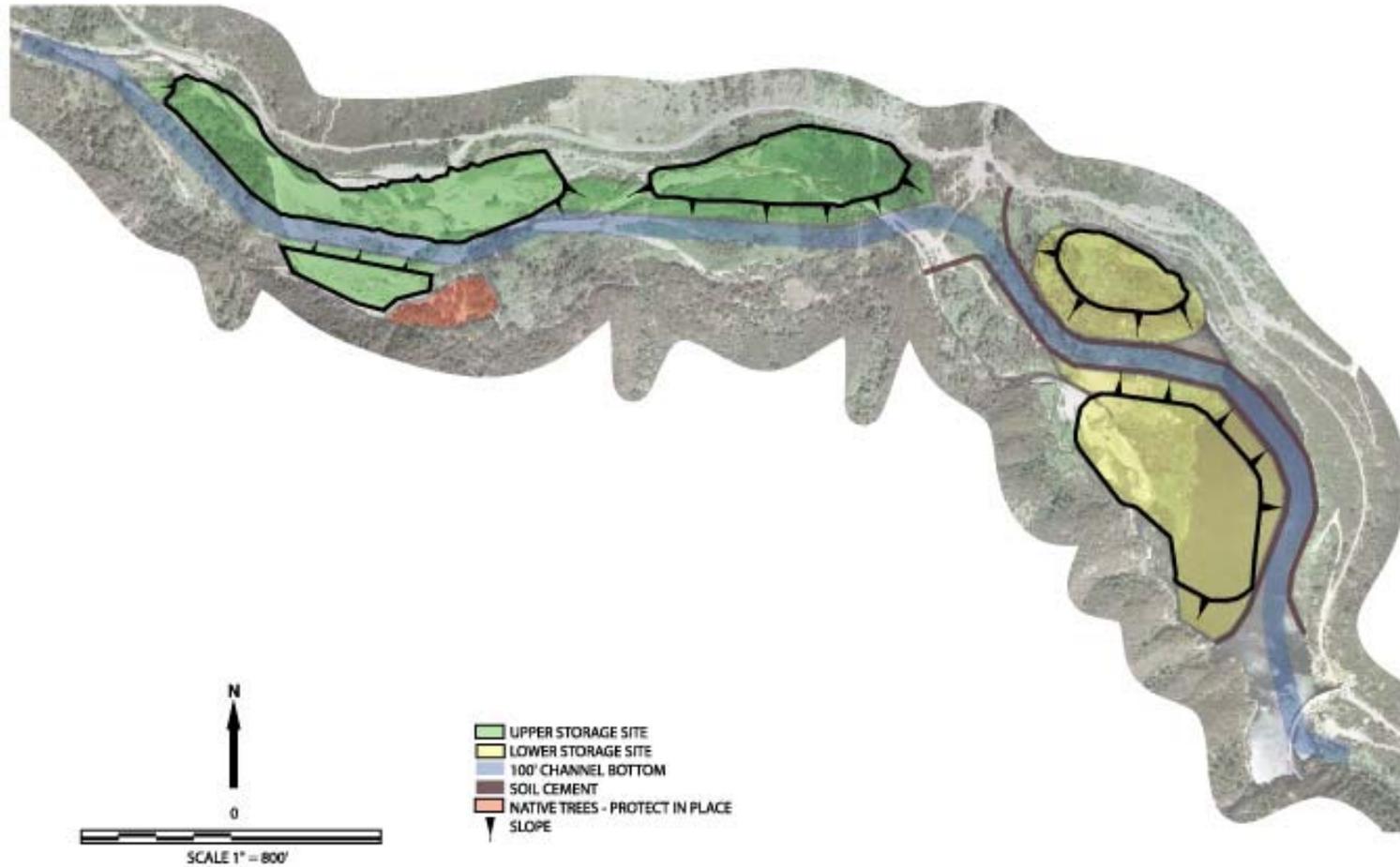
While the slurry operation is taking place, excavation operations will commence in the ‘Delta’ and ‘Upstream Channel’ areas to construct a channel with an alignment similar to the pre-dam channel. The 1.1 million cubic yards of sediment excavated will be temporarily placed in several storage sites within the reservoir basin, and also within the ‘Reservoir Area’ following slurring operations. Figure 4-3 presents the layout of the excavated channel alignment and the temporary storage sites.

The excavated channel will be 100 feet in width to allow for a smaller meandering channel to naturally develop in the channel bottom between storm events. The channel will have side slopes of 3H:1V. The invert (bottom) of the excavated channel will be to pre-dam elevation and similar gradient. Sediment excavated from the ‘Upstream Channel’ area, consisting predominately of coarse-grained materials, will be placed in storage sites located in the upper half of the reservoir basin. All sediment excavated from the ‘Delta Area’ will be placed in storage sites within the lower half of the reservoir basin. The ‘Delta Area’ materials contain the majority of the residual portions of the finer sediment trapped in the basin. Sediments within the original reservoir basin will be subject to natural erosion and transport downstream by stream flows. Selective segments of the channel within the lower half of the reservoir basin will be protected with soil cement revetment. The purpose of the revetment is to “meter” the erosion of the ‘Delta Area’ sediment whenever the revetment is overtopped by larger flows. The height of the revetment will extend 7 feet above the channel invert and 5 feet below the invert to prevent undermining of the structure. The revetment height will be overtopped by flows exceeding a 10-year storm event (12,500 ft³/sec). At the upstream end of the soil cement revetment, a tie-in to the adjacent canyon slope or road embankment will be required to prevent circumventing of the structure by breakout channel flows. The tie-in may consist of either soil cement or larger boulders (collected from on-site). Coarser-grained materials within the reservoir basin located upstream of the revetment will remain unprotected and subject to natural erosion by stream flow.

The soil cement revetment will be constructed utilizing aggregate available on site. Material behind the revetment will periodically need to be graded to avoid undermining of the revetment and improve erosion potential. All soil cement revetment would be removed from the site following sufficient evacuation of stored sediment from within the original reservoir limits. The removal will occur in stages, and will be dependent on criteria established in the monitoring and adaptive management plan taking into account levels of sediment evacuation and limiting adverse effects downstream. Complete removal is expected to occur within 20 years.

Locations for the sediment storage sites were selected to align the channel in a similar way to pre-dam conditions, to minimize impacts to more sensitive habitat areas, and to ensure the natural aesthetics of the area were not adversely affected by the temporary stockpile of sediments. The design slopes for the storage sites are 4H:1V. The top elevations of the storage sites will not impede views of the canyon from Matilija Road. No revegetation plans of the storage sites or channel are included in the Recommended Plan. It is assumed that the area will naturally revegetate after several years.

FIGURE 4-3: TEMPORARY SEDIMENT STORAGE SITES



CHANNEL AND SEDIMENT STORAGE SITES

Dam Demolition

The dam demolition process for Alternative 4b will be conducted in one phase, initiated during slurry operations. A small cofferdam would be constructed to direct flows away from the dam during demolition. The portion of the dam at the left abutment will be demolished early to improve access to Highway 33. Following dredging of the Reservoir area, the remainder of the structure above the original streambed (approximate elevation 975) will be removed. This will be done by controlled blasting, in approximately 15-foot vertical increments. Concrete rubble (77,000 cubic yards, assuming a bulking factor of 1.5) will be processed after blasting as required for transportation to a commercial concrete recycling plant, assumed to be Hanson Aggregates (approximately 28 miles from Matilija Dam). For estimating purposes, the concrete is assumed to be processed to a maximum diameter of two feet and all reinforcement, or other embedded metal will be cut flush with the concrete, by torch, as required by the aforementioned recycling plants. Metal debris will be hauled from the site and salvaged when possible. The processing of any concrete which remains too large after blasting will be assumed to be performed by a hoe-ram. It should be noted that the contractor may choose to process the material for sale on site. Non-recyclable debris will be sent to Toland Landfill.

Final Clean-up

It is estimated that this alternative will require approximately 36 months to complete the slurring operation of the 'Reservoir Area' sediment, removal of the dam, excavation of the channel, and construction of the soil cement revetment. While removal of the remaining trapped sediment will be variable and dependent upon the hydrology, it is assumed that within 20 years of initial earthmoving and deconstruction activities, the re-vegetation phase will be completed.

Mitigation for Flooding Impacts

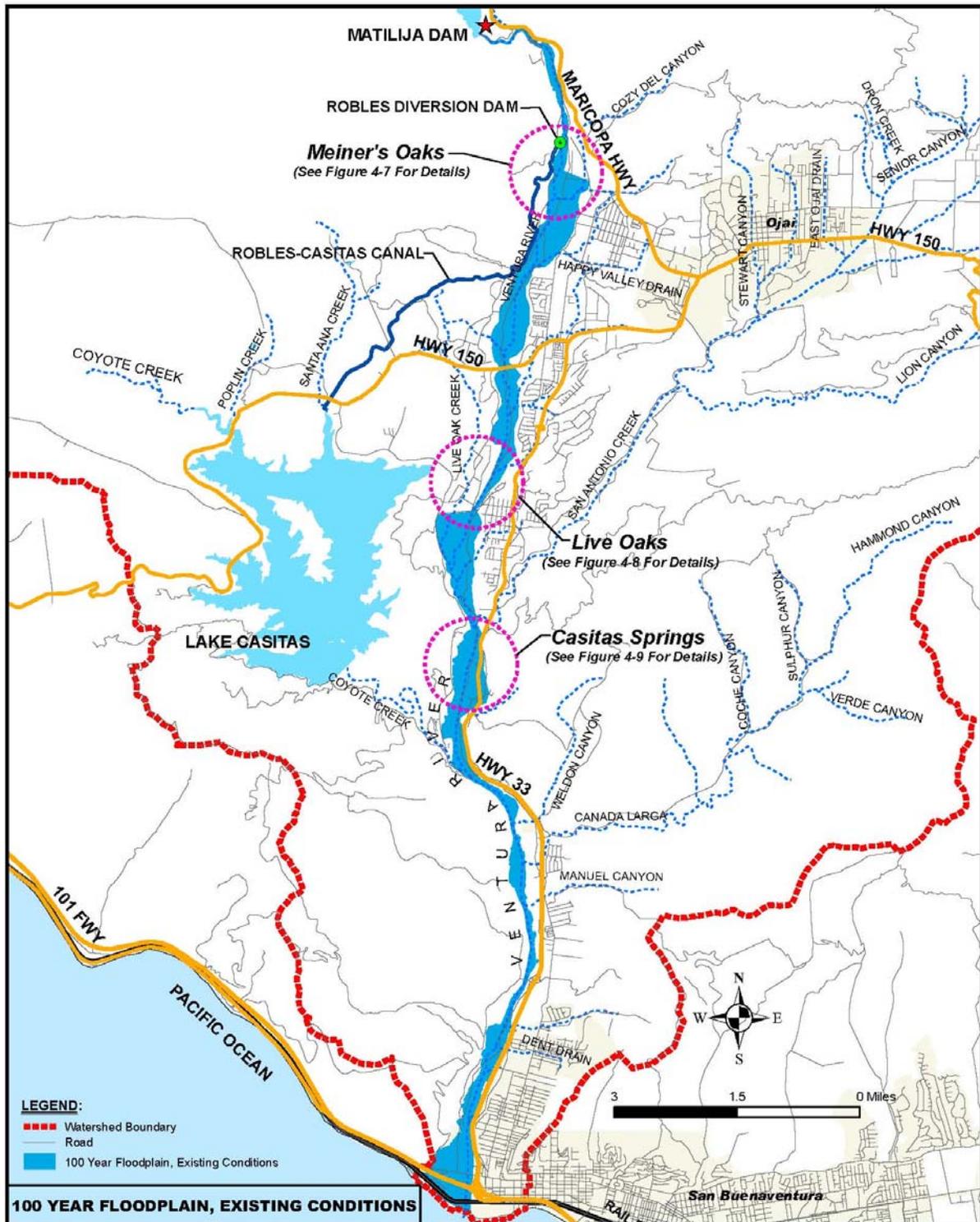
Justification for Mitigation of Downstream Damages

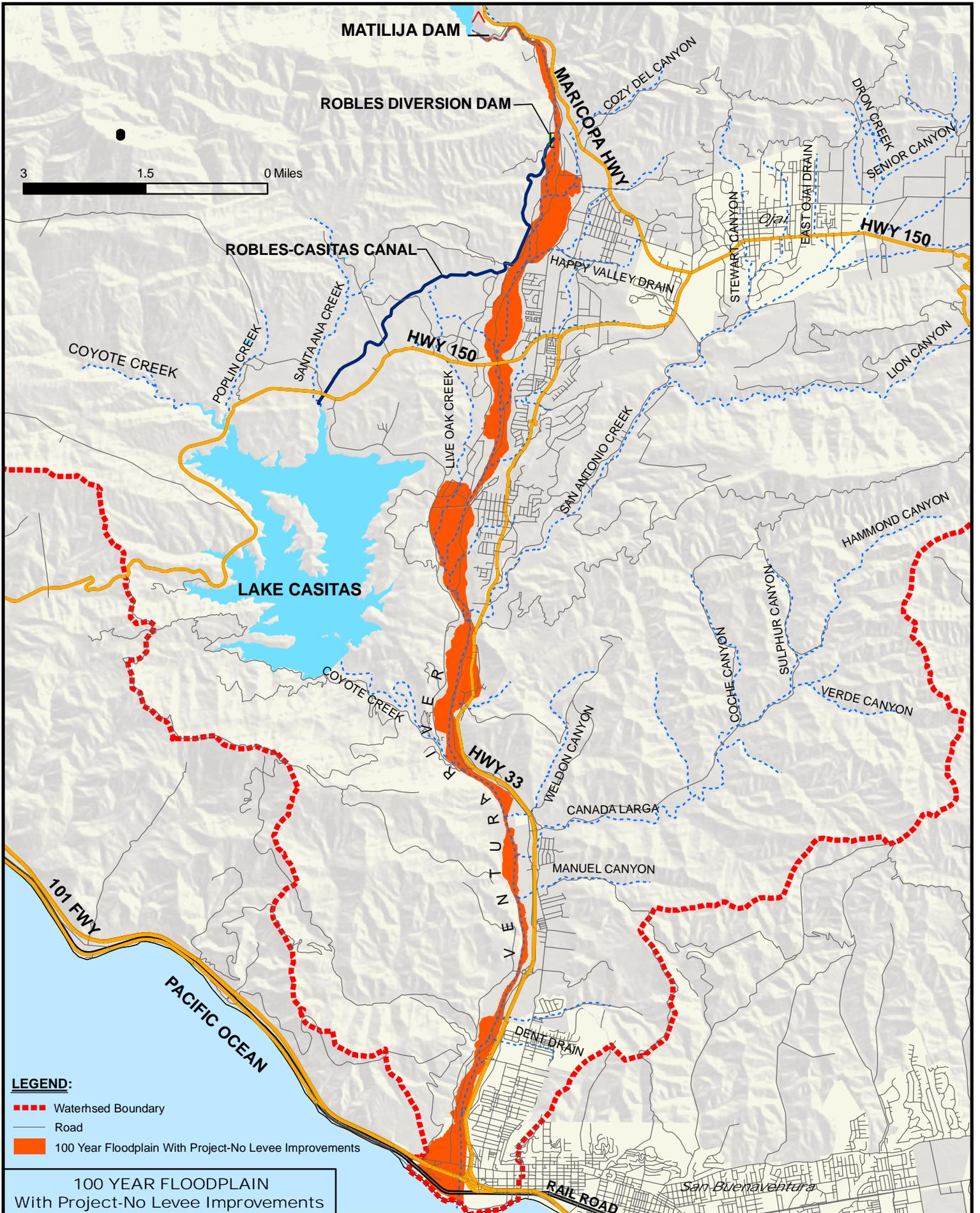
Flood mitigation measures to protect against structural damages include construction of levees/floodwalls (new, or raising/extending existing structures) and bridge modifications. Where protection is not possible, due to engineering, social, legal, or economical reasons, land must be acquired. Mitigation for occasional damages beyond without-project conditions to parcels not proposed to require levee modification measures, such as croplands, will also require compensation. Additional modeling will be performed in the next detailed design phase to allow for refined assessment with respect to the acquiring of land, and also for the need for flowage easements. Table 4-1 summarizes the mitigation measures resulting from analyses performed at this feasibility level.

Figures 4-4 and 4-5 show the 100-year floodplain for the without-project conditions and post-dam removal with no levee modifications. Figure 4-6 shows the floodplain for the Recommended Plan with levee improvements. Details of the differences in floodplains limits and mitigation improvements for Meiners Oaks, Live Oak, and Casitas Springs are presented on figures 4-7 through 4-9.

Table 4-1: Downstream Flood Mitigation Measures

Location	Mitigation	Justification
Matilija Hot Springs	Buy-out	Proximity of Hot Springs site to dam and channel, narrowness of canyon, and limited flood conveyance area, poses high risk from sediment-laden flows in event of a very large storm event and limits the effectiveness of any structural protection.
Camino Cielo Properties	Buy-out	Proximity of six residential tracts to dam and channel, and narrowness of canyon, poses high risk from sediment-laden flows in event of a very large storm event and limits the effectiveness of any structural protection.
Camino Cielo Bridge	Improve conveyance. Removal and replacement at new location. Restore channel width at original location.	Existing low flow crossing (concrete box culvert) exacerbates constricted channel. Removal of bridge and restoration to original channel width will improve conveyance and prevent backwater effects. New bridge with higher deck at a wider channel section is justified because bridge is sole ingress\egress for remaining Camino Cielo residential tracts not impacted by potential flooding.
Meiners Oaks	Construct new (east) levee/floodwall	Flood protection less costly than real estate acquisition. Number of structures already prone to flooding under existing conditions would increase. Under with-project conditions, water depth increase by 2 ft min. Confinement by levee at lower end necessitates continuation of protection upstream.
Live Oak	Raise existing (west) levee	Flood protection less costly than real estate acquisition. Constricted nature of channel and expected rise in water surface in high flow events upstream of Santa Ana bridge necessitates levee raising. Confinement by levee at lower end necessitates continuation of protection upstream.
Santa Ana Bridge	Improve conveyance by widening channel and extending bridge length.	Existing bridge is severe constriction, and not capable of passing a 100-yr discharge with additional sediment-laden flows. Due to constricted channel upstream of bridge, current sediment removal maintenance efforts will need to continue albeit channel widening for a limited distance (500 ft) upstream of bridge.
Casitas Springs	Raise existing (east) levee	Flood protection less costly than real estate acquisition. Number of structures already prone to flooding under existing conditions would increase. Under with-project conditions, water depth would increase by 2 ft min.





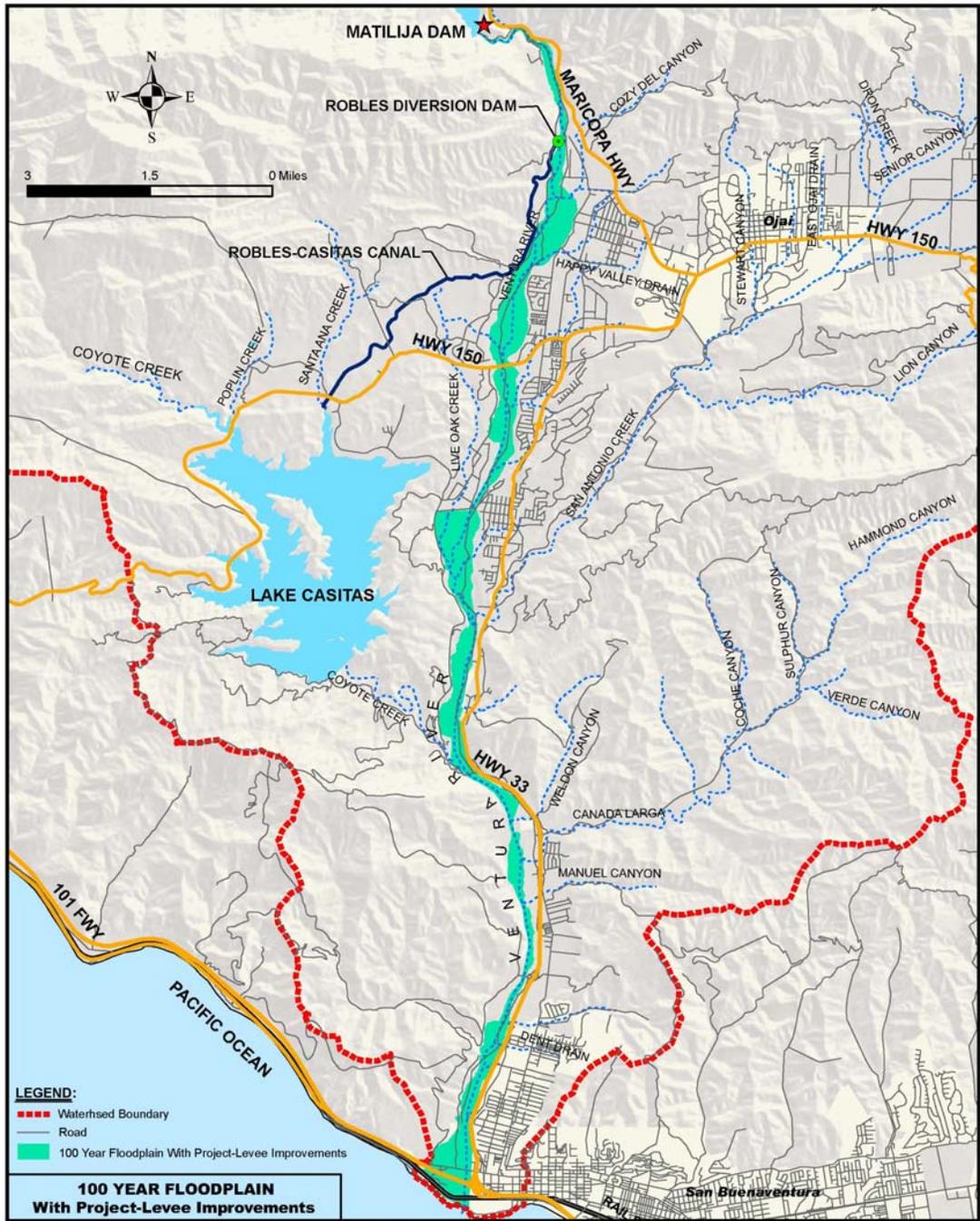
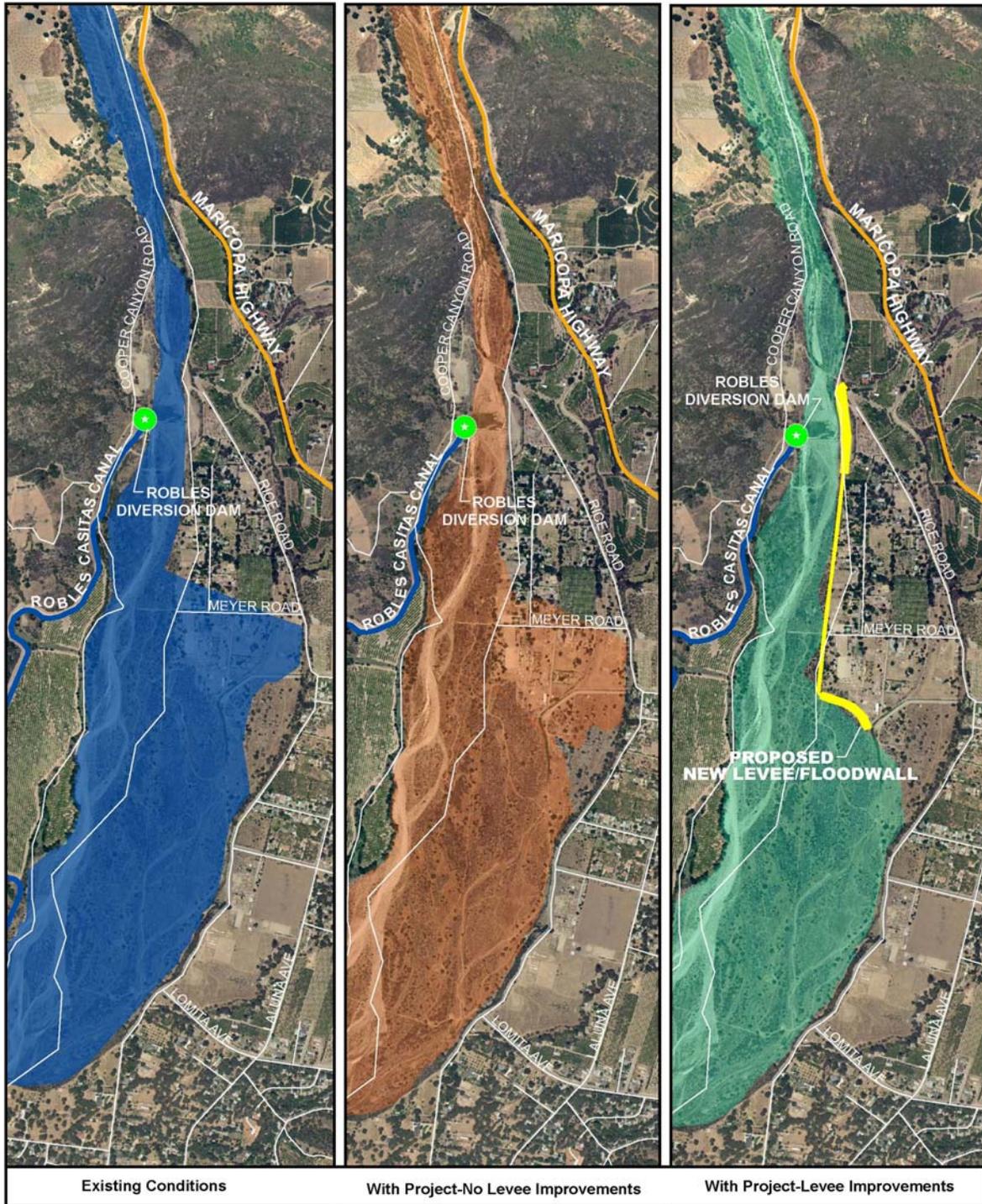
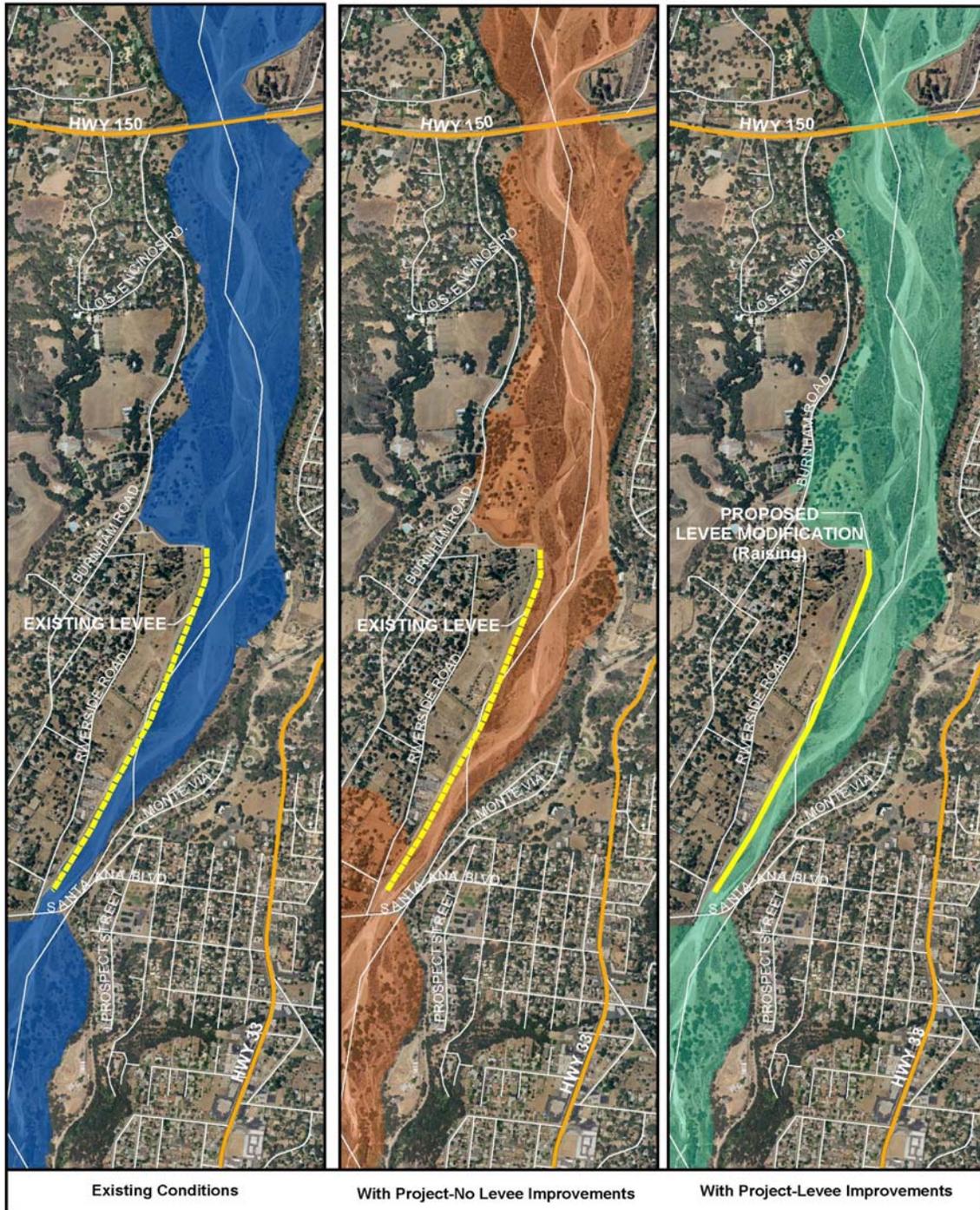


FIGURE 4-7 MEINERS OAKS – 100-YEAR FLOODPLAIN



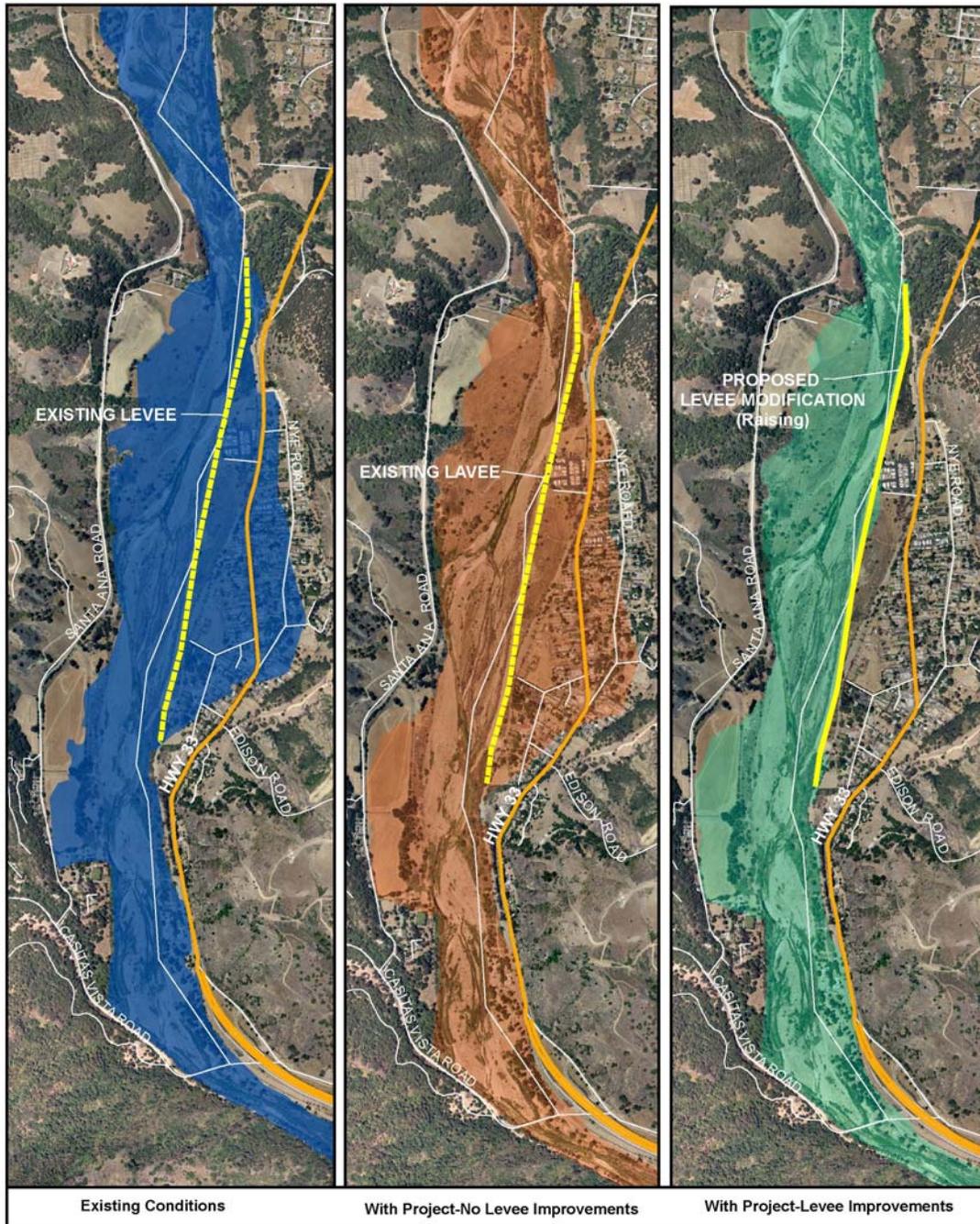
**MEINER'S OAKS
100 YEAR FLOODPLAIN**

FIGURE 4-8 LIVE OAK- 100-YEAR FLOODPLAIN



**LIVE OAKS
100 YEAR FLOODPLAIN**

FIG 4-9 CASITAS SPRINGS- 100-YEAR FLOODPLAIN



**CASITAS SPRINGS
100 YEAR FLOODPLAIN**

Levee Heights Based on Risk and Uncertainty A risk and uncertainty analysis was conducted to better define recommended levee or floodwall protection heights for Alternative 4b. The analysis is in conformance with Corps of Engineers' reference EM 1110-2-1619, "Risk-Based Analysis for Flood Damage Reduction Studies." For additional details, see appropriate discussions in Appendix D (Hydrologic, Hydraulic, and Sediment Studies; Section 10.2) and Appendix F (Economics; Risk and Uncertainty).

Areas with building structures shown to be prone to flooding under with-project conditions include the Matilija Hot Springs facility, Camino Cielo residences, and Meiners Oaks, Live Oak, and Casitas Springs townships. Matilija Hot Springs and Camino Cielo were not included in the risk-based analysis as these areas will be at very high risk during high flow events. For each of the other areas (Meiners Oaks, Live Oak, and Casitas Springs), one representative river mile station was selected.

At the selected river mile stations (index locations), the procedure first established the hydrologic and hydraulic uncertainty. The hydrologic uncertainty determination utilized the discharge-frequency relationships based on available stream gage records. The hydraulic uncertainty determination considered both the uncertainty in streambed elevations associated with future deposition (or erosion) in the Ventura River, and also that of the Manning's roughness coefficient "n" (utilized in numerical modeling for computing water surface profiles). Water surface profiles were generated for several flow frequency events (10-, 50-, 100-, and 500-year) utilizing various streambed profiles that were determined to best represent conditions of low, mean, and high bed levels. At each index location, the stage-discharge relationship for each flow frequency level was determined, and finally the water surface elevation based on standard deviation analysis of high and low values was computed.

In accordance with current Corps guidance for certification of existing and proposed levees or floodwalls, a Flood Damage Reduction Analysis computer program (HEC-FDA), a risk-based analysis, was used to determine recommended heights for the flood protection features. The selected flood level of protection corresponds to a 95 percent conditional non-exceedance level.

For this level of analysis, only one average height was established for each levee/floodwall location. During the next phase of study (Preconstruction, Engineering and Design) further analysis will be performed to establish levee/floodwall profiles.

The risk analysis considered: 1) maintaining existing levels of flood protection, and 2) increasing existing levels of protection to FEMA 100-year levels. The results are presented in Table 4-2.

Feature	Current Level of Flood Protection	Index Station (River Mile)	Improvement	Mitigation to Current Level of Protection (Ft)	100-yr FEMA Level (Ft)
Meiners Oaks	100-yr	13.7	New (East) Levee/Floodwall	5	5
Live Oak	100+ yr	9.6	Raise Existing (West) levee	6	4
Casitas Springs	50-yr	7.4	Raise Existing (East) Levee	3	5

Level of Protection for Flood Mitigation The Sponsor has expressed interest in raising the current level of flood protection to the 100-year level for flood control structures requiring modification and that are currently less than the 100-year level of protection. Casitas Springs levee would be the only structure to consider. Only one levee, Live Oak, offers greater than 100-year protection. For the Live Oak levee the mitigation would require the structure to be raised beyond the 100–year levee height to maintain the existing level of protection (100-year plus). For existing conditions, a flood damage analysis (structure/ content and agricultural crops) concluded that a separable element under NED for flood control was not justified. Therefore, under with-project flood mitigation, any improvement beyond maintaining the existing level of protection would be considered a betterment.

Investigations have been conducted to address the justification of the levees and floodwalls, and the acquisition of properties presented in Table 4-1. A cost effectiveness/incremental cost analysis (CE/ICA) has been prepared in the Economic Appendix and includes evaluation of the Meiners Oak, Live Oak, and Casitas Springs levees/floodwalls and Santa Ana and Camino Cielo Bridge modifications.

The cost estimates for the levees have been revised based on further review of the necessary fill quantities for the levees. Costs range from \$413,000 to \$1.3 million, depending on the location of the levee/floodwall.

Based on potential induced damages prevented in each area, the Casitas Springs levee is the only economically justified measure at this time. On the whole, the damages prevented by the levees/floodwalls and bridge modifications amount to \$8.7 million, and the total costs for these features (including real estate interests) are \$11.1 million.

A takings analysis has not been prepared to date. But judging from the current level of property costs and real estate values, the building of levees and the bridge modifications are the most likely least cost option.

Purchase of the properties in the Camino Cielo area and the Matilija Hot Springs are necessary at this time due to the close proximity to the dam site and the risk and uncertainties associated with sediment deposition in the area. Currently, water surface elevations of model runs related to the Recommended Plan show inundation at or near some of the structures that have been identified for acquisition.

Further refinement of the modeling during the detailed design phase will allow for more runs to be conducted in verification of properties, or portions of properties, needed to be acquired. At that time, justification for federal interest for levee and bridge modifications will be also be re-assessed. In addition, temporary flood impacts to croplands in reaches 2, 4, and 6 will be addressed. Currently some parcels are subjected to without-project flooding, and will be more at risk under future without-project conditions. Flowage easements may be necessary and/or compensation for crop damage under with-project conditions.

At present, flood mitigation will be to maintain the current level of protection. Until further evaluation is possible, at this time it is assumed that federal interest in cost-sharing the flood mitigation described is warranted.

An Item of local cooperation has been added to capture the non-Federal requirement to maintain their channel cleanout activities upstream of the Santa Ana Bridge.

Additional Flooding Impacts and Mitigation The hydraulic and sediment transport analysis has indicated that the Ojai Valley Sanitary District Wastewater Treatment Plant, located at RM 5.0, will be placed in 500-year floodplain under with-project conditions. Though the facility is not currently in the 500-year floodplain for existing conditions, it will be under the future without-project condition. The facility includes the treatment plant structure and a sludge pond. Additional risk and uncertainty analysis will be performed in the detailed design phase to recommend flood protection measures. Due to limited space, it would be likely a floodwall would be required at that location. Currently the Canada Larga levee protects this reach of the river.

Summary of Mitigation Features

Table 4-3 presents a summary of the features included in the Recommended Plan to mitigate the induced flooding impacts of removing Matilija Dam.

Table 4-3: Summary of Measures Included to Mitigate Induced Flooding					
Feature	Reach	River Mile	Action	Levee/Floodwall (LV/FW)	
				Heights (ft)	River Mile
Matilija Hot Springs	6	16.4	Purchase and vacate structures at complex		
Camino Cielo Bridge	6	15.5	Purchase and remove/restore original channel width. Construct bridge at new location.		
Camino Cielo Structures	6	15.6 to 14.2	Purchase and remove 2 houses and 9 cabins		
Meiners Oaks Area	6/5	14.3 to 13.4	Add levee along east bank	LV: 5 (avg) FW: 5 (avg) LV: 5 (avg)	14.3 to 14.1 14.1 to 13.6 13.6 to 13.4
Live Oak Levee	4	10.6 to 9.4	Add levee/floodwall to existing (west) levee	LV: 6 (avg) FW: 6 (avg)	10.6 to 9.9 9.9 to 9.4
Santa Ana Bridge	4	9.4	Extend bridge and widen channel.		
Casitas Springs Levee	3	7.8 to 6.8	Increase existing (east) levee ht. with levee/floodwall	LV: 3 (avg) FW: 3 (avg) LV: 3 (avg)	7.8 to 7.5 7.5 to 7.4 7.4 to 6.8
Croplands	2,4 and 6		Compensation		

Water Supply Impacts

The Recommended Plan will accelerate the restoration of natural sediment supply to the Ventura River from the Matilija Creek subwatershed when compared to the baseline conditions. In addition, the approximately 4 million cubic yards of trapped sediment remaining in the reservoir basin following slurry operations will also contribute to downstream replenishment. The volume of sediments eroded from the reservoir basin following dam removal will depend on the magnitude of a specific storm event and access of flows to specific areas of the reservoir basin. Portions of the channel with soil cement revetment will provide a 10-year recurrence level of protection. The flows from storm events less than the 10-year recurrence level will cause erosion of the coarser grained sediment not protected by soil cement revetment in the upper half of the reservoir basin (i.e. the ‘Upstream Channel Area’). The flows from storm events exceeding the 10-

yr return period would, in addition to the above, have access to materials protected by soil cement in the lower half of the reservoir basin since overtopping of the structure would occur, allowing erosion of mostly medium-grain sediment with fines, largely in the middle portion of the reservoir basin (i.e. the 'Delta Area') as well as the lowermost portion of the basin where 'Delta Area' materials have been placed following channel excavation operations. With time, as the soil cement revetment is removed in stages, sediment in areas of the reservoir basin previously stabilized would be subject to variable levels of erosion, depending on the magnitude of the storm flow event, and subsequent transport downstream.

The outcome of removing Matilija Dam is expected to have little effect on local landowner water extraction operations. There are some short-term impacts to two large-scale public water supply diversion operations: at the Robles Diversion Dam and at Foster Park. Adverse impacts are related to both coarse-grained and fine-grained sediment delivery and deposition. The following summarizes the impacts and concerns related to both water supply and water quality.

Robles Diversion Dam

Loss of Diversion Operations: In the event that sediment deposition levels at the facility exceed 40,000 cubic yards, diversion operations to Lake Casitas will be interrupted until the sediment basin is cleared out. Should this occur at the beginning or middle of the diversion season, the facility will miss diversion opportunities for the remaining portion of the season. Environmental regulations do not allow for maintenance during the wet season. Repeated missed diversion opportunities could adversely affect the safe annual yield for Lake Casitas. The safe annual yield is defined as the amount of water that the reservoir can yield for consumption without producing unacceptable negative impacts on the long-term water supply within the jurisdictional boundaries of Casitas Municipal Water District (CMWD). Based on the sediment transport modeling studies for the Recommended Plan, without including any mitigation measures, in the first few years of storm events potential deposition in the Robles sediment basin could be large enough to effectively shut down diversion operations for the respective diversion season.

Turbidity: Turbidity from fine sediment (silts and clays) in Ventura River flows diverted to the Robles-Casitas Canal can contribute to water quality problems at Lake Casitas. Fine sediments, especially clays, do not easily come out of suspension. Fine sediments contain absorbed nutrients that tend to promote algal production, currently a problem at the reservoir. Water treatment efforts also need to be increased should large amounts of fine sediment be present in the reservoir and remain in suspension. Fine sediment can also contribute to storage loss and can also adversely affect recreational activities (i.e. fishing, boating).

The modeling studies for the Recommended Plan show that prior to the staged removal of soil cement, flows below a 10-year storm event would exhibit turbidity levels similar to baseline conditions. For flows above a 10-year storm event, turbidity levels would be on the order of 2 to 4 times greater than baseline conditions. During these high-flow events,

the fine sediment concentrations are already high, and therefore the increase in turbidity would be expected to be within the natural variability.

During the staged removal phase of the soil cement revetment (removal phase sequence would be downstream to upstream), due to the likely temporary increases in turbidity levels, from 2 to 10 times greater than baseline conditions, it would be prudent to coincide removals in periods when reservoir levels at Lake Casitas are at or above average. Removal phases would be coordinated utilizing a monitoring/adaptive management plan. Turbidity levels would be expected to stabilize to levels similar to the No Action Alternative after one or two storm events of average magnitude pass through the reservoir basin.

Turbidity impacts to Lake Casitas resulting from the removal of Matilija Dam are not expected to be significant.

Lost Storage: CMWD has a lease with the Ventura County Watershed Protection District to use stored water at Matilija Dam until 2009. Matilija Dam provides an average of 590 ac-ft/yr of water for Robles diversions under current operating criteria. The construction timeframe for the project is not anticipated to begin until 2008 at the earliest. The first year of construction will include downstream features such as bridge modifications, levee construction and slurry pipeline and disposal site construction. The slurry of fines and dam deconstruction will not begin until the second year of construction, in 2009. Therefore, the CMWD lease with the VCWPD will expire prior to any construction activities that may impact the Matilija Dam water supply.

Deposition in Robles-Casitas Canal and Fish Screen: When sediment loads are high, sands carried in suspension may deposit either in the canal due to the gentle gradient of the structure or at the fish screen due to reduced velocities. The fish screen is a component of the fish passage facility (Fishway) currently under construction at the Robles diversion facility. The screen will function to keep downstream migrating steelhead from being entrained into the canal and transported to Lake Casitas. The sedimentation in the fish screen or canal could increase maintenance requirements and even cause interruptions (short-term) to diversion operations.

Other Water Quality Concerns: Concerns expressed by CMWD regarding the detection of arsenic and DDT in discrete samples of the trapped sediment obtained from field investigations conducted in July through September 2001 in the Matilija reservoir basin, and the potential threat to Lake Casitas and Mira Monte well were assessed by the Corps and the VCWPD. Consultation with another water agency indicated that the concentration levels detected were considered within normal background levels and would not usually be associated with adversely impacting water quality. Initial consultation by the Corps has occurred with the Environmental Protection Agency and the California Department of Health Services. Additional efforts to evaluate arsenic, DDT, and other regulated substances will not be pursued at this time. Future consultation with the California Department of Health Services and the California Regional Water Quality Control Board will be pursued during the Preconstruction, Engineering and

Design (PED) phase. As an outcome of consultation with these regulatory agencies, appropriate action as needed, including monitoring and/or mitigation measures would be implemented by the Corps and VCWPD during the pre-construction, construction and subsequent post-construction adaptive management period.

Foster Park Water Supply Facilities

The increase in sediment deposition resulting from the Recommended Plan will also cause impacts to water supply facilities located at Foster Park. These facilities include both groundwater and surface water diversions, and are owned and operated by the City of Ventura. The surface diversion is actually a combination of an aboveground surface diversion and an intake that is approximately 4 feet below the riverbed. The subsurface wells are approximately 50 feet deep. Groundwater pumping operations of up to 6,000 acre-feet annually will not be affected by the implementation of the Recommended Plan. Surface water diversions averaging 7 ft³/sec, with a maximum of 24 ft³/sec, will be adversely impacted by implementation of the Recommended Plan.

Water Supply Mitigation Measures

The following mitigation measures are included in the Recommended Plan to reduce impacts specifically associated with water supply and water quality at the CMWD and City of Ventura facilities. Project associated features, included in the plan by the Sponsor are described in the section “*Local Associated features*” in this chapter.

Sediment Bypass: A sediment bypass structure is included in the Recommended Plan to limit the amount of additional coarse sediment deposition, associated with the removal of Matilija Dam, in the sediment basin at the Robles Diversion Dam. Sediment transport modeling performed to date indicates that though deposition levels following removal of Matilija Dam may be greater for a given storm event compared to current levels, the sediment bypass will significantly reduce the amount of additional deposition. In addition, for larger flow events that may cause interruptions to diversion operations under current conditions, the bypass structure will effectively prolong the time to which diversion operations would be impacted by allowing deposition to occur more gradually. Emergency intervention time would thereby be made possible. Modeling indicates that after flows from several storm events have passed through the Matilija reservoir basin, the deposition at the Robles facility will approach equilibrium conditions (i.e. influence from Matilija Creek only and no effects from Matilija Dam or trapped reservoir basin sediments).

The bypass includes four radial gates that, when combined with the existing sluice gate structure, allow for passage of sediments and flows up to 17,000 ft³/sec. Initial modeling shows that a sediment bypass structure placed at the sediment basin would limit the amount of deposition to approximately No Action levels after only a few storm flow events have passed through the reservoir basin. This bypass feature would significantly reduce any potential impacts related to water diversions at the Robles facility. Impacts to the facility and to Lake Casitas due to increased turbidity levels are conservatively

assumed to remain unaffected by the bypass structure since fines will remain suspended in the water that is being held at a constant level in the forebay during diversion operations. Adverse downstream impacts are not anticipated with this bypass feature in place.

A new concrete overflow weir will replace the existing timber crib weir structure to insure the adjacent sediment bypass structure is not undermined during very large flow events. Selective operations of the bypass sluice gates in conjunction with the existing sluice gates could allow the diversion at Robles to remain in operation in larger flood events than previously possible. In addition, there may be the possibility of improvement of fish passage opportunities at higher flows. More detailed study will be conducted on the operation of the bypass structure during the Pre-construction, Engineering and Design phase. The conceptual plan is shown in Figure 4-10.

FIGURE 4-10 ROBLES SEDIMENT BYPASS STRUCTURE



Foster Park Facility Losses: The Recommended Plan includes the construction of two groundwater wells at Foster Park to mitigate impacts to the water supply facilities in this area. Well depths are estimated to be about the same as the existing 50-foot well depths. The operation of the two wells by the City of Ventura must insure that the increased water extraction capability provided by the two wells will not produce any net loss to the quantity of surface flows otherwise extracted by the surface diversion operation.

Other Environmental Features

A giant reed (*Arundo donax*) management/removal plan has been developed for this study, particularly for the downstream reaches of the Recommended Plan, including the Ventura River mainstem. Current estimates of the extent of giant reed infestation in reaches 1-9 (mouth of Ventura River to upstream of the original reservoir basin of Matilija Dam) are about 250 acres, with the highest concentration in Reach 7 behind Matilija Dam (118 acres). The current cost estimate for the removal of the giant reed, monitoring and maintenance is about \$10.0 million.

Densities of giant reed cover vary between 3 and 95 percent cover. Upstream of the dam, there is 118 giant reed acres in reach 7 (reservoir) that will be removed with large equipment during clearing and grubbing; 0.4 giant reed acres in reaches 8 and 9 will be removed by hand. Downstream of the dam, there is 123 giant reed acres in reaches 1-6; the balance of giant reed cover is low density (3% cover) spread over 1059 acres.

Other Environmental Mitigation Measures

A number of environmental mitigation measures have been identified in the U.S. Fish and Wildlife Service draft Coordination Act Report (CAR). In addition to a giant reed management plan, the Recommended Plan includes other CAR recommendations such as a management program for bullfrogs, crayfish and green sunfish around the reservoir before dam removal to preclude downstream relocation, a relocation plan for the California red-legged frog, southwestern pond turtle, coastal whiptail, two-striped garter snakes, and other special status and native species. Revegetation and stream restoration programs are also recommended, as are survey programs for the endangered least Bell's vireo and the southwestern willow flycatcher. Details are provided in the draft EIS/R document.

An initial 106 compliance letter (National Historic Preservation Act) has been prepared to the California State Historic Preservation Office (SHPO) to address cultural resources. Two historic/prehistoric sites located in the vicinity of the reservoir basin will need to be evaluated for NRHP eligibility. Other project features that make up the Recommended Plan include the slurry disposal site, the slurry line alignment, the bridge locations where modifications will take place, and the desilting basin.

Design and Construction Considerations

The features included in the Recommended Plan are currently designed to develop reasonable cost estimates to assess the cost of alternatives and the Recommended Plan as well as environmental impacts. In some cases such as the design of mitigation measures, the design and construction requirements are somewhat conservative to assure impacts would be fully mitigated. During the Preconstruction Engineering and Design phase, further studies will be made to refine information on the magnitude of impacts and mitigation requirements. This will include consideration of possible other less costly and more environmentally acceptable measures.

Real Estate Requirements

The Real Estate Plan (Appendix G) presents information on the lands, easements, rights-of-way, utility relocations, and disposal area requirements (LERRDs) associated with the Recommended Plan. The Plan also discusses the ownership of project properties, requirements for acquisition, and costs based on information provided by the Ventura County Watershed Protection District. A gross appraisal study has been completed to better define the requirements and costs.

Dam and Sediment Removal

For the dam and mechanical sediment removal of sediment, real estate requirements include the acquisition in fee of the 118-acre slurry disposal site, and temporary easements for the 30-foot wide, 3-mile long right-of-way strip of properties for the slurry pipeline. Lands will also be required for several staging areas in the dam and reservoir area, and disposal site. The fresh water pipeline from Lake Casitas to the disposal area would be placed along the existing maintenance road along the CMWD canal from the lake to Robles Diversion Dam. Special considerations would be required at several crossings. Upstream of the disposal area, the fresh water pipe would utilize the same right of way as that required for the slurry pipe. It is expected that the slurry pipeline rights of way will also be used for developing trails as part of the Recreation Plan for the project. If so, these lands will need to be acquired in fee. The reservoir is Sponsor-owned land and will be included under LERRDs.

Mitigation for induced Flooding

The LERRDs requirement for implementing the mitigation measures for induced flooding include the acquisition of Matilija Hot Springs and 11 other structures in the flood plain. These properties would include purchase in fee, relocation of occupants, and removal of structures. Additional right of way would be required for the new/raised levees and flood walls. A summary of the LERRD requirements for flood mitigation is as follows.

- Matilija Hot Spring property acquisitions.

- Camino Cielo: There are 11 cabin structures and a bridge that will be acquired in fee and removed. The Camino Cielo bridge relocation/construction site is included in land to be acquired in fee.
- Meiners Oaks/Robles Area. The mitigation measure includes constructing a 4,400 foot-long floodwall/levee. Floodwall requires 20 ft. by 2,500 ft., or 1.2 acres of right-of-way; levee requires 80' by 2,000', or 3.7 acres. VCWPD currently has no right-of-way at this location.
- Live Oak area. Mitigation includes 6,300' long levee. VCWPD currently maintains existing Live Oak Levee and has right of way in this location. Additional rights-of-way to acquire is estimated to require a strip of land 30 feet by 3,050 or 2.1 acres.
- Modification of Santa Ana Bridge. The channel width will be widened at the bridge, and the existing structure will be extended with a new span that allows greater flows to pass under the bridge. Vehicular traffic cannot be completely cut off at this location. A temporary low-flow crossing will be needed during construction. Land rights for temporary traffic realignment are included in the acquisitions needed for the improvements. Some utilities will also be affected, including a water and gas line.
- Casitas Springs. Ventura County Watershed Protection District currently maintains the existing Casitas Springs levee and has the ROW of a 200' wide strip along the levee. A 20' wide and about 5,000-foot long ROW is needed for the levee extension.
- Construction and maintenance requirements. Information to define staging and other construction land requirements for the flood mitigation measures has been preliminarily identified.

Mitigation for Water Supply Impacts

The LERRDs required for implementing the features required for mitigating the impacts to water supply are as follows:

- Sediment Bypass: Robles Diversion Dam is owned by the Bureau of Reclamation and leased to Casitas Municipal Water District. No real estate requirements are included at this time for this mitigation feature.
- Foster Park Wells: Right- of- entry (temporary work) permits will be acquired from the City Of Ventura to install two groundwater wells.
- Slurry Disposal site (near Highway 150 Bridge): Acquisition from private ownerships located within the river bottom comprises 97 acres. LERRDs includes containment dikes and associated features.
- Desilting Basin (associated feature): The proposed site is on Bureau of Reclamation property, adjacent to the Robles-Casitas canal. The site includes five acres for the desilting basin, and 11.9 acres for the sludge disposal. Access rights would be required. An easement would be required for sediment deposition and maintenance activities.

Giant Reed Removal/Control

Downstream of the dam, permanent access easement will be required to enter impacted properties for initial removal and continued maintenance. Upstream of the dam, no real estate interest is needed in the reservoir basin as it is owned by the Local Sponsor.

Local Associated Features

Measures for mitigating induced flooding damage and water supply impacts may result in benefits as compared to the without-project condition. There are a number of areas where there is flood damage potential under the without-project condition. This without-project damage potential will be reduced by the with-project mitigation. There is some potential that the final design of the flood control mitigation measures could be increased to assure a minimum of 100-year protection in some areas. The review of the impacts and mitigation requirements will be conducted during final design to ascertain whether the benefits are incidental to the project or whether portions of the mitigation should be considered a separable feature (eligible for Federal flood control participation) or a local associated feature.

A desilting basin is included as a local associated feature for the Recommended Plan. This feature is being considered an associated feature with respect to improving diversion operations at Robles Diversion as compared to the baseline conditions. The desilting basin, an off-line structure to the Robles-Casitas canal, functions by allowing diverted flows from the Ventura River to settle out fine sediment (silts, clays) prior to conveyance of the flows via the canal to Lake Casitas. Canal waters would be diverted through the desilting basin, reducing the velocity of the flows and allowing the fines to settle in the basin. Conceptual plans are shown in Figure 4-11.

The size of the basin is based on the required storage capacity to settle fines for a 1991 storm event. USBR model simulations estimated that the storage capacity would need to be 61 acre-feet to settle about 46 acre-feet of fine sediments, providing extra volume to limit the maximum velocity of the diverted flows. The proposed basin would require excavation and levee construction to contain the diverted flows. Fine sediment would be settled out by the addition of a flocculating polymer. The resulting sludge would require periodic removal and disposal to a nearby storage site. To prevent infiltration losses, a geofabric liner would be installed. The intake structure to the canal will require modification. The Sponsor has identified two potential locations for this basin. Costs could be lower should federal land (USBR) near Lake Casitas become available. The estimated cost of the basin is \$5.7 million and is based on the need to acquire up to 13.2 acres of (non-Federal) land. The Sponsor would initially operate this facility for the Casitas Municipal Water District.

Two potential locations for the basin are presented in Figure 4-12. The primary site at this time being considered is on Federal land.

FIGURE 4-11

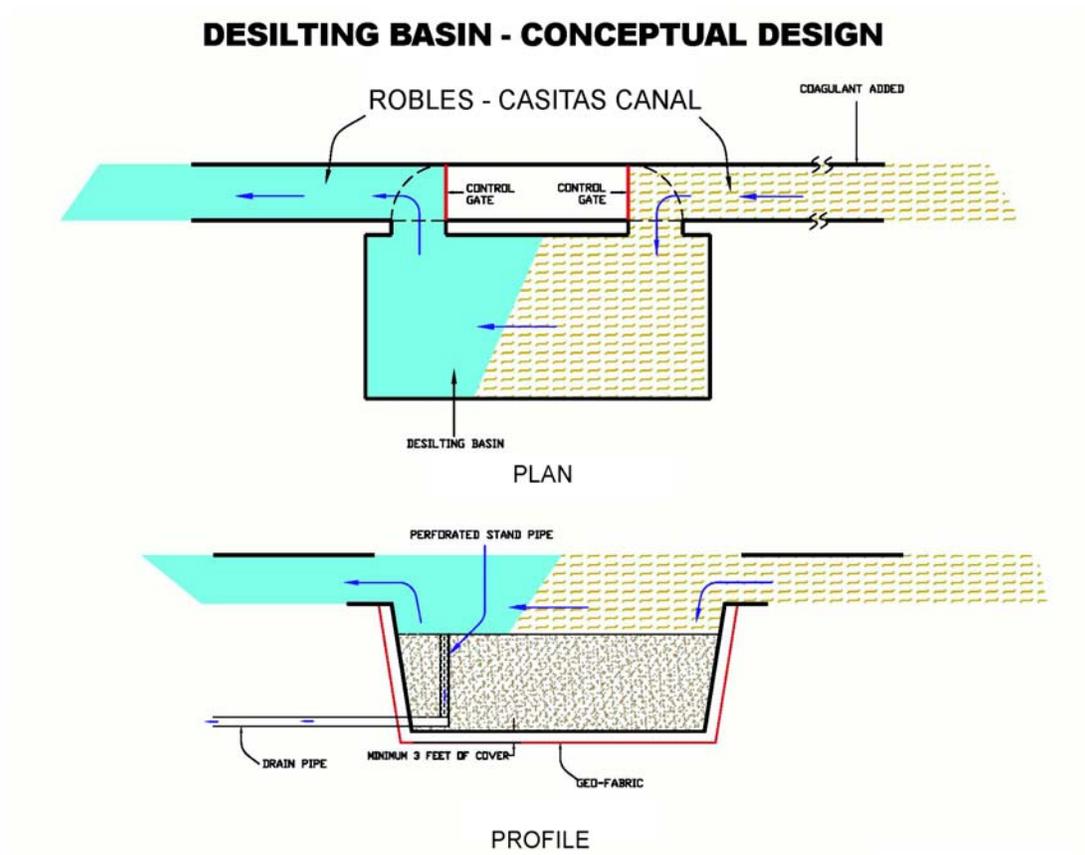
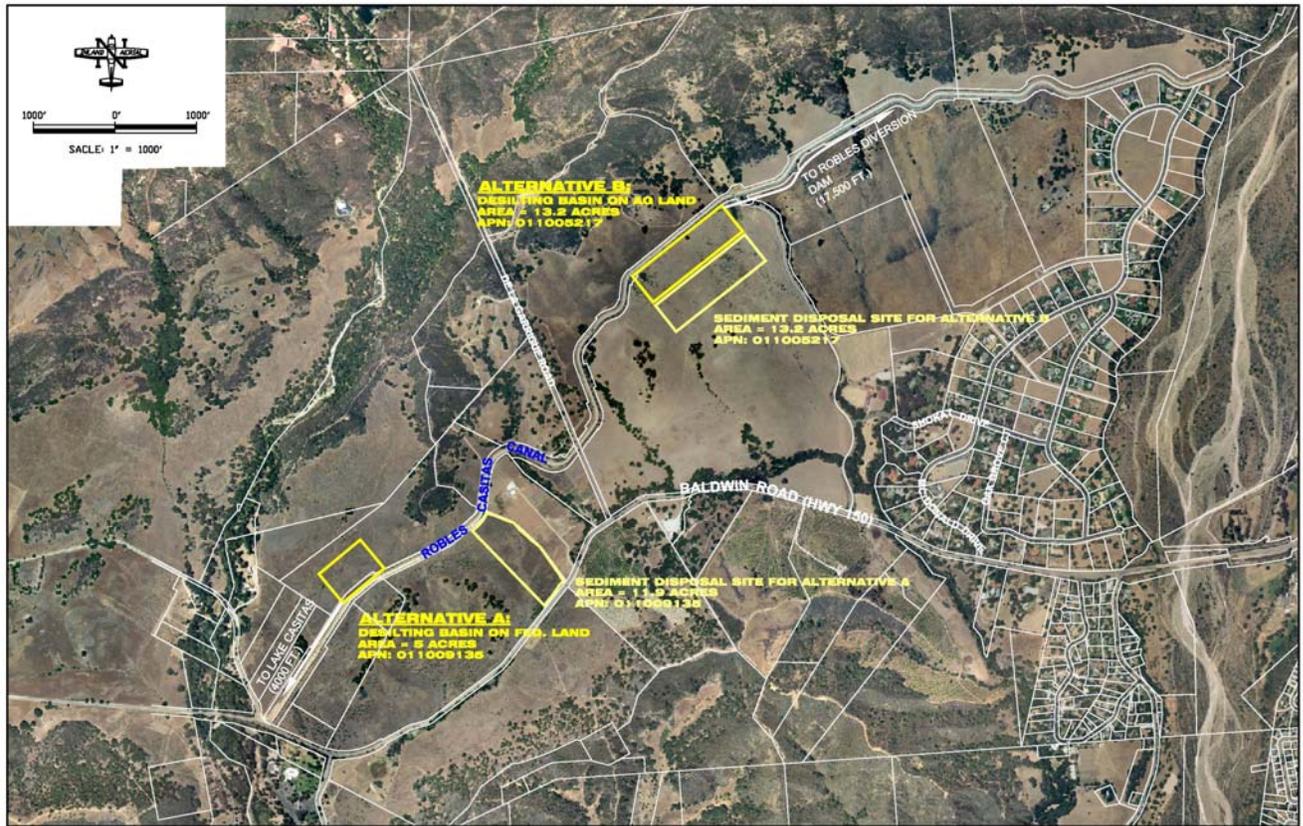


FIGURE 4-12: POTENTIAL DESILTING BASIN SITES



Monitoring and Adaptive Management

For complex specifically authorized projects that have higher levels of risk and uncertainty of obtaining the proposed outputs, monitoring and adaptive management measures may be recommended. For this project, a Monitoring and Adaptive Management Plan will be established to evaluate the effectiveness of the implemented restoration measures and to make adaptive changes, if required, to obtain project objectives. Initial monitoring and adaptive management measures for the project have been developed. Details are presented in Appendix K of the EIS/R. Additional refinement is necessary and will be based on more detailed work to be performed during the Pre-construction, Engineering and Design (PED) phase.

In general, the monitoring of project performance and outputs is considered necessary to provide feedback for future projects and to assure the project is functioning in accordance with its objective. Adaptive management measures may be taken to address project performance problems such as trapped sediment evacuation and unforeseen circumstances such as additional removal of exotic species and revegetation. In general, the period for monitoring and adaptive management is limited to no more than five years

following completion of construction unless there is justification to extend this period. The cost of monitoring project performance and outputs is generally limited to 2 percent of total project costs; adaptive management actions, if needed, is limited to 3 percent of the project cost. Extension of the monitoring and adaptive management period to 10 years is justified and has been approved based on the higher levels of risk and uncertainty associated with this proposed project. Monitoring and adaptive management percent allocations however will remain at 2 and 3 percent, respectively, of total project costs.

Considerable uncertainty exists regarding removal of dams and sediment impacts as related to achieving restoration objectives and minimizing adverse impacts. This is because limited projects involving dam removal, especially large projects of the magnitude of Matilija Dam removal, have been completed to date. Given the lack of precedent and scarcity of empirical data, there is uncertainty regarding a number of aspects of the design, construction and operation of the recommended alternative.

For the Recommended Plan there is uncertainty regarding the volumes and frequency of sediment transport from flow events and resulting impacts on ecosystem, flooding, water quality, and water supply. Monitoring with respect to project performance and achieving output objective will be required. The effectiveness of revegetation efforts and eradication of exotic species are also uncertainties that need to be monitored. The monitoring of sediment transport and revegetation and exotic species eradication shall be accomplished through periodic surveys of sediment deposits and quantities to assure unforeseen performance results do not degrade the restored ecosystem or increase flooding or water supply impacts. Adaptive management measures to address unforeseen sediment transport impacts include partial or complete removal of deposits as well as further stabilizing sediment sources in the reservoir areas. Additional eradication of exotics and revegetation efforts may also be necessary to achieve project performance objectives.

Though the level of uncertainty remains appreciable, proposed features of the Recommended Plan will be in place to reduce levels of risk and uncertainty. Features to reduce turbidity impacts include the slurring of the majority of the trapped fine sediment downstream; allowing a degree of control with respect to the release of the remaining trapped finer sediments from the Matilija reservoir basin by use of soil cement revetment; the addition of a desilting basin (Local Sponsor preferred feature) to serve to completely remove any (infrequent) remnant levels of increased turbidity from reaching Lake Casitas; and the installation of two groundwater wells at Foster Park. Levees and bridge modifications will reduce flooding risks.

The Monitoring and Adaptive Management Plan for the Recommended Plan has been developed by the Environmental Working Group, with input from the Technical Studies Working Group. The goal of this effort is to restore the pre-dam natural ecology of Matilija Creek and allow species to have unobstructed access to and from the upper watershed habitat and achieve other natural habitat and ecosystem improvements. It is expected that the habitat value of the restored natural river regime will have good to above average quality. It is also expected that the restored habitat will be suitable for

native wildlife. The quality of the habitats (i.e., average or high) is expected to dictate the abundance or density of wildlife. Additional goals of the Monitoring and Adaptive Management Plan include, but are not limited to, the following actions: 1) monitor deposition and erosion in the riverine system and at the estuary and to take necessary actions to reduce any adverse impacts including blockage to fish passage and increase to flooding risks; 2) monitor erosion of trapped sediment from the reservoir basin, performance of the soil cement protection, and plan and execute staged removal of soil cement; 3) monitor turbidity levels and suspended sediment concentrations with the intent to minimize impacts to water supply; 4) monitor water quality for regulated substances potentially transferred to the water by trapped sediments associated with Matilija Dam, and negotiate any necessary mitigation measures in accordance with consultations with the Regional Water Quality Control Board; and 5) monitoring effects of sediment bypass to sediment deposition and diversion operations at the Robles Facility, and also effects to the fish passage facility function and operation, with the intent to minimize any impacts to current operating criteria of the diversion facility. Further refinement and/or additional goals will be established during the PED phase.

The Monitoring and Adaptive Management Plan will provide a description of: the habitats to be restored, the density and composition of the plantings to restore habitat, surveys to monitor the expected, natural re-introduction of native wildlife into the restored habitats, the monitoring protocols, and the performance or criteria and monitoring protocol to evaluate success of the restoration effort. The plan will also present adaptive management actions (or maintenance activities) that may be performed to ensure a successful restoration effort and reporting requirements.

The Monitoring and Adaptive Management Plan covers monitoring and adaptive management actions during the first 10 years after initial construction. After the first 10 years, monitoring and/or adaptive management becomes the responsibility of the Local Sponsor. During the PED phase, more specific monitoring details (e.g., exact monitoring transect locations, reference site locations, more specific performance/success criteria, more specific monitoring protocols, etc.) will be added to the Monitoring and Adaptive Management Plan.

The Corps and/or the non-Federal Sponsor will be responsible for collecting monitoring data and preparing annual Monitoring Reports. A Technical Committee consisting of, at least, U.S. Fish and Wildlife Service, National Marine Fisheries, California State Fish and Game, and possibly other agencies or organizations, will assist in collection of monitoring data, review monitoring data results, and provide recommendations of possible adaptive management measures. The Technical Committee will recommend adaptive management measures to the existing project's design should habitat not achieve the identified goal and objectives. If designed vegetation species composition are not achieved: replanting, additional irrigation, and/or removal of vegetation (especially exotics) may be necessary. Annual Monitoring Reports and any adaptive management measures recommended by the Technical Committee will be forwarded to an Executive Committee that will consist of, at least, a representative of the non-Federal Sponsor and the U.S. Army Corps of Engineers. The Executive Committee will decide whether to

adopt adaptive management measures recommended by the Technical Committee.

Recreation Plan

The U.S. Army Corps of Engineers policy for ecosystem projects recognizes that at many ecosystem restoration projects, the lands used for project construction also provide a low-cost opportunity to provide recreation facilities. Recreation at ecosystem restoration projects should not only be compatible but also enhance the visitation experience by taking advantage of the natural values. The recreational experience should build upon the ecosystem restoration objective and take advantage of the restored resources rather than distract from them. Recreation development at an ecosystem project should be totally ancillary. The facilities may be added to take advantage of the education and recreation potential of the ecosystem project, but cannot be specifically formulated for a recreation purpose. Planning of recreation facilities to be cost-shared must comply with three major criteria (a) the philosophy noted above and limited to certain facilities included in a Corps of Engineers checklist, (b) economic justification where the combined monetary and non-monetary benefits exceed the monetary and non-monetary costs, and (c) the level of Federal participation cannot increase the Federal cost of the ecosystem restoration project by more than ten percent unless otherwise approved by the Assistant Secretary of the Army.

The entire Matilija Canyon lies within the Los Padres National Forest, although there are extensive non-Federal in-holdings as well, totaling over 2,245 acres, including the 442-acre Ventura County Watershed Protection District Matilija Reservoir site. Additionally, Matilija Canyon habitats support a number of federally listed species of animals that are sensitive to human activities, including recreational activities. Therefore, private interests and environmental resources have been important considerations in developing a recreation plan in conjunction with the Recommended Plan.

Matilija Canyon has been a favorite destination for outdoor enthusiasts since 1865, and a favorite haunt of trout fishers since the establishment of a private resort near the mouth of Matilija Canyon in 1872. The construction of Matilija Dam, and the VCWPD operation of the once-private Matilija Hot Springs, altered the nature and intensity of recreational use of this popular canyon within the Los Padres National Forest. Removing Matilija Dam and restoring the reservoir site and downstream reaches of Matilija Creek and the Ventura River has the potential to provide opportunities for regional open space/recreation network connectivity. There are many opportunities to integrate the project site into a broader, regional network of open space, recreational and educational amenities, providing links between existing trail systems from the Los Padres National Forest to trails near the Ventura River.

The Recreation Planning Committee established the overall concept of the recreation plan including the location of trails, rest areas, educational kiosks, parking and facilities. A recreation benefit analysis was prepared by the Corps of Engineers to examine the expected visitation and to evaluate the economic value of the proposed recreation

opportunities. This economic (unit-day) analysis included ranking of certain evaluation criteria including added recreational opportunities, the availability of similar nearby recreation opportunities, the adequacy of proposed facilities for activities, accessibility and the environmental aesthetic qualities of the site. Details of the economic analysis are presented in the Economics Appendix.

Recreation Trails and Associated Features

The U.S. Forest Service (USFS) manages the Los Padres National Forest in the upper portion of the Matilija Creek watershed. A trailhead provides access to the wilderness area upstream of the dam site beyond the cluster of private residential holdings that line the middle reach of Matilija Creek. This trailhead also functions as a conduit for reaching three trails maintained by the USFS including the trail that traverses the Upper North Fork of Matilija Creek, the Bald Hills Trail, and a trail that coincides with an unimproved road up Matilija Canyon. These three trails also provide access to four campgrounds in the Matilija Creek watershed, including the Maple, Middle Matilija, Matilija, and Murietta campgrounds, as well as access to other trails that continue to other areas of the Forest.

The new trail includes a hiking trail linking the existing Los Padres National Forest Matilija Wilderness Area trails to the Matilija Reservoir Area (See Figure 4-13). The dirt trail would then be designed for multiple uses (hiking, equestrian and mountain biking) from Rest Area C (Figure 4-13) along the existing unimproved access road that parallels the eastern edge of the Matilija Reservoir Area to the road entrance below the dam site. The upper portion of the trail lies within the footprint of the sediment deposition behind Matilija Dam on lands already owned by the Sponsor.

A future parallel trail could be cut down slope from the multi-use trail in the vicinity of the dam site. This trail would facilitate better access to the project site while providing opportunities for low-impact wildlife observation near the riparian areas of the creek. Because the lower trail would be located in an area currently inundated with sediment, precise delineation of the lower trail would be subject to coordination with the specifications associated with the project and may require evacuation of sediment from the storage sites prior to construction.

The multi-use trail would continue downstream along the Ventura River using the slurry pipeline and service road alignment after completion of that phase of the project. The trail would extend from Matilija Road to the Highway 150 Bridge (Baldwin Road) crossing (see Figure 4-14). An opportunity is available to link the new trail to the network of other trails located in the adjacent [Ventura River-Rancho El Nido Preserve](#) managed by the Ojai Valley Land Conservancy. The Sponsor would pursue a link between the lower end of this proposed trail at Highway 150 Bridge crossing to the County of Ventura Ojai Valley Trail located along Highway 33, about a ¼ mile away.

An optional link to provide a paved biking path may be pursued for the project, where the existing Ojai Valley Trail bikeway is extended from the Highway 150/ Highway 33

junctions to the dam site. This optional link would be a shorter distance, but would require more coordination.

Vegetative barriers, such as chaparral, would be used along portions of the trail to protect adjacent private properties and environmentally sensitive habitat areas from unwanted access by trail users. Fencing would be installed where vegetative barriers could not be used.

Two trailheads would be constructed for the multi-use recreation trail. The lower site would be located at the Highway 150 Bridge as part of the restoration plan for the disposal site, and the upper site would be at Rest Area A at the current location of Matilija Dam. Consideration would be given to including turnarounds, parking, footbridges and other measures for access and circulation as well as safety measures along the trails.

Three rest areas are proposed for the project area based on existing facilities and landscape features. Specific facilities at these areas could include comfort stations, shelters, picnic areas, drinking fountains and faucets, interpretive signs and markers, and similar features consistent with Corps of Engineers guidance.

Rest Area A, located at the dam site, has the greatest opportunity for interpretation, as well as ancillary facilities such as restrooms and water. At a minimum, this 9-acre area could function as a gateway and staging area to the project area as well as Matilija Canyon as a whole. The Matilija Hot Springs complex could also potentially be used as this staging area. Rest Area A could include an informational kiosk and educational materials or potentially a small interpretive center. The rest area would also include plans for vehicular parking for approximately 20 vehicles. This location is also strategic for the local community in that it would alleviate the adverse effects of recreational staging in the residential area further up Matilija Canyon.

Rest Area B would be located at Hanging Rock, a historically significant geologic landmark that has been buried due to sedimentation associated with operation of the dam. The Hanging Rock is a landmark that has been the subject of many historic postcards and images of Matilija Creek to the point of being an icon of the area. Should the opportunity arise as a result of the project to restore this landscape feature, the Hanging Rock would be a likely location where users would stop along the trail. As such, this would be a strategic location to provide interpretive amenities and/or a rest area. The historic significance of this site as a natural landscape feature would provide numerous interpretive opportunities.

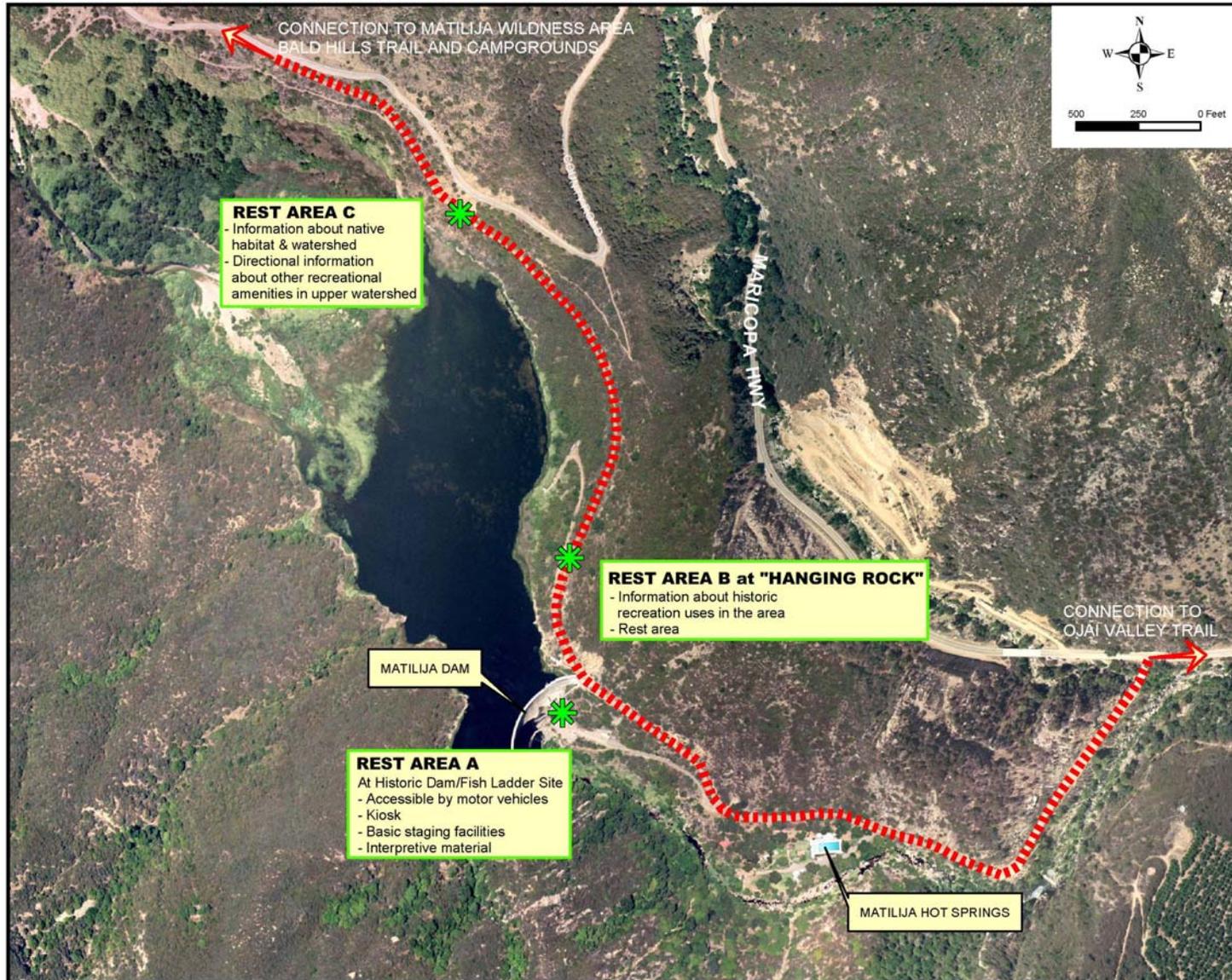
Rest Area C would be located at the northern end of the immediate project area where the proposed multi-use and hiking trails converge. This site could be designed to encourage casual trail users to turn around to minimize impacts to residences further up the canyon. An alternative route would be safer for both trail users and motor vehicle drivers while providing a more wilderness/rural experience for the trail user and minimizing potential conflicts between recreation and canyon residents.

Secondary interests for the management of the recreation trails are being pursued because the Sponsor cannot assume long-term responsibility for OMRR&R of the proposed recreational facilities based on the constraints of our mission statement. Provisions are made for recreational uses of VCWPD facilities only where it does not interfere and is not inconsistent with the broader public safety purpose, as is the case for the proposed recreation trails for the Matilija Dam Recommended Plan. Therefore, VCWPD can participate in the costs associated with the acquisition, construction or installation of the recreational trail and other features, but not the OMRR&R of the trail.

The Sponsor has initiated discussions with the U.S. Forest Service and the Ojai Valley Land Conservancy. Both entities have indicated interest in extending their OMRR&R responsibilities to include new trails that would connect to existing trails they currently maintain. The U.S. Forest Service would only be interested in extending their OMRR&R responsibilities of trail maintenance through Matilija Canyon, upstream of Matilija Dam. Other entities, including the County of Ventura Parks Department and the Trust for Public Lands have also been identified as potential sponsors. However, no formal agreements have been reached.

The VCWPD will assume responsibility for the OMRR&R at this time, and will take the lead in securing a long-term sponsor for the recreational trails until such time that VCWPD secures a second party OMRR&R agreement. The issue of OMRR&R will be further addressed during the detailed Planning, Engineering and Design (PED) phase of the project. The trail above Matilija Dam will be excluded from the final plan prior to execution of a Project Cooperation Agreement (PCA) if the U.S. Forest Service agrees to operate and maintain that portion of the trail.

The potential recreation benefits identified in the economic appendix justify a recreation cost of about \$4,000,000. Total estimated construction costs for the recreation features, including trails, signs, fencing and barriers and rest areas are about \$1,000,000. The costs of the recreation trails and associated facilities are well justified based on the economic benefits.



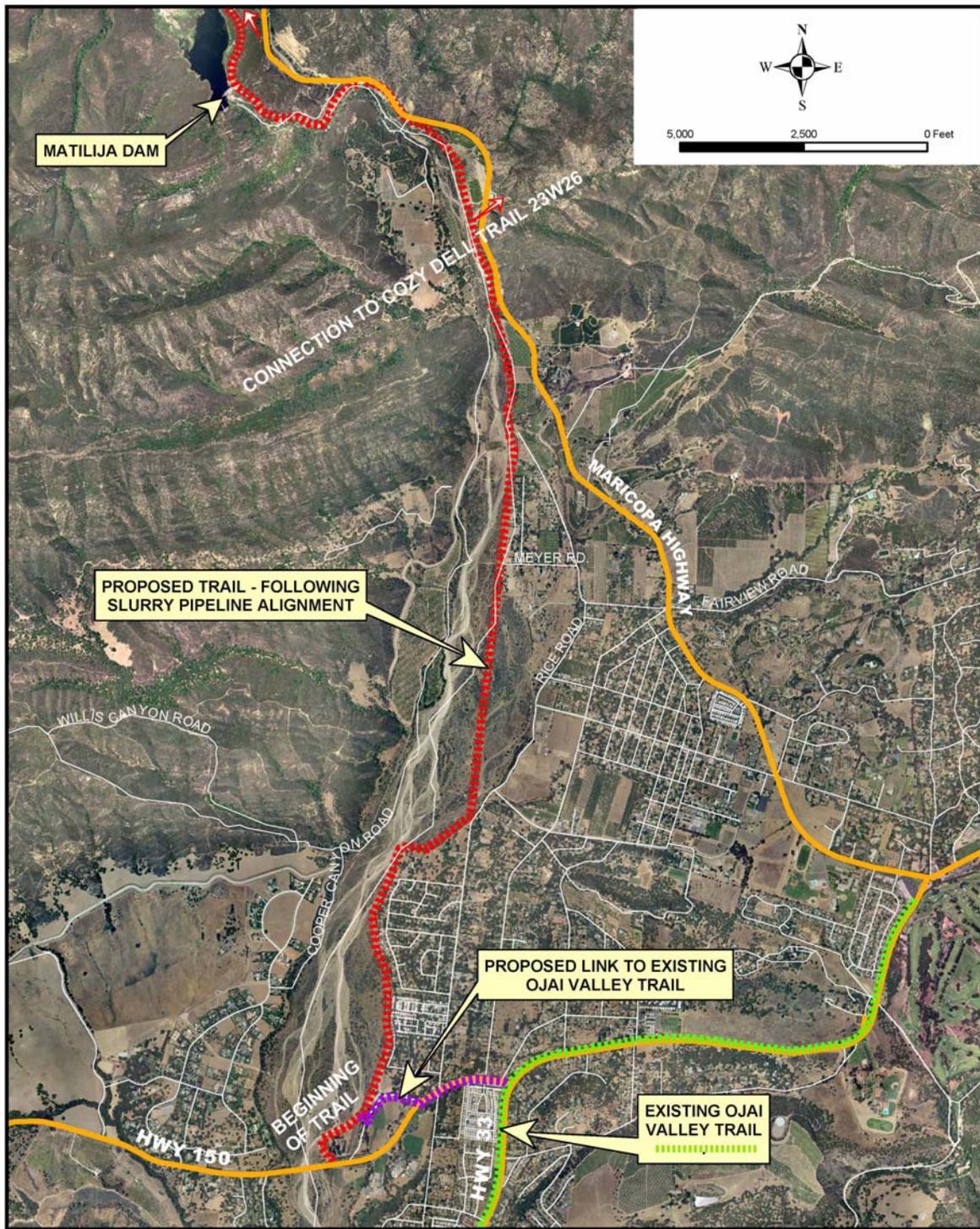


Figure 4-14 - Lower Portion of Recreation Trail

Design and Construction Considerations

Preconstruction, Engineering and Design studies (PED) will be accomplished to further design the project features and prepare plans and specifications. These studies will include further analysis of sediment transport potential and impacts, particularly as related to ecosystem benefits, induced flood damages and impacts to water supply and quality. The results of these studies will be used in further design of the mitigation features. The further development of these mitigation features will also consider the potential for other less costly or environmentally acceptable measures to be used for mitigation.

Further investigations will also be conducted on the dam structure itself and methods for dam removal. This will include finite element studies on the dam structure to better define the approach for dam removal.

It is recognized that the construction sequence for the project will require mitigation measures for induced flooding and impacts to water quality to be implemented prior to dam removal. The construction of the mitigation features could occur coincidentally with removal of sediments from the reservoir area. In fact, PED studies will further analyze the reservoir materials and sediment basin material to determine whether they can be used for levee and floodwall construction.

Operations, Maintenance, Repair, Rehabilitation & Replacement Considerations (OMRRR)

An Operation and Maintenance Manual will be developed as part of turning the project over to the local sponsor. The manual will describe the specific requirements expected for properly operating and maintaining project features to assure they will continue to function. The OMRRR requirements for the project features are described in general below.

Ecosystem Restoration Features

The most significant OMRRR requirements will be for the giant reed management/removal plan for Reaches 1 through 9. Over 80 percent of total OMRRR for the Recommended Plan is for this feature.

In general, there will be little OMRRR requirements necessary for those features of the project specifically related to sediment management in the reservoir basin after construction and adaptive management is completed. Occasional grading will be necessary behind the soil cement to prevent undermining of the backside of the structure. As sediment behind the soil cement is depleted, the soil cement will be removed in stages and the residual area of the reservoir will be revegetated, as necessary. It is expected that all sediments associated with the dam will be depleted after a 10 to 20-year period and the hydrologic and sediment transport relationships in this reach will be restored to pre-dam conditions.

Mitigation for Induced Flooding

The OMRRR requirements for the induced flooding mitigation features will require maintenance of the levees and floodwalls. This includes periodic inspections, especially after flood events of the constructed features, and appropriate repair of any damages that could impact its function.

The on-going sediment removal program performed by the Sponsor in the vicinity of Santa Ana Bridge will need to continue as the channel upstream of the bridge will still remain a constriction.

Mitigation for Water Supply Impacts

Sediment deposition OMRRR will be required at Robles Diversion Dam, although maintenance should not be substantial with the construction of the sediment bypass. The responsibility of removal of the additional accumulation of sediment at the Robles Facility, attributed to the release of trapped sediment from Matilija Dam, will be borne by the Sponsor.

Other Environmental Features

At the Robles Diversion facility, anticipated additional deposition of mostly sandy sediment will occur at the fish screen and within the fishway. For the recommended plan, preliminary estimates of two to three feet of deposition, or about 400 cubic yards, may occur upstream of the fish screen once or twice a year. Some deposition would occur in the fishway. Under baseline conditions, the fishway has been designed to require only low maintenance and to typically function for the entire diversion season before requiring routine maintenance. Under with-project conditions, adaptive management would be needed to insure that if the fish screen or fishway was affected by sediment accumulation and was operating at a below normal capacity, maintenance intervention would be limited as much as possible to outside the migration period. Should maintenance to the structure(s) be required during the migration season, the portion of the facility requiring maintenance would be shut down only for as long as needed to perform the necessary maintenance. With a sediment bypass in place, shutdowns to the diversion facility (which would also affect the fishway) due to large sediment accumulation in the basin should be limited.

Recreation Plan

Maintenance requirements needed for the Recreation Plan include items to assure continued functioning of the features and public safety. This will include assuring trails are kept clean of debris, emptying trash barrels, repairing or replacing picnic facilities, comfort stations, etc.

Desilting Basin

OMRRR requirements for the desilting basin, which is included as an associated feature, will require periodic removal of sediments (silts and clays), including chemical additives, such as ferric chloride, used to promote settling, to restore trapping capacity. The basin sediments would be cleaned out after sedimentation depths exceed one-foot, or prior to the beginning of the rainy season. The materials will be deposited at a permanent storage site, a preferred location currently identified as Bureau of Reclamation land less than 1 mile away from Lake Casitas along the Robles-Casitas Canal.

The permanent storage site will be operated and maintained in a similar fashion as a standard landfill. Disposed materials would be graded to drain to a collection system. The site, underlain by a synthetic barrier, will include a leachate collection system. Collected leachate will be disposed of in accordance with environmental regulations. A monitoring program will be

implemented to insure that no contamination to the local groundwater occurs both during operation and following closure of the site. Once the site has reached capacity, an impermeable soil cap will be placed over the site and will be subsequently replanted with native vegetation. Efforts that will include detailed design and operation of the desilting basin and the permanent storage site will be conducted during the Pre-Construction, Engineering and Design phase.

Project Costs

First Costs

Table 4-4 presents the details of the first costs required for implementing the Recommended Plan. The estimated project first costs have been developed in accordance with MCACES estimating procedures and guidelines for estimating project construction costs. The current estimate of costs are based on FY 2004 price levels and reflect estimates developed by the Los Angeles District and review of information provided by the local sponsor. The cost estimate includes those costs needed for implementing the project. This includes costs for all LERRDs, construction of the ecosystem restoration features, construction of mitigation requirements to reduce induced flooding and water supply impacts, monitoring and adaptation measures, cultural resource mitigation, and costs to construct the recreation plan. The first cost of the project also includes the cost for the next phase of study, the Pre-Construction, Engineering and Design (PED) phase. The PED costs are estimated to be 10% of total construction costs, and include such products as the final detailed design, the plans and specifications, further development of real estate requirements, actions necessary to acquire estates, and costs for developing and executing a Project Cooperation Agreement (PCA) for the construction phase. The first cost of the project also includes Supervision and Administration (S&A) costs of construction activities and engineering during construction (E&D) (6.5 % for S&A and 1% for E&D, respectively).

Real Estate Costs

LERRD costs are based on a review of real estate acquisition requirements and costs provided by the Ventura County Watershed Protection District. The real estate estimate includes acquisitions costs for the Matilija Hot Springs, Camino Cielo structures, Camino Cielo and Santa Ana Bridge right-of-way, and right-of-way for the levees and floodwalls at Meiners Oaks, Live Oak and Casitas Springs, slurry line and slurry disposal sites. The groundwater wells at Foster Park will require a right-of-entry (temporary work) permit. The cost estimate also includes VCWPD administrative costs for acquiring the necessary estates and Federal costs for assuring all estates are available for the project. Details are presented in the Real Estate Plan Appendix.

Table 4-4: First Cost to Implement the Recommended Plan (Fiscal Year 2004 Price Levels)				
Description	Estimated Quantity	UOM	Unit Cost	Estimated Cost
REAL ESTATE				
LERRDS				
Non-Federal Sponsor Owned Land, Easements & ROW	1	LS	\$872,500	\$872,500
Land, Easements & ROW to be Acquired by Non-Fed Sponsor				
Fee	1	LS	\$5,570,000	\$5,570,000
Permanent Easement (including Arundo removal)	1	LS	\$80,500	\$80,500
Temporary Easement	1	LS	\$150	\$150
PL 91-646 Relocation Assistance	1	LS	\$750,000	\$750,000
Facility/Utility Relocation	1	LS	\$4,570,000	\$4,570,000
Non-Federal Sponsor Admin Cost	1	LS	\$500,000	\$500,000
Remove Existing Camino Cielo Bridge/Replace 150' Long Bridge	1	LS	\$5,100,000.00	\$5,100,000
Santa Ana Bridge Modification (75' extension)	1	LS	\$2,800,000.00	\$2,800,000
Federal Admin Cost	1	LS	\$35,000	\$35,000
SITE PREPARATION				
Mobilization, Demobilization, and Preparatory	1	LS	\$5,000,000.00	\$5,000,000
Clearing & Grubbing	134.60	ACR	\$3,800.00	\$511,480
Arundo Eradication				
Eradication (Reach 7)	118.00	ACR	\$10,000.00	\$1,180,000
Eradication (Reach 8 & 9)	0.40	ACR	\$28,000.00	\$11,200
Diversion & Control of Water	1	LS	\$100,000.00	\$100,000
Fish Rescue & Relocation	1	LS	\$100,000.00	\$100,000
MATILJA RESERVOIR SEDIMENT COMPONENTS				
Diposal Site Closure	1	LS	\$200,000.00	\$200,000
Soil Cement Wall	62,900	CY	\$30.00	\$1,887,000
Channel Excavation	1,113,000	CY	\$3.00	\$3,339,000
SLURRY SYSTEM COMPONENTS				
Import Water from Casitas				
Cost of Water	4,500	ACR-FT	\$171.00	\$769,500
Pipeline Corridor Preparation (24ftx22,000ft)	648,000	SF	\$1.00	\$648,000
Fresh Water Supply Pumps, 800 HP Each, Goulds Vertical Turbines, in Parallel	1	EA	\$125,000.00	\$125,000
Power to Pumps from Casitas for 9 Months	3,900,000	KW-HRS	\$0.15	\$585,000
Fresh Water Pipeline, 8 Miles Long, 24"x.357" Wall, A53 Cast Iron	42,240	LF	\$15.00	\$633,600
Water Storage Tank, 90,000 Gal, 25ftx25ft Carbon Steel	1	EA	\$130,000.00	\$130,000
Makeup Water Pumps, 900 HP Each, Goulds Centrifugals, in Series	3	EA	\$112,000.00	\$336,000
Makeup Waterline, 1 Mile Long, 24"x.357" Wall,	5,280	LF	\$26.00	\$137,280

Table 4-4: First Cost to Implement the Recommended Plan (Fiscal Year 2004 Price Levels)				
Description	Estimated Quantity	UOM	Unit Cost	Estimated Cost
A53 Cast Iron				
Power for Makeup System for 9 Months	13,053,000	KW-HRS	\$0.15	\$1,957,950
12" Cutter Head Suction Dredge, 9 Months Continuous Slurry System	2	EA	\$3,150,000.00	\$6,300,000
Pipeline Corridor Preparation (30ftx41,470ft)	1,244,100	SF	\$1.00	\$1,244,100
Thickener, 115' Diameter, incl. Flocculant Package, 40 HP Rake Motor	1	EA	\$1,100,000.00	\$1,100,000
Slurry Pipeline, 7.85 Miles Long, 20" SRD 11, HDPE Pipe, 16.146" ID	41,470	LF	\$23.00	\$953,810
Slurry Pumps, 1,200 HP Each, Warman Slurry Pumps in Series	1	EA	\$88,000.00	\$88,000
Power for Slurry System for 9 Months	1,934,000	KW-HRS	\$0.15	\$290,100
Operation Crew: 4 Operators, 1 Technician, 24hrs x 270 days	26,000	MAN-HRS	\$54.00	\$1,404,000
Clear disposal area	97	ACR	\$4,300.00	\$417,100
Construct containment dikes (excavation, place & compact in disposal area)	416,000	CY	\$5.00	\$2,080,000
Misc. detail at dikes (drainage, grading, imported stone 4600cy)	1	LS	\$671,000.00	\$671,000
Dust Abatement	1	LS	\$135,000.00	\$135,000
Site Restoration	1	LS	\$1,037,500.00	\$1,037,500
Road Repair	2	MILE	\$61,300.00	\$122,600
DAM REMOVAL COMPONENTS				
Excavation & Removal of Concrete Fish Trap	120	CY	\$245.00	\$29,400
Excavation & Removal of Concrete Control House	70	CY	\$300.00	\$21,000
Excavation of Concrete Dam	51,100	CY	\$36.00	\$1,839,600
Drilling & Blasting for Dam Removal				
Blasting Horizontal Rows	9,550	EA	\$18.00	\$171,900
Drilling Horizontal Holes	124,400	LF	\$28.00	\$3,483,200
Blasting Vertical Holes	7,600	EA	\$19.00	\$144,400
Drilling Vertical Holes	122,000	LF	\$23.00	\$2,806,000
Process Concrete for Hauling	9,638	CY	\$2.00	\$19,276
Haul Concrete to Recycling Plant	72,285	CY	\$25.00	\$1,807,125
Removal & Disposal of Misc. Metal Work	46,513	LB	\$2.50	\$116,283
ROBLES DIVERSION DAM COMPONENTS				
High Flow Sediment Bypass (for project life)				
Radial Gates (120' section)	1	LS	\$3,300,000.00	\$3,300,000
Timber Crib Structure Replacement (210' section)	1	LS	\$1,350,000.00	\$1,350,000
DOWNSTREAM FLOOD MITIGATION COMPONENTS				
Levees/Floodwalls				
Meiners Oaks/Robles Levee/Floodwall	1	LS	\$1,100,000.00	\$1,100,000
Live Oaks Levee/Floodwall	1	LS	\$1,300,000.00	\$1,300,000
Casitas Springs Levee/Floodwall	1	LS	\$413,000.00	\$413,000
FOSTER PARK COMPONENTS				

Table 4-4: First Cost to Implement the Recommended Plan (Fiscal Year 2004 Price Levels)				
Description	Estimated Quantity	UOM	Unit Cost	Estimated Cost
Wells	2	EA	\$400,000.00	\$800,000
DOWNSTREAM ARUNDO ERADICATION				
Arundo Control				
Control (Reach 1-6) Med-High Density	123.00	ACR	\$28,000.00	\$3,444,000
Control (Reach 1-6) Low Density	1,059.00	ACR	\$1,500.00	\$1,588,500
Subtotal				\$77,506,054
Contingency			25%	\$19,376,513
Planning, Survey, Engineering and Design			10.00%	\$7,750,605
Engineering During Construction			1.00%	\$775,061
Supervision and Administration			6.50%	\$5,037,893
TOTAL PROJECT CONST. COST FOR RECOMMENDED PLAN				\$110,450,000
Cultural Resources			1%	\$1,104,500
Monitoring			2%	\$2,209,000
Adaptive Management			3%	\$3,313,500
TOTAL NER PROJECT COSTS FOR RECOMMENDED PLAN				\$117,077,000
Desilting Basin (Associated Feature)			LS	\$5,700,000
Recreation			LS	\$1,000,000
TOTAL PROJECT COSTS FOR RECOMMENDED PLAN				\$123,777,000

Monitoring and Adaptive Management Plan Costs

The costs for the adaptive management are based on Corps of Engineers upper limit guidelines. The cost for monitoring is estimated to be 2 percent of total project costs and will not exceed a ten-year period. The cost for adaptive management is estimated not to exceed 3 percent of total project costs. The plan and costs will be refined during the Pre-Construction, Engineering, and Design phase.

Associated Feature Costs

The cost for the desilting basin is considered an associated feature since it is expected that the control of fine sediment without the feature is sufficient to mitigate adverse impacts to Lake Casitas. It is estimated to cost about \$5.7 million for construction.

OMRRR Costs

The costs for operation, maintenance, repairs, replacements, and rehabilitation of project requirements are presented in Table 4-5. These costs are presented on an average annual basis.

Feature	Duration	Avg. Annual Cost
Grading behind Soil Cement Revetment	1 st 10 Yrs	\$1,200
Rip Rap for Downstream Slope Protection (for project life)	Once every 10 Yrs	\$1600
Robles Sediment Basin Excavation	1 st 5 Yrs	\$9,200
Other Water Supply Mitigation Measures	1 st 7 Yrs	\$1,100
Channel Sediment Removal	50 Yrs	\$5,000
Arundo Removal/Control (Reaches 1-9)	50 Yrs	\$242,000
Subtotal NER OMRRR Costs		
Recreation Plan	50 Yrs	\$90,000
Total OMRRR		\$350,000

Project Benefits

Ecosystem Restoration Benefits

Prior to construction of Matilija Dam in 1947, historic records reported the Ventura River watershed supported a substantial steelhead run of at least 4,000 to 5,000 spawning fish. Sections of the middle to upper Matilija Creek are thought to have been the primary spawning habitat, representing over half of the historically used habitat. Today, the steelhead is designated a Federal endangered species.

The Recommended Plan would remove Matilija Dam and reservoir area and restore fish passage and eventually the natural ecology to pre-dam conditions. Matilija Creek in the reaches upstream of Matilija Reservoir's influence has high quality spawning and rearing habitat. About 21.6 miles of prime steelhead habitat will be available including an estimated 4.3 miles of habitat on the Lower North Fork of Matilija Creek and 17.3 miles of habitat above Matilija Dam. The Plan will also restore a more natural ecology consistent with about 30 miles of the upper reaches of Matilija Creek and its tributaries that are designated as Wild and Scenic Rivers.

The Recommended Plan will also result in improved ecology downstream from the dam, where many reaches have experienced severe erosion since construction of Matilija Dam. The elimination of the Dam will restore natural hydrologic and sediment transport conditions, such that many of the eroded areas could recover to a more stable equilibrium.

The Environmental Working Group included representatives from the California Department of Fish & Game, National Marine Fisheries Service (NMFS), USFWS, University of California's Cooperative Extension, Casitas Municipal Water District (CMWD), the Matilija Coalition, the

Southern California Wetlands Recovery Project, VCWPD and the Corps. As presented in earlier Chapters, this group developed a modified Habitat Evaluation Procedure (HEP) to measure the relative value of biological resources of concern in quantitative, non-monetary terms. Three riparian ecosystem components were used to quantify HEP values: riparian habitat, steelhead habitat and natural processes. Details of the HEP analysis for without- and with-project conditions are presented in HEP Appendix of the EIS/R.

The HEP value in terms of natural processes for the reservoir is considered very low due to the extreme alteration of hydrologic regime and the unnatural alteration to the sedimentation regime. The environment has transformed from a pre-dam riverine system, to an open water and delta system following the construction of Matilija Dam.

The Recommended Plan will remove Matilija Dam and eventually the sediments trapped in the reservoir will be depleted resulting in a more natural hydrologic and sediment transport system similar to pre-dam conditions. The with-project HEP values shown in Table 4-6 reflect that just over 17 miles of habitat will be re-opened to southern steelhead and, as a result, significant environmental outputs will be produced. Reaches 8 and 9 are presently considered high quality steelhead habitat and would be accessible to steelhead once the dam is removed and a more natural channel condition is created. The quality of steelhead habitat in Reaches 6 and 7 will gradually improve as the beneficial effects from the removal of the dam are manifested. Smolt productivity, for example, will increase, as there is more efficient movement of nutrients downstream. Reach 7 will eventually return to near pre-dam conditions.

TABLE 4-6: HEP Comparison of No Action to Recommended Plan (Habitat Units)

TARGET YEAR	Steelhead Habitat Component		Riparian Habitat Component		Natural Processes Component		TOTALS	
	No Action	With Project	No Action	With Project	No Action	With Project	No Action	With Project
0	177	177	1032	1032	228	228	1437	1437
5	234	501	1029	1125	228	240	1491	1866
20	234	543	944	1145	228	520	1406	2208
50	234	544	782	1183	286	570	1302	2297
AAHUS	231	514	917	1147	245	464	1393	2128
Change in AAHUs	----	283	----	229	----	219		731
% Change	----	122%	----	25%	----	89%		53%

The removal and management of giant reed (*Arundo donax*) and other exotic plant species will greatly improve the riparian ecosystem quality within the study area.

The reestablishment of natural sediment transport processes will improve the quality of the habitat in the Ventura River in terms of natural riverine processes. Reach 6 and 7 will benefit the most, with the latter becoming more similar to pre-dam conditions with time. The improvement to the habitat quality from a natural processes perspective is less dramatic in the downstream reaches.

Coastal Benefits

Sediment released from behind the dam and the Matilija watershed will not only deposit within downstream Ventura River reaches, but will also nourish the nearby shoreline. The sediment transport modeling showed that there would be an approximate 32% increase in the delivery of sands, gravels, and cobbles over a 50-year timeframe when compared to the No Action plan. This equates to an increase of about 1.9 million cubic yards of sand, 80,000 cubic yards of gravel and 5,000 cubic yards of cobble (see Table 3-2). The delivery of fines will also increase by about 6% over 50-years, by approximately 400,000 cubic yards. The fines will dissipate soon after delivery by the storms due to strong littoral currents.

Cobbles are anticipated to settle by the mouth of the Ventura River at Surfer's Point. The cobbles act to stabilize the point, thereby decreasing the potential nearby shoreline erosion. Each cubic yard of additional sand could potentially equate to an additional square foot of dry sand on the beach based on the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) estimates. The assumption is that some of the sand will deposit on the beach after storm events and will contribute to increases in beach widths, benefiting recreational beach uses, increasing the aesthetic appeal of the beach, and adding storm damage protection to local shoreline structures.

If other nearby sources were pursued for beach nourishment estimates of mechanical placement of sand on these beaches range between \$10 and \$15 per cubic yard. Therefore, the restored natural transport of sand to the shoreline also provides a significant economic savings when compared to sources of sand that require mechanical dredging and transport.

Delivery of additional sand and cobbles could also help stabilize the upper beach zone, a spawning habitat for the California grunion and the threatened western snowy plover. Coastal dunes in the area have also been subject to erosion. Additional beach sand could help to stabilize the dune loss, which provides habitat for the silvery legless lizard, a California species of special concern.

Nearshore habitats should not be adversely affected by increased sediment delivery from the Ventura River watershed. The plumes of fines could add nutrients to the coast. Hard bottom habitat is also not expected to be adversely impacted by the increased delivery of sediment due to the strong littoral currents in the nearshore area.

Flood Protection Benefits

Under without-project conditions there are about 170 structures within the 50-year floodplain, 220 residential, commercial and industrial structures within the 100-year floodplain and over 400 structures within the 500-year floodplain. There are a number of existing levees that provide protection to existing development. A preliminary estimate of potential flood damages that could occur under the without-project condition is about \$4 million and over \$5 million for the 50-year and 100-year events respectively, and over \$18 million for the 500-year event. Equivalent average annual damages are estimated to be about \$152,000. The relatively low average annual damage potential is not considered sufficient to justify flood protection measures as a separable project. However, in view of the potential increase in these damages resulting from with-project

sediment transport and deposition, mitigation for induced impacts is considered necessary. There could be some incidental benefits to the existing development as a result of these mitigation measures.

Water Supply Benefits

At the Robles diversion facility the sediment bypass structure will limit the amount of deposition in the sediment basin under with-project conditions to approximately existing conditions.

Other measures to control the with-project increase in deposition at the Robles diversion facility were dismissed after consideration and include more frequent sediment removal maintenance operations and sediment basin enlargement. The costs associated with either of these measures were greater than the sediment bypass structure (including the timber crib structure modification). Additional details are provided in the *Plan Formulation Chapter, Water Supply* section.

At the Foster Park facility (owned by the City of Ventura), the two groundwater wells as mitigation will offset the diversion losses due to operation shutdown of the surface diversion when turbidity concentrations exceed maximum allowable levels under with-project conditions. An estimate for lost water diversion opportunity due to number of shutdown days from high turbidity was determined for a 12-year period. The replacement cost of the water, using the least cost rate (Casitas Municipal Water District- from which the City of Ventura does not fully utilize its full entitlement) justifies the cost of the two wells.

Economic Summary

Table 4-7 presents an economic analysis of the Recommended Plan. The estimated first costs and OMRRR costs have been developed using the Corps MCACES cost estimating system.

Table 4-7: Economic Analysis of Recommended Plan	
Item	Amount
First Cost	
LERRDs	\$25,340,000
Construction	\$71,540,000
Monitoring and Adaptive Management	\$5,520,000
Cultural Resources	\$1,100,000
Subtotal	\$103,510,000
Engineering and Design	\$8,530,000
Supervision and Administration	\$5,040,000
Subtotal	\$117,080,000
Total NER First Costs	\$117,070,000
Associated feature- Desilting Basin	\$5,700,000
Recreation Plan	\$1,000,000
Total Project First Cost	\$123,770,000
Average Annual Cost	
Annual Cost of Total Gross Investment	\$7,403,000
OMRR&R	\$260,000
Total Average Annual Cost	\$7,663,000
Average Annual Benefits	
Increased Habitat Units	731
Number of acres Restored	2,814
Incidental Flood Protection	
Incidental Water Supply	
Recreation	
Total non-monetary benefits	731
Total monetary benefits	N/A
Average Annual Cost per Habitat Unit	\$10,127
Avg Annual Equivalent Cost per Acre	\$2,723/acre
First Cost per Acre	\$43,984/acre

The first costs include all costs associated with final design and construction and mitigation of the project, LERRDs, and monitoring and adaptation. The OMRRR costs are presented on an average annual basis. The average annual costs include the interest and amortization of project first costs, including interest during construction, and OMRRR costs, presented on an average annual basis. These values are based on Fiscal Year 2004 price levels, and an interest rate of 5.625 percent and a 50-year period of economic analysis. The costs for associated features, and the recreation Plan are not included in the average annual cost calculations for the NER analysis. The average annual benefits reflect the increase in habitat units based on HEP values, reflecting non-monetary benefits.

Project Justification

The Recommended Plan is considered justified based on the significance of the non-monetary benefits as compared to average annual costs. The average annual cost per habitat unit is \$8,890 and the first cost per acre is \$37,070. The ecosystem benefits are considered very significant in view of the restoration of 2,814 acres of important riparian and wetland habitat for a wide variety of native wildlife species, including many sensitive species and several threatened and endangered species.

Environmental Commitments

The environmental impacts of the Recommended Plan are addressed in the Environmental Impact Statement/Environmental Impact Report (EIS/R). Table ES-1 in the EIS/R presents a summary of the impacts associated with the Recommended Plan and mitigation measures that are being considered for incorporation into the project.

The efforts for the Matilija Dam Ecosystem Restoration Recommended Plan encompass a watershed scale and would restore essential physical and natural processes responsible for creating and sustaining habitats and ecosystem functions that support a wide variety of native species, including listed species. The Plan would also benefit current weak stocks of southern steelhead by providing the species access to historically high quality spawning and rearing steelhead habitat.

The primary beneficial impact of the Recommended Plan is restoration of Matilija Creek to natural riverine conditions prior to construction of Matilija Dam. This results in allowing fish passage to over 17 miles of historic spawning and rearing habitat area for the Federal endangered steelhead. Although it eliminates the lake ecology currently existing, it is expected that this environment would eventually be lost due to continued sediment trapping in the reservoir area. There could be some adverse impacts to species currently existing in the reservoir area. These will be minimized by relocating significant species prior to and during construction operations in the dam and reservoir area. The recommended plan also includes removal and control of exotic and invasive plant species, particularly giant reed (*Arundo donax*) from the reservoir basin, upstream of the basin, and in the downstream reaches of the Ventura River. This action will reverse a habitat degradation trend in the watershed and will promote the support of sensitive species that rely on native willow, cottonwood, and other native riparian species. The action of dam removal will also benefit beach and coastline nourishment and the associated habitats.

The major adverse impacts relate to impacts of sediment transport to downstream areas, and measures to mitigate the impacts resulting from induced flooding potential and impacts to water supply operations. The removal of structures, replacement of bridges and construction of levees and floodwalls will have significant adverse impacts to existing habitat located in the construction footprints, and adjacent areas. The height of the levees and floodwalls will also impact aesthetics and local resident vistas.

Adverse impacts will occur to habitat at the desilting basin due to frequent sediment deposition and removal operations, and within the footprint of the sediment bypass facilities.

There will also be significant adverse impacts related to construction activities. These impacts will be minimized to the extent practicable by including best management practices as part of the environmental plan for construction.

Relationship to Environmental Requirements

The degree to which the Recommended Plan complies with the applicable laws, policies and plans is summarized in Table 4-9.

Table 4-9: Degree of Compliance with Environmental Requirements		
	Environmental Requirement	Status
Federal		
1	National Environmental Policy Act	On-going
2	Clean Air Act	On-going
3	River and Harbor Act	N/A
4	Clean Water Act, Section 404(b)	On-going
5	CEQ Policy on Prime or Unique Farmlands	N/A
6	Federal Water Project Recreation Act	N/A
7	Land and Water Conservation Fund Act	N/A
8	Marine Research and Sanctuaries Act	N/A
9	Watershed Protection and Flood Prevention Act	
10	Wild and Scenic Rivers Act	N/A
11	EO 11988 – Flood Plain Management	
12	Archaeological and Historic Preservation Act	On-going
13	EO 11593 – Protection and Enhancement Cultural Environment	On-going
14	National Historic Preservation Act	On-going
15	Coastal Zone Management Act	On-going
16	Fish and Wildlife Coordination Act	On-going
17	Estuary Protection Act	N/A
18	Endangered Species Act	On-going
19	Executive Order 11990 – Wetlands	On-going
20	Chief of Engineers Wetlands Policy	
State		
21	State of California Wetlands Policy	On-going
Local		
22	Local Land Use Plans	
Legend		
	On-going – will be completed for the EIS/EIR	
FC:	Full Compliance – All requirements of the law, policy, or related regulations have been met.	
PC:	Partial Compliance – Some requirements of the law, policy, or related regulations has been met.	
NA:	Not Applicable – The law, policy, or related regulations do not apply.	