

CHAPTER 9 - RECOMMENDED PLAN

This chapter describes the recommended plan, as well as procedures and cost sharing required to implement the plan. A schedule and list of further studies are also included.

9.1 RECOMMENDED PLAN

The plan identified as the recommended plan is Combined Alternative 6 (see Figure 9-1). The recommended plan is described in detail below.

9.1.1 Features and Accomplishments

The principle features of the recommended plan are (1) construction of 6.8 miles of setback levee to provide a more reliable form of flood protection to the community and agricultural areas, (2) degradation of the existing "J" levee to allow for reconnection of the river to the flood plain, and (3) restoration of about 1,500 acres of native habitat between the new setback levee and the Sacramento River.

Setback Levee/Training Dike. The 6.8-mile-long setback levee would have varying heights and consequently varying levels of performance. The entire length of setback levee would have a gravel road for patrolling, and would be fenced along the landside.

The new setback levee would begin about 2 miles north of Hamilton City, tying into high ground near the northern end of the "J" levee. Tying into high ground at this location would prevent flows greater than the 250-year event from possibly wrapping around the setback levee and flowing over County Road 203. The setback levee would be extended to a point just west of County Road 203, which would be ramped approximately 2.5 feet from its current height over the setback levee. Glenn County constructed a short setback levee near the northern end of the "J" levee in 2003. This short levee would provide additional protection against potential erosion along the Sacramento River. Entrenched rock would also be placed either on the waterside or the landside of the Glenn County setback levee additional protection for the new setback levee from erosion.

From the northern part of the study area to south of Dunning Slough, a distance of 4.4 miles, the levee would be on average of 7.5 feet high (6 feet for the "J" levee replacement levee and an additional 1.5 feet for the flood damage reduction increment). The new setback levee would run southeast along the County Road 203 until turning east and running along higher ground roughly parallel to, and about 1,300 feet to the west of, the Sacramento River. A seepage berm would be constructed on the landside of the setback levee from the northern end of the levee south to Dunning Slough. This portion of the levee would provide a 90 percent confidence of passing a 75-year event, thereby providing improved flood protection to the community of Hamilton City. The top-of-levee elevation for this portion of the levee would be set at the 320-year water-surface elevation (wsel). Some agricultural lands north of the community of Hamilton City would have improved protection, but would not be removed from the FEMA regulated flood plain.

At Highway 32, the levee would turn east and run parallel to the highway until tying into the approach to the Gianella Bridge. The highway would not need to be raised, but rock riprap would be placed to protect the levee embankment from induced overland flows. Grouted and/or

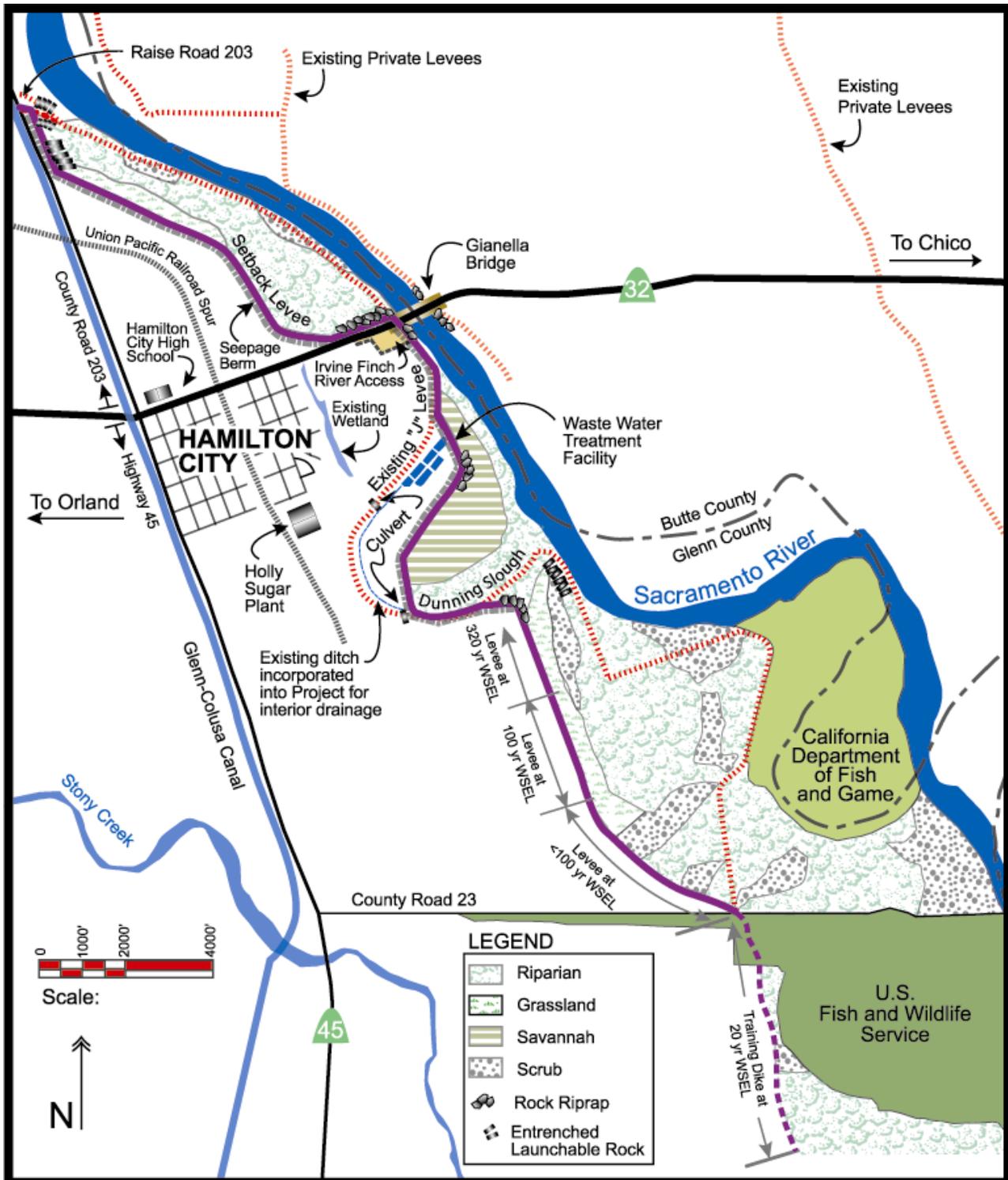


Figure 9-1: Recommended Plan

rock riprap would be placed under the bridge below the surface of the river to protect the bridge from potential increased velocities and potential scouring. South of Highway 32, the alignment would follow the existing "J" levee adjacent to the Irvine Finch River Access (just south of the highway). Some modification to the existing boat ramp may be required. South of the Irvine Finch River Access, the setback levee would be aligned away from the river to open up the flood plain.

The alignment would cut across a portion of Dunning Slough and provide protection to the Hamilton City wastewater treatment plant, some abandoned holding ponds for the old Holly Sugar plant, and a lime disposal pile. An existing ditch within Dunning Slough would be used to drain runoff from the agricultural fields and Hamilton City. This ditch would be connected to the flood plain via a culvert in the setback levee south of Dunning Slough.

South of Dunning Slough, the alignment would roughly follow along the western edge of the habitat restoration area before turning east and merging with the southern end of the "J" levee at County Road 23. As the levee turns east, the levee height would gradually decrease from 7.5 feet to 6 feet and would continue at this height for approximately 4,000 feet. The setback levee performance would be 90 percent confidence of passing the 35-year event. The top-of-levee would be set at the 100-year wsel. This change reflects the difference in land use behind the levee at this point (largely agricultural).

The setback levee height would then gradually decrease from 6 feet to approximately 3 feet. Just north of County Road 23, the new levee would become a "training dike" meant to redirect flows rather than control them. The training dike would perform with an 90 percent confidence of passing the 11-year event, and the top-of-levee would be set at the 20-year wsel. The training dike would reduce the frequency of flooding on the adjacent agricultural lands and reduce damages from scouring flows. Large flood events would overtop the training dike, spilling into the orchards without the damaging scouring flows and avoiding adverse hydraulic effects to downstream property owners. The training dike would also reduce the potential for backwater flooding in Hamilton City.

The training dike would continue for about 1 mile south of County Road 23, running along the western edge of the USFWS property boundary. A small ramp with culverts on either side would be constructed over the training dike at County Road 23 to maintain the river access. This alignment would not tie into high ground and would therefore allow some backwater flooding of agricultural lands, as currently happens with the "J" levee. In fact, the training dike would be designed to allow floodwaters to flow over the top and spread out onto the agricultural areas while reducing the high velocities that cause extensive damage to the orchards.

"J" Levee. In order to accomplish ecosystem restoration within the project area, most of the existing "J" levee would be removed to reconnect the river to the flood plain, allow overbank flooding, and increase capacity in the Sacramento River. The "J" levee would remain in place where it would serve to reduce velocities of the Sacramento River for establishment of newly planted habitat. Established riparian vegetation waterside of the existing "J" levee would be avoided wherever possible.

Native Habitat. Native habitat would be restored on all project lands waterside of the new setback levee. Restoration would also occur on the land within Dunning Slough and the land south of the USFWS property (Zones A-1 and B-2, respectively, on Figure 3-1). Existing orchards in the proposed restoration areas would be removed, and native vegetation would be planted. The predominant native vegetation would be riparian species, with some scrub, oak savannah,

and grassland species based on hydrologic, topographic, and soil conditions. An exception is the land in the middle of Dunning Slough. This land is relatively higher in elevation than the rest of the restored area, and oak savannah vegetation is anticipated to be more appropriate for these lands.

9.1.2 Hydraulic Effects

The recommended plan would provide the community of Hamilton City with a 90 percent confidence of passing a 75-year event. This protection would also be provided to lands north of Highway 32 and south to about Holly Sugar Plant south of Highway 32. The recommended plan would provide a 90 percent confidence of passing a 35-year event from south of Dunning Slough to just north of County Road 23. The training dike would provide a 90 percent confidence of passing an 11-year event to lands south of County Road 23. The training dike would also reduce frequent scouring floodflows and provide additional flood damage reduction benefits to structures within Hamilton City by lowering backwater flows.

Results from hydraulic modeling have shown that widening the floodway on the western side of the Sacramento River has reduced stages in Butte County. In addition, the water-surface elevation near Big Chico Creek has reduced stages, resulting in less overflow to Butte Basin. The reduction in flow would be about 2,000 cubic feet per second (cfs), while the Sacramento River is conveying about 343,000 cfs (320-year flood event).

Although the recommended plan would benefit both Glenn and Butte Counties and would provide regional benefits downstream by increasing storage in the system, a local increase in the water-surface elevation in the Sacramento River channel occurs only north of the Highway 32 bridge. Butte County just east of this area shows a decrease in water-surface elevation. This decrease suggests that additional flow is being conveyed through the Sacramento River. With the increase in flow, the bridge acts as a control, causing a localized increase in the water-surface elevation to push flow under the bridge.

The recommended plan could also provide regional attenuation of stage downstream of the project area due to more floodway storage from widening of the flood plain accomplished through removing the existing "J" levee and constructing the setback levee.

The recommended plan would provide hydraulic benefits because it would provide protection from flooding to the community and would reduce stages in the flood plains in the region. Increases in water-surface elevation would either occur in areas intended to be exposed to flooding (between the existing "J" levee and the setback levee) or would be contained in the river channel and would not constitute an adverse hydraulic effect.

9.1.3 Erosion Control

Placement of rock (entrenched and revetment) would be necessary at some points along the setback levee to ensure that the existing condition (community's ability to flood fight and pass the 12-year flood event) is not reduced and to offset potential scouring from changes in flows. Placement of rock would be as follows:

North End of the Project.

Entrenched rock would be buried in a 1,500-foot-long trench in Zone G, parallel to County Road 203 and approximately 200 feet from the toe of the levee. When the river erodes away the bank at the location of the trench, the rock would fall and armor the bank, preventing erosion beyond that point. Figure 9-2 shows existing erosion at the north end of the study area.



Figure 9-2: Erosion Along the Sacramento River Near North End of Study Area

Highway 32 Gianella Bridge.

Because the new levee would be set back from the existing "J" levee, the northern bridge approach would be exposed to direct flows. Since the bridge is not currently exposed to these direct flows, they could scour the approach. To ensure that the bridge is not compromised, 1,000 feet of rock riprap would be placed on and around the abutments. Because this rock would be necessary to maintain the existing condition, it is considered a part of equitable replacement of the existing "J" levee. Also, up to 100 feet of rock and/or grouted rock and/or a concrete lining would be placed under the Gianella Bridge at Highway 32 abutment specifically to protect it from exposure to higher velocities resulting from passing higher flows.

Dunning Slough. Because the levee would be set back from the existing "J" levee, a bend in the setback levee would be exposed to overland flows from multiple angles, which could erode the levee. To ensure that the levee is not subject to this erosion, 1,400 feet of rock riprap would be placed along the levee at the bend. Because this rock would be necessary to maintain the existing condition, it is considered a part of equitable replacement of the existing "J" levee. South of Dunning Slough, 1,500 feet of entrenched rock would be placed to protect the new levee from erosion and river migration.

Southernmost Extent. The setback levee would not affect the existing erosion conditions south of Dunning Slough. It is assumed that the Chico Landing to Red Bluff Project (local site constructed in 1975-1976) would remain authorized and continue to be maintained. For the new levee to perform to the same level as the existing "J" levee, erosion control at the end of the levee would consist of planting significant amounts of vegetation about 20 feet from the levee toe to reduce velocities at the levee.

9.1.4 Regional Benefits

Although designed to stand alone, the recommended plan complements a set of other projects that TNC and the SRCAF members are developing (see Figure 9-3). Collectively, these projects accomplish habitat protection, habitat restoration, improved ecosystem processes, coordinated flood plain management, and habitat restoration monitoring, thereby addressing

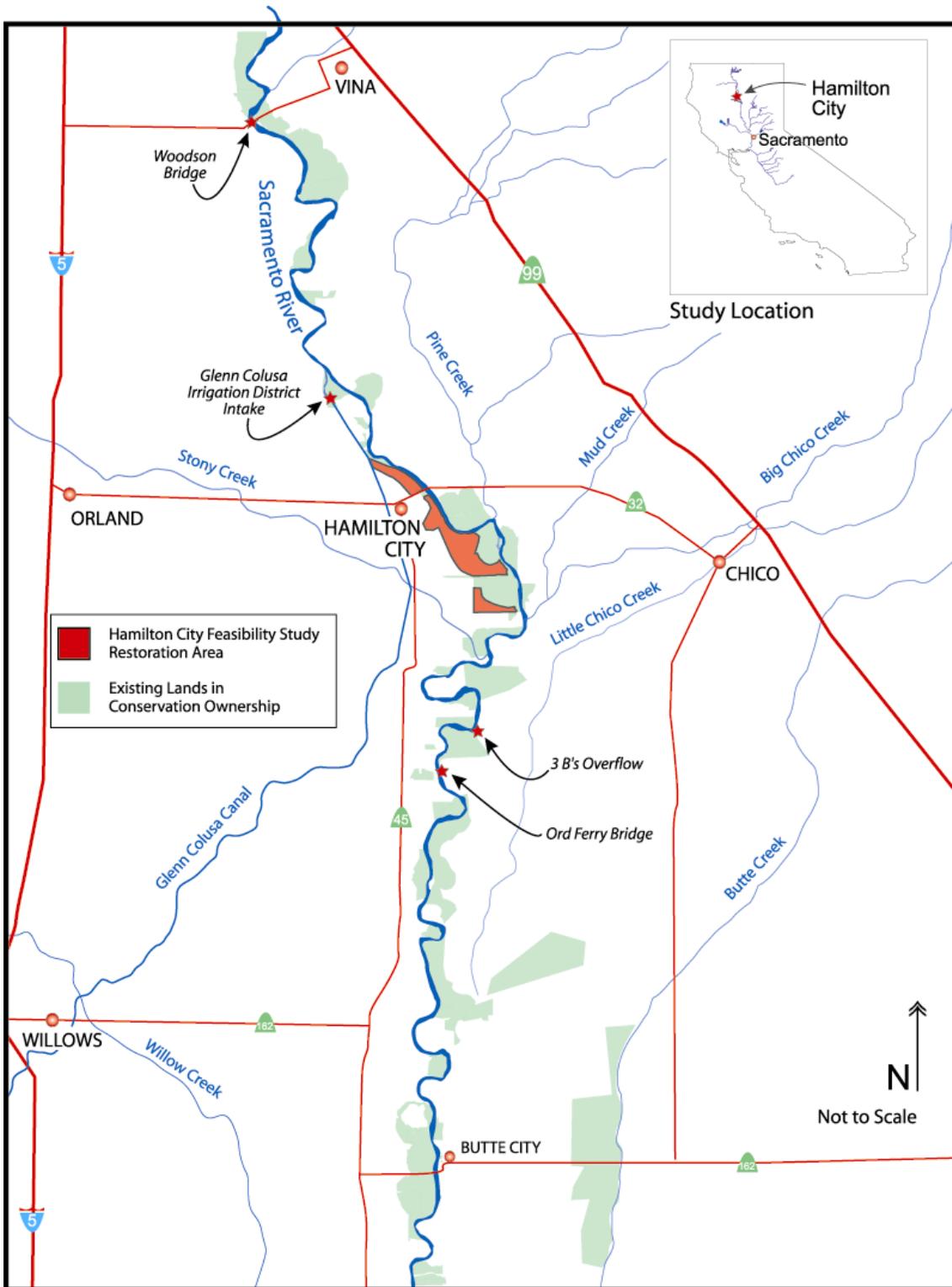


Figure 9-3: Regional Conservation Lands

many of CALFED Implementation Plan goals; Central Valley Project Improvement Act (CVPIA) goals and priorities; Sacramento Region Priorities 1, 3, 4, and 7; CALFED Ecosystem Restoration Program (ERP) Goals 1, 2, 4, 5, and 6; Key CALFED Science Program goals, and CVPIA goals.

The regional restoration proposal specifically addresses many of the CALFED ERP and Science Program goals, and CVPIA priorities. TNC has worked closely with the SRCAF within the guidelines of the Sacramento River Conservation Area Handbook (SRCAF 2000) to develop regional restoration activities. Increasing riparian habitat in the Sacramento River Conservation Area is designed to help protect and restore the stream meander corridor between Red Bluff and Colusa (PSP SR-1). The SRCAF projects to add 1,218 acres of riparian habitat to the Chico Landing Sub-reach, for a total of approximately 4,863 acres of nearly contiguous protection (restored plus conservation lands) to help alleviate habitat loss and fragmentation throughout the reach.

At-risk riparian species, as well as common riparian species, would benefit from protection and restoration of large expanses of habitat along the main stem of the Sacramento River (CALFED ERP Goals 1 and 4).

Specifically within the study area, there are two areas targeted for restoration. The first is by TNC through SRCAF, Capay Ranch, and the second by DFG, the Pine Creek Unit of the Sacramento River Wildlife Area. Capay Ranch has been fallow and dominated by nonnative invasive species vegetation for several years. Successfully establishing native understory and overstory vegetation in the parcels proposed for restoration would help control and reduce the number of acres dominated by nonnative invasive species along the Sacramento River, thereby reducing their adverse biological and economic effects (MR-1, CALFED ERP Goal 5).

Restoration of the proposed tracts would allow natural processes such as flooding on the flood plain in select areas along these tracts. Additionally, a long-term benefit of restoring these tracts would help to provide instream complexity in the form of large woody debris (LWD) that falls into the river as the tracts erode (PSP SR-2 and SR-4, CALFED ERP Goal 2).

Restoration of flood-prone land along the Sacramento River would help improve water and sediment quality in the river. Replacing flood-prone agriculture with riparian habitat decreases pesticide and herbicide use on land adjacent to the river, thereby contributing to improved water quality. Additionally, riparian forests act as a buffer and filter for toxic runoff of manmade sources of organic matter that originate farther away from the river, thereby helping to improve water and sediment quality (ERP Goal 6). The regional goals address the following specific CVPIA goals and Anadromous Fish Restoration Program (AFRP) objectives:

- Protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California;
- Improve habitat for all life stages of anadromous fish by providing flows of suitable quality, quantity, and timing, and improved physical habitat; and
- Involve partners in the implementation and evaluation of restoration actions.

Restoring complex riparian habitat along the Sacramento River would improve habitat for fish and wildlife. Fish benefit from complex riparian areas that become flooded at high flows or that slow floodwaters down and provide refugia for young and juvenile fish (Sommer et al. 2001).

These regional projects build on over 3,000 acres of habitat restoration along the Sacramento River between Red Bluff and Colusa. The Chico Landing Sub-reach is the site of recent acquisitions and subsequent management planning to address ecosystem restoration

funded by CALFED (97 NO-2). The recommended plan would also contribute to CALFED's Draft Multi-Year Program plan and Year 4 Work Plan, including focusing restoration efforts on acquiring lands that can meet ecosystem restoration goals from willing sellers where at least part of the reason to sell is economic hardship (for example, lands that flood frequently or where levees are too expensive to maintain). In addition, this project contributes to using farmer-initiated and developed restoration and conservation projects as a means of reaching program goals. Hydraulic and geomorphic modeling, Hamilton City hydraulic modeling and foundation investigation, baseline assessments, and restoration plant designs have been funded through the 97 NO-2 grant agreement.

This framework furthers the goals of the following programs: SRCAF Non-Profit, CVPIA, Central Valley Habitat Joint Venture, Sacramento River National Wildlife Refuge, Department of Fish and Game's Sacramento River Wildlife Area, California Riparian Habitat Conservation Program, and Riparian Habitat Joint Venture (Partners in Flight).

Through work with partners and stakeholders, this approach offers substantial systemwide ecosystem benefits. By using both horticultural and natural restoration in an adaptive management framework, these collective efforts are successfully restoring the viability of native species and reducing the proliferation and adverse effects of nonnative invasive species. Specifically, the effort to establish a continuous riparian corridor along the Sacramento River is already improving the health of local wildlife populations by promoting the recolonization of areas where local elimination of species has taken place. Several taxa, including the State-endangered yellow-billed cuckoo and the Federally threatened valley elderberry longhorn beetle (VELB), have colonized and successfully bred on restoration tracts (Small et al. 2000).

The ecological benefits of restoration activities extend far beyond the reaches of the study area. For many species, the main stem of the Sacramento River is a migratory pathway.

By making the habitat in this area more supportive of migratory species, this project would bolster breeding and wintering populations in areas physically removed, but ecologically linked to the Sacramento River. Examples include the habitat benefits to neotropical migratory birds and native anadromous fish. Additionally, improvements in water quality as a result of restoration efforts have beneficial effects all the way down the Sacramento River into the Bay-Delta.

The ecological benefits gained by removing rock must be weighed against the potential costs that could result from its removal. Historically, the Sacramento River has been very active in the vicinity of the revetment below Dunning Slough. It is expected that removal of this rock would increase channel migration rates to a point that the setback levee would be threatened well within the 50-year period of analysis of the project. Protecting the setback levee is estimated to cost \$5 million per mile. A geomorphic study conducted by Ayres (see Appendix C.3-Hydraulics) estimates river migration rates.

The long-term viability of species inhabiting the Sacramento River ecosystem depends on the restoration of important physical processes, including appropriately timed flooding. The project could significantly contribute to restoring these species and related resources of the river. The proposed project would allow a large riparian zone along the river to establish and restore much of the natural fluvial processes by allowing the floodplain to flood. Removal of the existing "J" levee would restore frequent flooding to the area. This would significantly help to restore fish and wildlife habitats and benefit Federally and State-listed species. Additional

detailed hydrologic and geomorphic study is needed to ensure that the potential project features are designed and implemented in a way to not induce adverse effects.

9.1.5 Operation, Maintenance, Repair, Replacement, and Rehabilitation

Once project construction is complete, the project would be turned over to the non-Federal sponsor. The non-Federal sponsor would then be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the project in accordance with the OMRR&R manual.

Periodic maintenance of the new levee would be required to maintain the levee to pass the design flow. Erosion and excessive vegetal growth on levee sideslopes could require maintenance. Maintenance requirements will be discussed in detail in the OMRR&R manual. In general, the project is inspected and maintained periodically as well as during and after floods by the non-Federal sponsor. The Corps also inspects the project features and recommends corrective action to ensure that the project functions as designed.

The restoration plantings are expected to be self-sufficient, therefore requiring no maintenance. A minimal amount of maintenance of such items as gates, locks, signs, fencing, and other items that protect the restoration areas would be required. Also, periodic checklist type inspections on an annual or biannual basis would be required to monitor the site for severe adverse effects. The grassland buffer would require periodic burning, mowing, or grazing (estimate three times per decade).

Subsequent to the completion of the design of the project features and prior to construction, a draft OMRR&R manual would be prepared in coordination with the non-Federal sponsor and affected agencies. The manual would be provided to the non-Federal sponsor. A final OMRR&R manual would be prepared after the completion of construction.

Annual OMRR&R costs are estimated to be \$55,000, of which \$47,000 is for levee maintenance and \$8,000 is for habitat restoration.

9.1.6 Real Estate

Acquisition of about 1,500 acres in fee title along with about 145 acres of permanent easements and about 28 acres of temporary work easements are required for the recommended plan. This consists of lands under and waterside of the proposed setback levee. The non-Federal sponsor would acquire these lands as part of the project.

Real estate acquisition for the recommended plan is split among 14 landowners. Relocations are estimated to be about \$563,000, which would consist of raising County Road 203 about 2.5 feet to tie into the new levee, ramping County Road 23 over the new levee, and relocating affected utilities and irrigation ditches.

9.1.7 Plan Economics and Cost Sharing

The project first cost was estimated on the basis of October 2003 price levels and amounts to \$44,876,000. Table 9-1 breaks down this cost by primary project feature. Estimated average annual costs were based on a 5 5/8 percent interest rate, a period of analysis of 50 years, and construction ending in 2010. Monitoring of plantings would continue until 2013. Table 9-2

shows the project first costs and benefits. The total average annual habitat units are 888, and the total average annual flood damage reduction benefits are \$577,000. The total area of habitat restored would be 1,500 acres. Expected residual annual flood damages would be about \$263,000.

**TABLE 9-1: ESTIMATED COSTS OF
RECOMMENDED PLAN¹ (\$1,000)**

MCACES Account ²	Description	Total First Cost
01	Lands and Damages ³	13,347
02	Relocations ⁴	563
06	Fish and Wildlife ⁵	24,540
11	Levees ⁶	921
18	Cultural Resources ⁷	170
30	Planning, Engineering, Design ⁸	3,123
31	Construction Management ⁹	2,212
	Total First Cost	44,876

¹Based on October 2003 price levels, 5 5/8 percent rate of interest, and a 50-year period of analysis.

²Micro Computer-Aided Cost Engineering System (MCACES) is the software program and associated format used by the Corps in developing cost estimates. Costs are divided into various categories identified as "accounts." Detailed costs estimates are presented in Appendix C, part 8, Cost Engineering.

³Real Estate land costs, which include no damages.

⁴Relocations include raising County Road 203, ramping County Road 23, and relocating affected utilities and irrigation ditches.

⁵Includes habitat restoration, removal of "J" levee, levee costs allocated to restoration, plus 25 percent contingency.

⁶Includes levee costs allocated to flood damage reduction and training dike, plus 25 percent contingency.

⁷Assumes approximately 0.4 percent of project first cost.

⁸12 percent of 02, 06, 11, and 18 accounts. PED is cost shared 75 percent Federal and 25 percent non-Federal during PED, then adjusted as part of the total project cost sharing to 65 percent Federal and 35 percent non-Federal during construction.

⁹8.5 percent of 02, 06, 11 and 18 accounts.

The total project first cost of \$44,876,000 was allocated by project purpose in the preliminary cost allocation process detailed in Chapter 3. The total amount allocated to the flood damage reduction project purpose is \$4,260,000. The total amount allocated to the ecosystem restoration project purpose is \$40,446,000. These amounts were then apportioned as either Federal or non-Federal costs, with the additional costs for cultural resource preservation (\$170,000) being apportioned 100 percent to the Federal cost. The post authorization costs of cultural resource preservation are excluded from the allocation of costs in accordance with Corps guidance (ER 1105-2-100, Appendix E, paragraph E-63), but are included as a separate line item in Table 9-6.

Table 9-3 presents the allocated project first costs by project purpose. Table 9-4 presents the Federal and non-Federal apportionment of the flood damage reduction costs of the project for cost-sharing purposes. Table 9-5 presents the Federal and non-Federal apportionment of the ecosystem restoration costs of the project for cost-sharing purposes.

Table 9-6 presents the total Federal and non-Federal costs for the project. The non-Federal sponsor's financial capability is presented later in this chapter.

TABLE 9-2: ECONOMIC COSTS AND BENEFITS OF RECOMMENDED PLAN¹ (\$1,000)

Item	FDR		Ecosystem		Total Costs	
	Allocated Costs	Benefits	Allocated Costs	Benefits	Allocated Costs	Benefits
Investment Cost						
First Cost ²	4,260		40,446		44,706	
Interest During Construction	271 ⁴		3,066 ⁵		3,337 ⁵	
Total	4,531		43,512		48,043	
Annual Cost						
Interest and Amortization	272		2,615		2,887	
OMRR&R ³	47 ⁶		8		55	
Subtotal	319		2,623		2,942	
Annual Benefits						
Monetary (FDR)		577				577
Non-monetary (Ecosystem)				888 AAHU's		888 AAHU's
Net Annual FDR Benefits		258				258
FDR Benefit-Cost Ratio		1.8 to 1				1.8 to 1

¹Based on October 2003 price levels, 5 5/8 percent rate of interest, and a 50-year period of analysis.

²Excludes Cultural Resource Preservation.

³Operation, Maintenance, Repair, Replacement, and Rehabilitation

⁴Two year period of construction assumed for J levee removal and construction of setback levee

⁵Three year period construction assumed for overall project

⁶Excludes environmental O&M costs.

9.1.8 Risk and Uncertainty

In general, the ability of the plan to provide the expected accomplishments depends on the validity of pertinent assumptions, base data, and analytical techniques used in this study; the successful completion of future studies, designs, and construction; and appropriate operation, maintenance, repair, replacement, and rehabilitation after construction.

Other risks include natural environmental risks such as extreme flooding, wildfire, and herbivore damage to the restored lands. It is possible that an extremely large flood event could damage young restoration plantings before they are sufficiently mature to withstand extended flooding. Likewise it is also possible for wildfire to destroy plantings, both young and mature. It is also possible for damage from heavy grazing by deer, beaver, rabbits, voles, gophers, and insects to do considerable damage to restoration plantings severely affecting the accomplishments of the project.

The HEP, used to quantify ecosystem restoration benefits, provides a reasonable representation of the outputs of the project. During detailed design of the project, additional soil and groundwater information would be collected to develop the specific habitat-planting regime. These additional data would likely result in a modification to the conceptual planting plan upon which the HEP was based. An example modification could be a reduction in the

**TABLE 9-3: TOTAL ALLOCATED FIRST COST
OF RECOMMENDED PLAN BY PROJECT PURPOSE
BASED ON PRELIMINARY COST ALLOCATION¹ (\$1,000)**

Item	Ecosystem Restoration	Flood Damage Reduction
Lands		
Separable Costs	12,154	0
Allocated Joint Costs	919	274
Subtotal	13,073	274
Relocations		
Separable Costs	0	0
Allocated Joint Costs	434	129
Total LERRD's	13,507	403
Project Features		
Separable Costs	14,725	921
Allocated Joint Costs	7,557	2,258
Subtotal	22,282	3,179
Post Feasibility		
Planning, Engineering & Design	2,726	397
Construction Management	1,931	281
Subtotal	4,657	678
Total Project First Cost²	40,446	4,260

¹Based on October 2003 price levels, 5 5/8 percent rate of interest, and a 50-year period of analysis and preliminary cost allocation presented in Chapter 3.

²Excludes Cultural Resource Preservation.

**TABLE 9-4: COST APPORTIONMENT OF RECOMMENDED PLAN
FLOOD DAMAGE REDUCTION
BASED ON PRELIMINARY COST ALLOCATION¹ (\$1,000)**

Item	Federal	Non- Federal	Total
Project Features	3,179		3,179
LERRD's		403	403
PED	397		397
Construction Management	281		281
Subtotal	3,857	403	4,260
5 percent cash contribution	-213	213	
Subtotal	3,644	616	4,260
Additional cash contributions	-875	875	
Total ²	2,769	1,491	4,260
Percent of Total	65 percent	35 percent	

¹Based on October 2003 price levels, 5 5/8 percent rate of interest, and a 50-year period of analysis and preliminary cost allocation presented in Chapter 3.

²Excludes Cultural Resource Preservation.

**TABLE 9-5: COST APPORTIONMENT OF RECOMMENDED PLAN
ECOSYSTEM RESTORATION
BASED ON PRELIMINARY COST ALLOCATION¹ (\$1,000)**

	Federal	Non-Federal	Total
Item			
Project Features	22,282		22,282
LERRD's		13,507	13,507
PED	2,726		2,726
Construction Management	1,931		1,931
Subtotal	26,939	13,507	40,446
Cash Contribution	-649	649	
Total ²	26,290	14,156	40,446
Percent of Total	65 percent	35 percent	

¹Based on October 2003 price levels, 5 5/8 percent rate of interest, and a 50-year period of analysis and preliminary cost allocation presented in Chapter 3.

²Excludes Cultural Resource Preservation.

**TABLE 9-6: SUMMARY OF COST-SHARING RESPONSIBILITIES
RECOMMENDED PLAN¹ (\$1,000)**

Project Purpose	Federal	Non-Federal
Ecosystem Restoration	26,290	14,156
Flood Damage Reduction	2,769	1,491
Cultural Resource Preservation	170	
Total	29,229	15,647
Breakdown of Non-Federal		
LERRD's		13,910
Cash		1,737
Total		15,647

¹Based on October 2003 price levels, 5 5/8 percent rate of interest, and a 50-year period of analysis and preliminary cost allocation presented in Chapter 3.

proportion of riparian habitat anticipated and increase in the proportion of oak woodland savannah habitat. The final revegetation plan would be based on the specific soil and groundwater parameters at the restoration site in order to ensure a successful project.

9.2 Consistency with the CALFED Bay-Delta Authority Record of Decision

Several State agencies have contributed funds to prior efforts leading up to this project and to the non-Federal funding for this study. CALFED funded half of the funding necessary to complete the study. A CALFED State agency may be the non-Federal sponsor for implementing the project. Accordingly, this project has been developed to be consistent with the CALFED Programmatic Record of Decision (ROD) (August 2000).

The following paragraph from the CALFED ROD describes the relationship between the CALFED Bay-Delta Program Final Programmatic EIS/EIR and projects developed within the purview of the Sacramento and San Joaquin River Basins Comprehensive Study, of which Hamilton City is part: "The following action which was not analyzed in the Final Programmatic EIS/EIR and will, therefore, require additional environmental review; The CALFED Agencies intend that final development and implementation of actions under the Comprehensive Study will be coordinated and consistent with the CALFED Bay-Delta Program" (CALFED ROD p. 38).

Because this project is intended to be consistent with the CALFED ROD, the Corps and the Reclamation Board considered the strategies described in the ROD, Attachment A, in developing the project description and the alternatives. In addition, the agencies considered the programmatic commitments related to implementation of CALFED actions to ensure that this project would be consistent with the ROD. The project would be consistent with both specific measures in the ROD, as well as programmatic commitments related to implementation of CALFED actions to ensure that this project would be consistent with the ROD.

Specific Measures. The specific measures in the ROD are:

- **Site and align program features to avoid or minimize effects on agriculture.**

The Hamilton City levee alignment is based on flood plain topography, frequency, and depth of flooding, hydraulic analyses, location of land available for habitat restoration, input from local landowners, and protection of existing infrastructure, including agricultural operations. A 157-acre parcel of land that is currently owned by TNC is not included in the project because it was not needed based on the above analyses. Some type of permanent agricultural protection for this parcel is under consideration.

- **Examine structural and nonstructural alternatives to achieve project goals in order to avoid effects on agricultural land.**

The Corps is required to consider nonstructural measures in the planning process. The Corps defines nonstructural measures as project features that would not significantly alter the nature or extent of flooding, generally by changing the use made of the flood plains or by accommodating existing uses to the flood hazard. Nonstructural measures were considered as part of the alternative plan formulation process. Most were not considered further because they lacked local support and were not cost effective.

A goal (or objective per Federal planning guidelines) of the project is to reduce damages from flooding in the area. A large portion of the without-project damages in the area is related to the flooding of agricultural lands. Therefore, part of the intent of the project is to reduce damages to agricultural lands, including removal of elements vulnerable to damage from the flooding.

- **Implement features that are consistent with local and regional land use plans.**

Although designed to stand alone, the project complements a set of other projects that TNC and the SRCAF members are developing. Collectively, these projects accomplish

habitat protection, habitat restoration, improved ecosystem processes, coordinated flood plain management, and habitat restoration monitoring, thereby addressing many of CALFED Implementation Plan goals; CALFED Ecosystem Restoration Program (ERP) Goals 1, 2, 4, 5, and 6; Key CALFED Science Program goals; Sacramento Region Priorities 1, 3, 4, and 7; and Central Valley Project Improvement Act (CVPIA) goals and priorities.

- **Involve all affected parties, especially landowners and local communities, in developing appropriate configurations to achieve the optimal balance between resource effects and benefits.**

Landowners and the local community have been extensively involved in this project and have helped develop the alternative plans that were analyzed. The project has regularly been discussed at the Hamilton City Community Service District meetings and at the Sacramento River Conservation Area Forum meetings. A public scoping meeting was held in Hamilton City on January 9, 2003, and an additional public workshop, which focused on the development of alternative plans, was held in Hamilton City on June 12, 2003. In addition to the public workshops, a series of plan formulation meetings were held from December 2002 through January 2003 to discuss the problems, opportunities, significant resources, and potential measures and alternatives. The meetings included study team members, representatives from the local community, and interested agencies and organizations. Participants in the meetings included:

- Local landowners and residents
- Hamilton City Community Services District
- Glenn County Public Works Department
- Butte County Public Works Department
- Glenn Colusa Irrigation District
- U.S. Fish and Wildlife Service
- NOAA Fisheries
- The Nature Conservancy
- California Department of Fish and Game
- Sacramento River Partners
- Sacramento River Conservation Area Forum
- Sacramento River Preservation Trust
- California Department of Transportation (Caltrans)
- California Department of Parks and Recreation

Members of the study team regularly attended Hamilton City Workgroup meetings to report on the progress of the study, solicit feedback from the workgroup, and answer questions. These meetings were held at the Hamilton City Fire Hall approximately every 2 months over the course of the study. The Hamilton City Community Services District led the meetings, and the Sacramento River Conservation Area Forum helped with meeting facilitation. The purpose of the meetings was to provide a forum to discuss and coordinate water resources studies, projects, and other issues affecting the Hamilton City area. Local landowners and residents; representatives of local, State, and Federal agencies; representatives from State and Federal elected officials; representatives from non-profit organizations; and others attended the meetings. Information provided by the local and regional interest groups and individuals guided the identification of resources

problems and helped formulate the alternative plans to address the problems and identification of the recommended plan. The Hamilton City Feasibility Study has also periodically been discussed at the Sacramento River Conservation Area Forum (SRCAF) Board meetings.

A final public meeting was held in Hamilton City on May 6, 2004, during a 45-day public and agency review of the draft Feasibility Report/EIR/EIS to present the findings of the feasibility study and to provide the public an opportunity to express their views on the results and recommendations of the Hamilton City Feasibility Study.

- **Restore existing degraded habitat as a priority before converting agricultural land.**

Restoration of about 181 acres of existing degraded habitat in the study area is included as part of the project. Restoration of that land alone was not considered to be a significant contribution to the goals and objectives of the study and project. Using State grant funding¹, TNC acquired additional lands from willing sellers that were also included in the project in order to achieve the goals and objectives of the project. These parcels of land experience erosion, seepage, and scouring floodflow problems.

- **If public lands are not available for restoration efforts, focus restoration efforts on acquiring land that can meet ecosystem restoration goals from willing sellers where at least part of the reason to sell is an economic hardship (for example, lands that flood frequently or where levees are too expensive to maintain).**

The recommended plan includes native habitat restoration on lands predominantly acquired by TNC from willing sellers. Those lands have been at a frequent risk of flooding, and the recommended plan would alleviate the flood risk for remaining agricultural parcels landside of the new setback levee. The recommended plan includes a training dike; that is, a short, levee-like structure that while not preventing backwater, would reduce high frequency, damaging flows that currently scour agricultural lands.

- **Use a planned or phased habitat development approach in concert with adaptive management.**

The restoration plan includes planting the restoration area before the "J" levee is removed and as the setback levee is being built. The restoration plan is based on a vegetative predictive model developed by TNC that determines habitats to be planted based on soils, topography, frequency of flooding, and depth to groundwater. As more information regarding soils and depth to groundwater is developed, the restoration plan would be adapted.

¹ Funding came from the River Protection Program under Proposition 13. The funds were appropriated to Department of Water Resources for allocation to TNC. The agreement goes on to say that TNC would use these funds to acquire lands near the Sacramento River in the Hamilton City area for the protection and restoration of various riparian habitats and to provide those lands for a future flood damage reduction project.

- **Develop buffers and other tangible support for remaining agricultural lands. Vegetation planted on these buffers should be compatible with farming and habitat objectives.**

The recommended plan includes a buffer from the landside toe of the levee to the waterside restoration plantings. The buffer would be planted with native grasses, which is compatible with both farming and habitat restoration objectives. The final buffer distance would be determined during PED. These grasses would require burning or mowing as a part of the O&M manual. This buffer includes the setback levee with a gravel road on top for maintenance and inspection. The planting plan includes limiting the area of planting elderberries on areas adjacent to agricultural fields. The width of the elderberry buffer would be 300 feet, consistent with the current TNC “good neighbor” practices. It is anticipated that the restoration plan would allow the non-Federal sponsor to remove elderberries under 1-inch diameter from the buffer strip, though this is pending issuance of a take permit from the USFWS.

- **Implement erosion control measures to the extent possible during and after project construction activities.**

Restoration would begin before the “J” levee is removed and as the new levee is being built. Best management practices would be implemented for erosion control as the levee is removed to prevent any water quality degradation. Prior to the start of construction, a National Pollution Discharge Elimination System (NPDES) general permit for construction activities would be obtained from the Central Valley Regional Water Quality Control Board, and a storm water pollution prevention plan (SWPPP) would be developed per the guidelines of the general permit. The SWPPP would list all best management practices to be implemented during construction activities for control of erosion, siltation, and any other pollutants that could potentially enter stormwater or surface waters in the project area.

Temporary fast-growing cover crops would be seeded over all restoration areas. Permanent native vegetative cover would be no-till-drill seeded into the temporary cover. Areas disturbed by construction of flood control measures would be seeded with an erosion control seed mix and also would receive straw mulch. Areas disturbed by construction with steeper topography that generate sheetflow would receive appropriate erosion control best management practices such as straw mulch, bonded fiber matrix hydro mulch, and erosion control fabric, in addition to the vegetative cover. Areas disturbed by construction with topography that concentrates flow or conveys concentrated runoff offsite would receive best management practices for erosion control, such straw mulch, bonded fiber matrix hydro mulch, cobble dissipaters, and erosion control fabric, in addition to the vegetative cover.

Sedimentation best management practices would consist of straw rolls, silt fences, and/or sedimentation ponds, which would be implemented, where necessary, to prevent discharge of sediment-laden runoff into receiving waters. Additionally, vegetative buffer strips 50 feet in width would be used on the downslope edges of sites bordering receiving waters. These strips may be native grass established before soil disturbing activities or may be existing vegetation left in place.

- **Protect exposed soils with mulches, geotextiles, and vegetative ground covers to the extent possible during and after project construction activities in order to minimize soil loss.**

The recommended plan includes a vegetation barrier of 20 feet waterside of the setback levee and vegetation landside of the setback levee, where necessary, for protection from wave action. Long-term wave-wash protection would be provided by the restoration plantings. Areas that would not be protected in the long term may be protected by constructing vegetative barriers, using riprap, or reducing levee slope and planting with suitable erosion control grasses. In addition, a SWPPP would be implemented to reduce erosion and sediment discharges listed under the previous bulleted item.

- **When it appears that land within an agricultural preserve may be acquired from a willing seller by a State CALFED agency for a public improvement as used in Government Code Section 51920, advise the Director of Conservation and the local governing body.**

There are currently lands covered by the Williamson Act and Farmland Protection Act in the project area. TNC and the non-Federal sponsor own most of these lands. The Director of Conservation and the local governing body would be advised of the removal of the lands from these programs.

- **Implement seepage control measures.**

The levee would be built to Corps engineering standards and includes a training dike and rock revetment to prevent erosion and seepage. The levee would be designed to provide adequate seepage control and interior drainage. The interior drainage would be collected near the water treatment plant and pumped over to the other side.

Programmatic Commitments. The programmatic commitments are related to implementation of CALFED actions are:

- **Local Leadership** - This project was initially developed by leadership within Glenn County and the Hamilton City Community Services District, working in conjunction with TNC and local landowners.
- **Stakeholder Consultation** - Locals have been involved in every step of the development of this project from its conception. The project team conducted two public workshops in Hamilton City as well as an information booth at the local levee festival.
- **Environmental Justice** - The primary beneficiary of the flood damage reduction portion of the proposed project is the Hamilton City community, which is low income.
- **Tribal Consultation** - Funding for consultation with Tribal representatives would be included in the project budget to enable outreach efforts. Up to 1 percent of the Federal portion of the project first costs would be allocated for cultural resources data recovery.
- **Land Acquisition** - Most of the land required for the project has already been purchased from willing sellers because of the flood-prone nature of the land. The project has been

designed to consider third party and redirected effects such as level of flood protection and hydraulic effects.

- **CALFED Agency Coordination** - This project has been coordinated with CALFED and has been reviewed by the CALFED Independent Review Panel (IRP).
- **Integration of Non-Signatory Agencies** - This project would continue to be coordinated with all affected agencies.
- **Environmental Documentation** - This proposed project is documented in an integrated Feasibility EIS/EIR report.
- **Permit Clearinghouse** - A permit clearinghouse has been established for the CALFED Bay-Delta Program to coordinate and facilitate permit applications and approvals and compliance with NEPA and CEQA. Since this document is not tiered off the CALFED EIR/EIS, but rather is a stand alone EIS/EIR, the Corps and non-Federal sponsor would be obtaining all the necessary permits and approvals.
- **Adaptive Management/Science** - The restoration project would be managed to support the vegetative composition that occurs naturally over time.
- **Beneficiaries Pay** - The local sponsors would pay a portion of the project first costs along with ongoing O&M costs.
- **Compliance with Water Rights Laws** - The project would use water rights currently associated with the parcels to be restored.
- **Project Operations** - This is not applicable to the Hamilton City project.
- **Coordinated Operation Agreement** - This is not applicable to the Hamilton City project.

9.3 PLAN IMPLEMENTATION

This section describes the remaining steps to potential authorization of the project by Congress.

9.3.1 Report Completion

The draft feasibility report/EIS/EIR was circulated for public and agency review for 45 days. On May 6, 2004, a public meeting was held to obtain comments from the public, agencies, and other interested parties. After completion of the public review period, comments were considered and incorporated into the feasibility report/EIS/EIR, as appropriate. Comments received during the public and agency review period, as well as responses to them, are presented in Appendix F - Comments and Responses. The final feasibility report/EIS/EIR has been provided to any public agency that provided comments on the draft report. The State lead agency will certify that the final EIR was prepared in compliance with CEQA.

9.3.2 Report Approval

As required by NEPA, the Corps' South Pacific Division (SPD) Engineer would issue a notice of completion of the final report, submit the report to Corps Headquarters, and file the report with the U.S. EPA. The Division Engineer's notice of completion would be published in the *Federal Register*, starting a 30-day public review period. Corps Headquarters would coordinate

the public comments, receive comments from affected Federal and State agencies, and complete its own independent review of the final report.

After its review of the final feasibility report/EIS/EIR, including consideration of public comments, Corps Headquarters would prepare the Chief of Engineers' Report. This report would be submitted to the Assistant Secretary of the Army for Civil Works, who would coordinate with the Office of Management and Budget and submit the report to Congress.

Assuming that the non-Federal sponsor is willing to cost-share the project, detailed engineering studies and design efforts for the selected plan would be initiated. A project management plan outlining Federal and non-Federal obligations, requirements, tasks, costs, and schedule from PED through construction would also be prepared.

9.3.3 Project Authorization and Construction

Once the final report is approved by the Chief of Engineers and the project is authorized by Congress, construction funds must be appropriated for the project by Congress before a Project Cooperation Agreement can be signed by the Corps and sponsor to begin construction.

9.3.4 Division of Responsibilities

Federal. The Corps would accomplish Preconstruction Engineering and Design (PED) studies. Once the project is authorized, funds are appropriated, the non-Federal sponsor provides the cash contribution, lands, easements, rights-of-way, relocations, and disposal areas, as well as assurances, the Federal Government would construct the project.

Non-Federal Responsibilities. Specific items of local cooperation are identified in Chapter 10. The non-Federal sponsor plans to enter into local cost-sharing flood control agreements with Glenn County, the Hamilton City Community Services District, and possibly others to cost share the non-Federal project flood damage reduction cost with local entities in accordance with State law. Glenn County and the Hamilton City Community Services District intend to form a local levee district to operate and maintain the flood control portions of the project. It is anticipated that the local levee district would be formed prior to construction of the project. The non-Federal ecosystem restoration costs and maintenance would likely be cost shared according to State law and would involve State agencies and possibly other non-government entities.

Views of Non-Federal Sponsor. The non-Federal sponsor supports the recommended plan. Local interests have been supportive of the study and project. Throughout development of this feasibility report, there has been significant coordination with the State, Hamilton City Community Service District, Glenn County, the Sacramento River Conservation Area Forum, private landowners, and TNC.

Financial Capability of Sponsor. Prior to submittal of the final feasibility report, the State of California will pursue nonfederal funding from the California Bay-Delta Authority through their Ecosystem Restoration Program. As mentioned, the total estimated non-Federal first cost of the project is \$15,647,000 (including LERRD's) using October 2003 price levels. Actual costs may be slightly greater at the time of construction due to inflation. The total estimated value for the project lands (LERRD's) is \$13,910,000.

Project Cost-Sharing Agreements. A Design Agreement must be executed between the Corps and the non-Federal sponsor in order to cost share the development of detailed plans and specifications. Before construction is started, the Federal Government and the non-Federal sponsor would execute a Project Cooperation Agreement (PCA). This agreement would define responsibilities of the non-Federal sponsor for project construction as well as operation, maintenance, repair, replacement, and rehabilitation and other assurances.

9.4 SCHEDULE

If the project is authorized in 2004, construction activities could start as early as 2006. Following is a schedule showing the approval and construction phases of the project.

The Reclamation Board Public Hearing	July 16, 2004
Division Commander's Notice	September 2004
Chief of Engineers Report	December 2004
Potential Authorization	October 2004
Corps and Sponsor sign Design Agreement	potentially September 2004
PED	2004-2006
Initiate Construction	2006
Complete Physical Construction	2008
Complete Plant Establishment Period	2010
Complete Monitoring	2013

9.5 FURTHER STUDIES

During PED, some additional studies would be undertaken as part of developing detailed designs for the project. Upon initiation of PED, any new information that has been collected by others such as TNC would be considered before undertaking these additional studies. These studies include:

- Topographic surveys for project design;
- Investigation (by the Corps' Engineering Research and Development Center - Waterways Experiment Station) of installation of in-situ rock for cost-effective erosion protection;
- Foundation explorations for levee design;
- Soil borings for habitat planting;
- Cultural resource surveys;
- Develop operation and maintenance manual.