

CHAPTER 2 - NEED FOR AND OBJECTIVES OF ACTION

2.1 STUDY AREA DESCRIPTION

Hamilton City is in Glenn County, California, along the west bank of the Sacramento River, about 85 miles north of the City of Sacramento (Figure 2-1 - Regional Map). The study area includes Hamilton City and the surrounding rural area (Figure 2-2 - Study Area Map). The study area is bounded by the Sacramento River to the east and the Glenn Colusa Canal to the west and extends about two miles north and six miles south of Hamilton City.¹

Hamilton City has a population of about 2,000. Surrounding land use is agricultural with fruit and nut orchards being the primary crops. State Highway 32, an important transportation corridor, runs in an east-west direction through town and connects with Interstate 5 to the west and State Highway 99 and the City of Chico to the east. A Union Pacific Railroad spur line also provides service to the town. An abandoned sugar plant (Holly Sugar) is to the south of Hamilton City. A fertilizer company currently uses a small portion of the plant. The wastewater treatment facility for the community is located within Dunning Slough east of town. The Irvine Finch River Access, a California Department of Parks and Recreation facility, is located on west bank of the Sacramento River, immediately south of Highway 32.

An existing private levee, constructed by landowners in about 1904 and known as the "J" levee, provides some flood protection to the town and surrounding area (Figure 2-3). The "J" levee is not constructed to any formal engineering standards and is largely made of silty sand. It is extremely susceptible to erosion. Flood fighting is often necessary to prevent levee failure and flooding when river levels rise. Since the construction of Shasta Dam in 1945, flooding in Hamilton City due to failure of the "J" levee has occurred once, in 1974. In addition, extensive flood fighting has been necessary to avoid levee failure and flooding in 1983, 1986, 1995, 1997, and 1998. Currently, the Sacramento River is actively eroding into the toe of the "J" levee at the northern end of the study area. Glenn County built a backup levee, about 1,000 feet in length, to protect the community in the event the toe erosion causes failure at the northern end of the "J" levee. The southern end of the "J" levee does not tie into high ground and backwater can flood agricultural lands behind (west of) the "J" levee.

Native habitat and natural river function in the study area have been altered by construction of the "J" levee and conversion of the floodplain to agriculture and rural development. Hardening of the riverbank and levee in several locations through the years (typically with rock) has constrained the ability of the river to meander. Conversion of the floodplain to agriculture and rural development has reduced native habitat to remnant patches along the river and in historic oxbows. These ecosystem alterations greatly diminish the abundance, richness, and complexity of riparian and other floodplain habitat in the study area and the species dependent upon that habitat.

¹The study area includes the area specified in the U. S. House Report 108-357, (Conference Report accompanying the Energy and Water Development Appropriations Act, 2004, P.L. 108-137) which urged the Secretary of the Army to include in the study an area extending from 2 miles due north to 4 miles due south of State Highway 32, and extending at least 1.2 miles due south of County Road 23.

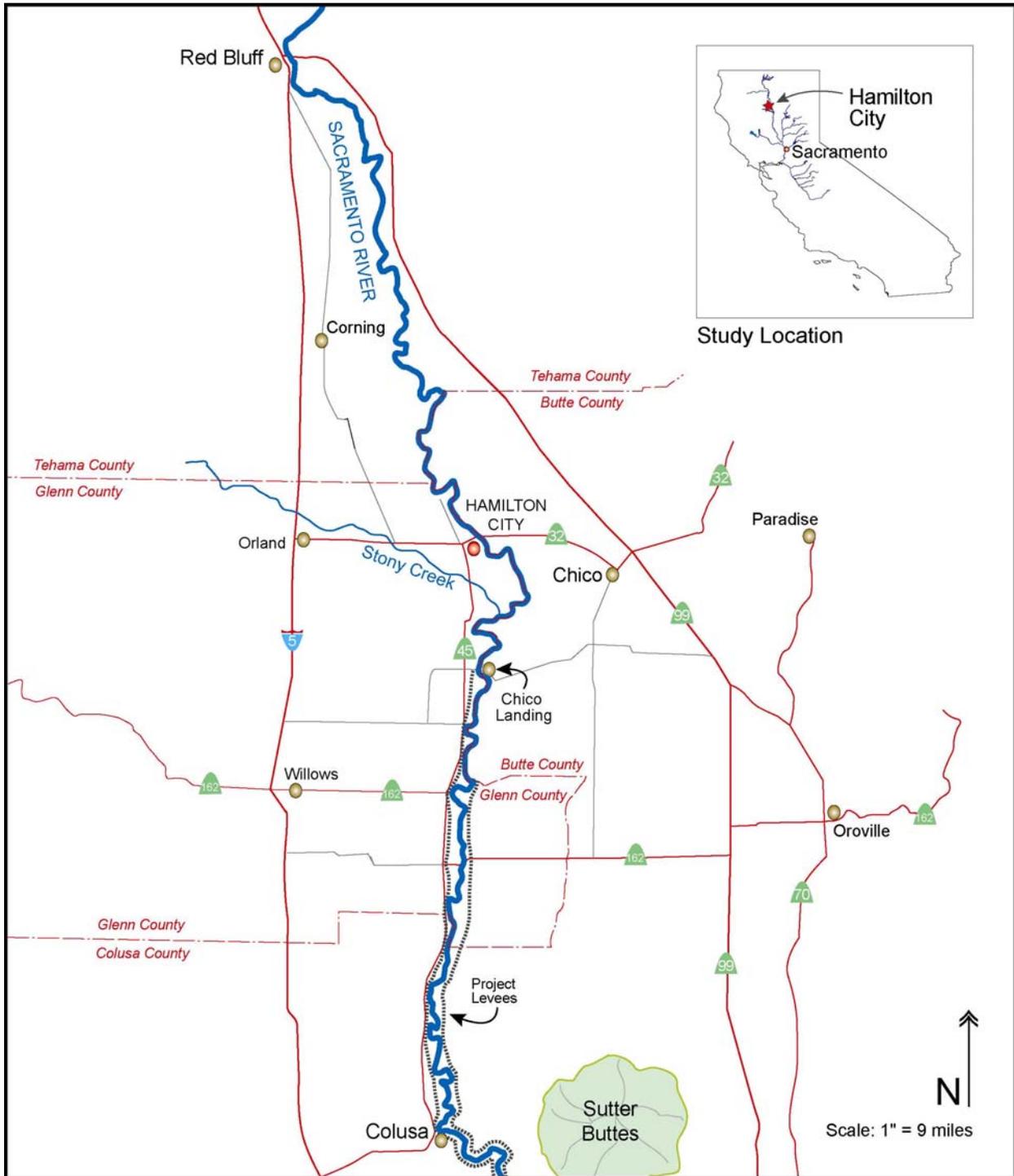


Figure 2-1: Regional Map

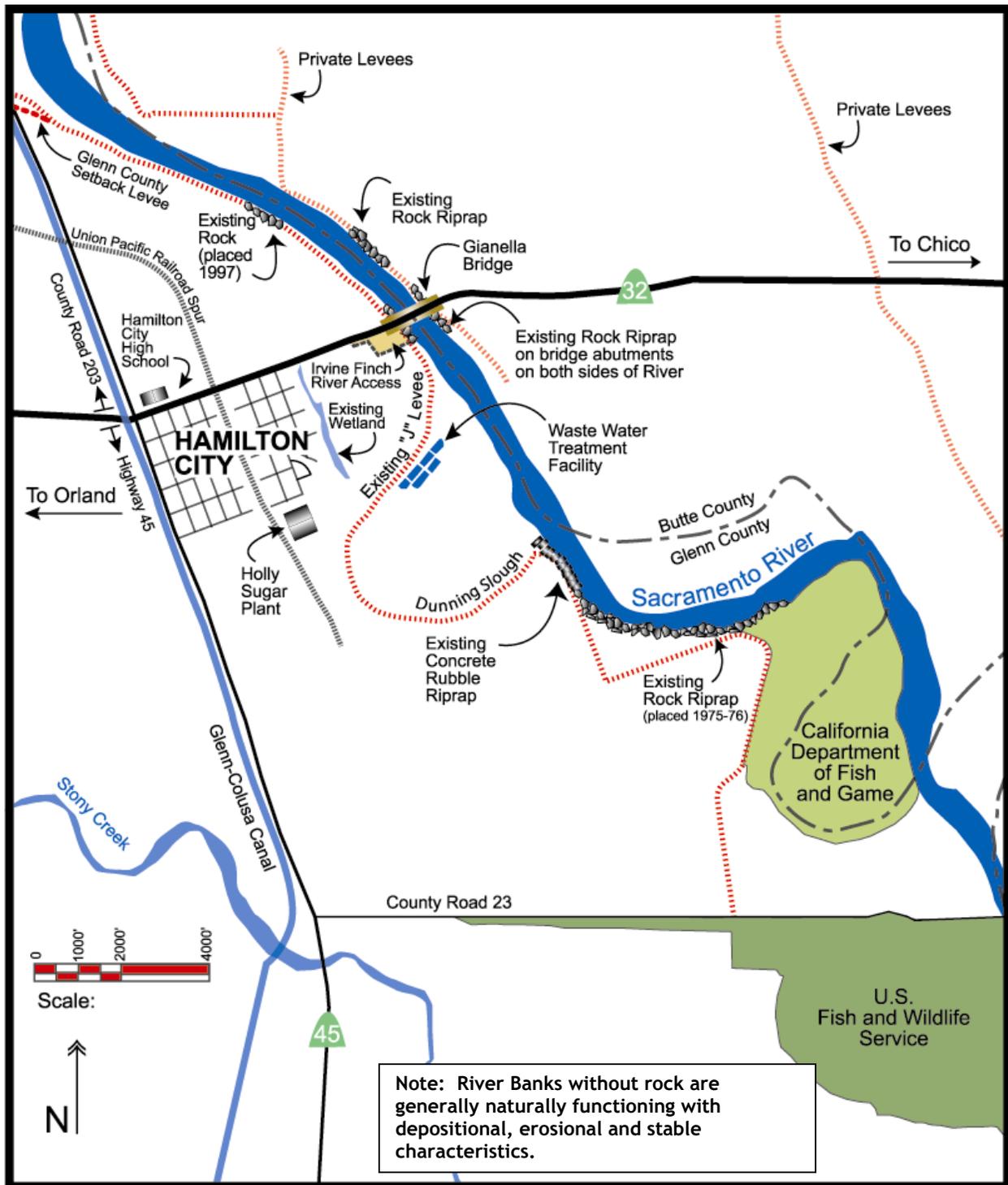


Figure 2-2: Study Area Map

Land ownership in the study area is a mix of public and private ownership. Much of the land in the study area along the Sacramento River is in conservation ownership, as shown in Figure 2-4. The California Department of Fish and Game (DFG) owns a large parcel of land known as the Pine Creek Unit located on either side of the Sacramento River in both Glenn and Butte Counties. The USFWS owns three parcels adjacent to the study area: one just north of the existing "J" levee in an area that is actively eroding, another across the River from Dunning Slough (known as the Pine Creek Unit) and the third just south of County Road 23 (known as the Capay Unit). The DFG and USFWS lands have been restored, or are proposed to be restored in the future. These parcels are not included in this project. TNC owns land north of Highway 32 between the Sacramento River and the Union Pacific Railroad tracks. TNC also owns land south of Hamilton City between Dunning Slough and County Road 23. The TNC land on the west side of the Sacramento River is the focus of the ecosystem restoration planning for this study.



Figure 2-3: The "J" levee north of Hamilton City

2.2 FEDERAL AND NON-FEDERAL OBJECTIVES

The Federal (Corps) and non-Federal sponsor (The Reclamation Board) objectives for water resources implementation studies establish the overall goals for the feasibility study. The specific objectives for this feasibility study were derived from the identification of the study problems and opportunities and are discussed in Section 2.3.

The Federal objective² of water and related land resources planning is to contribute to National Economic Development (NED) consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net economic benefits that accrue in the planning area and the rest of the nation.

The Corps has added a second national objective for ecosystem restoration in response to legislation and administration policy. This objective is to contribute to the nation's ecosystems (or National Ecosystem Restoration - NER) by restoring degraded ecosystem structure, function, and dynamic processes to a less degraded, more natural condition. Contributions to NER are increases in ecosystem value and productivity and are measured in non-monetary units such as acres or linear feet of habitat, average annual habitat units, or increased species number or diversity.

The CALFED Bay Delta Authority (CALFED), a funding partner for the study, has ecosystem restoration objectives that partner well with the national NER objectives stated

² The Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, established by the U.S. Water Resources Council on March 10, 1983, define the Federal objective for water resources implementation studies.

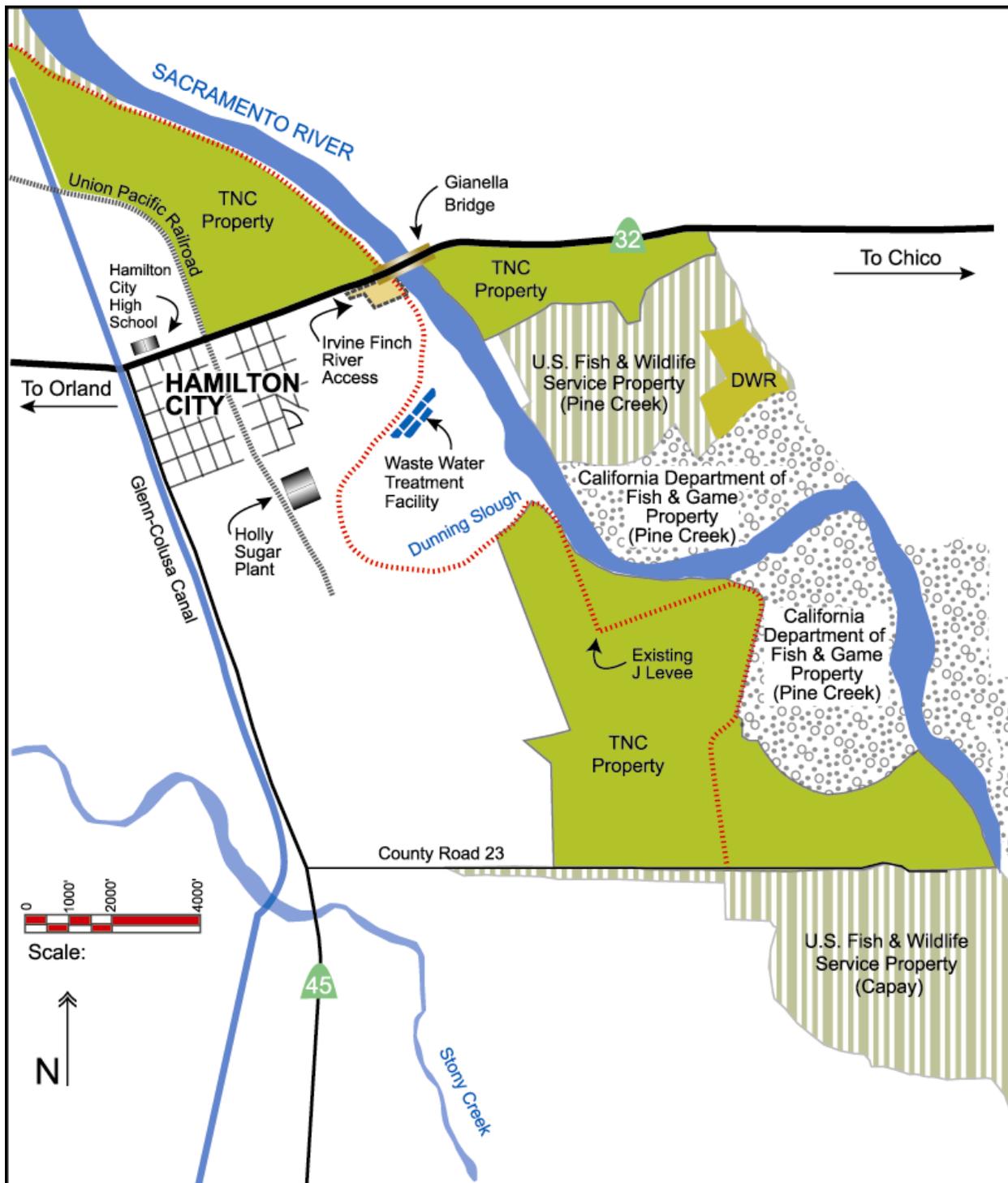


Figure 2-4: Conservation Ownership Map

above. CALFED's general goals for ecosystem restoration are to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. Specifically, CALFED aims to protect, enhance and restore the meander belt of the Sacramento River within the reach that includes the Hamilton City area. The Reclamation Board, as the non-Federal sponsor, has flood protection objectives similar to the national NED objectives, but recognizes the benefits of the ecosystem restoration goals and believes they can be implemented while maintaining the integrity of the flood control system.

2.3 PROBLEMS AND OPPORTUNITIES

A problem is an existing undesirable condition to be changed. An opportunity is a chance to create a future condition that is desirable. Within the context of solving the problems, opportunities contribute to the overall beneficial outcome of the project. The difference between problems and opportunities is often indistinct, but in both cases a changed future condition is preferred. The purpose of this feasibility study is to develop an implementable and acceptable plan to change the future condition and address specific water and related land resources problems and opportunities in the Hamilton City area.

Problems and opportunities to be addressed were identified in several ways. The study team reviewed previous studies by the Corps, The Reclamation Board, TNC, and others to identify flooding and water resource related environmental problems. Public workshops and several brainstorming meetings were held to help define the existing conditions and identify problems and opportunities. Participants in these meetings included:

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

Understanding of the problems and opportunities was further refined through analyses conducted during the Feasibility Study. The problems and opportunities addressed in the feasibility study are defined in the following sections.

2.3.1 Flooding and Ecosystem Problems

PROBLEM: Flooding threatens public safety in and around the community of Hamilton City.

The primary risk (highest probability) of flooding to Hamilton City is from upstream unregulated tributary streams along the Sacramento River between Shasta Dam and Hamilton City. Runoff from these streams can cause the Sacramento River water level to rise and break through or overtop the "J" levee. Extremely large storm events in the upper Sacramento River watershed result in high release flows from Shasta Dam, which could cause flooding in the Hamilton City area. Similarly, large storm events in the Stony Creek watershed can result in high release flows from Black Butte Dam, causing flooding in the Hamilton City area. In both cases, however, the probability of flooding due to dam releases is relatively low compared to the risk from the unregulated tributaries. The community relies on the "J" levee to contain flows in the Sacramento River. The "J" levee does not meet Corps or any other levee construction standards and could fail at river levels well below the top of the levee.

The estimated risk of failure³ in any year, neglecting the effect of flood fighting, is about 12 percent. That is, in every year there is about a 1 in 8 chance the "J" levee will fail without flood fighting. Over the next 25 years, the estimated risk of the levee failing at least once is about 95 percent. Although it is difficult to assess the risk of failure with flood fighting because of the uncertainties associated with a flood fight such as resource requirements and availability, weather conditions and hydraulic conditions, such an analysis was performed and is described in Appendixes A (Plan Formulation) and E (Economics).

The threat to public safety includes exposure to flood waters, accidents during evacuation, and accidents during flood fighting. Over the past twenty years, flood fighting has been required to prevent flooding in 1983, 1986, 1995, 1997, and 1998. Over that same period, the community was evacuated six times: 1983, 1986, twice in 1995, 1997, and 1998.

PROBLEM: Hamilton City and surrounding agricultural lands incur damages from flooding.

Flooding in and around Hamilton City can cause significant economic damages. To estimate the amount of damages, floodplains⁴ were developed based on analysis of runoff volumes, river flows and stages, and topography. Figures 2-5 and 2-6 show floodplains for the 50 percent, 10 percent, 4 percent, 2 percent, 1 percent, 0.2 percent, and 0.5 percent chance exceedence events; that is, floodplains associated with flows in the Sacramento River that have a 50 percent, 10 percent, 4 percent, 2 percent, 1 percent, 0.5 percent, and 0.2 percent chance of occurring or being exceeded in any year, respectively. The floodplains are based on several simplifying assumptions, including that the "J" levee is ineffective in preventing flooding (fails or

³Levee failure refers to either physical failure (such as erosion, seepage, or slope instability) or overtopping

⁴**Floodplain:** The portion of a river valley that has historically been inundated by a river during floods. Computer models predict how water moves through the floodplain, calculates its depth, and estimates the extent of flooding.

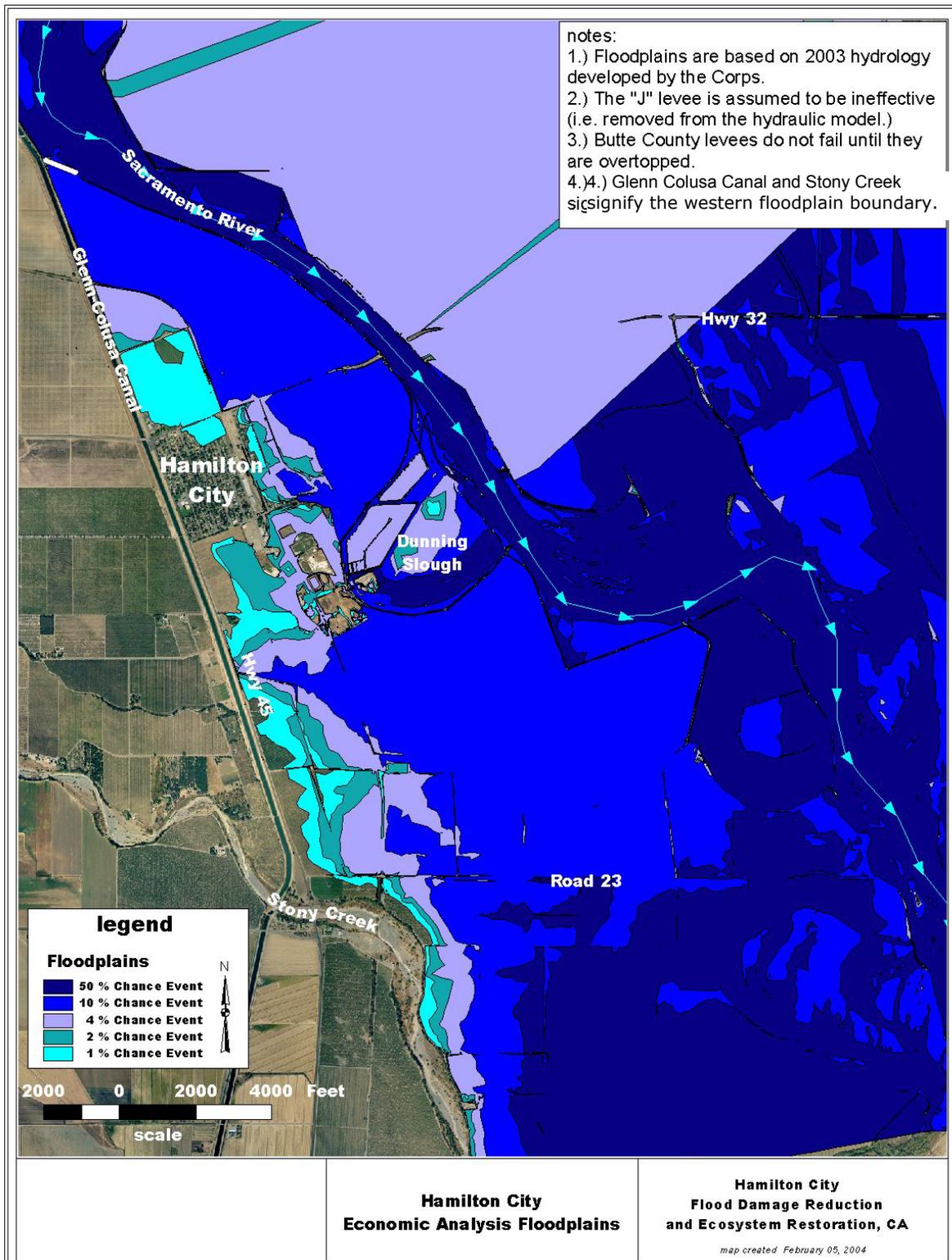


Figure 2-5: Hamilton City Economic Analysis Floodplains, 50% to 1% Chance Events

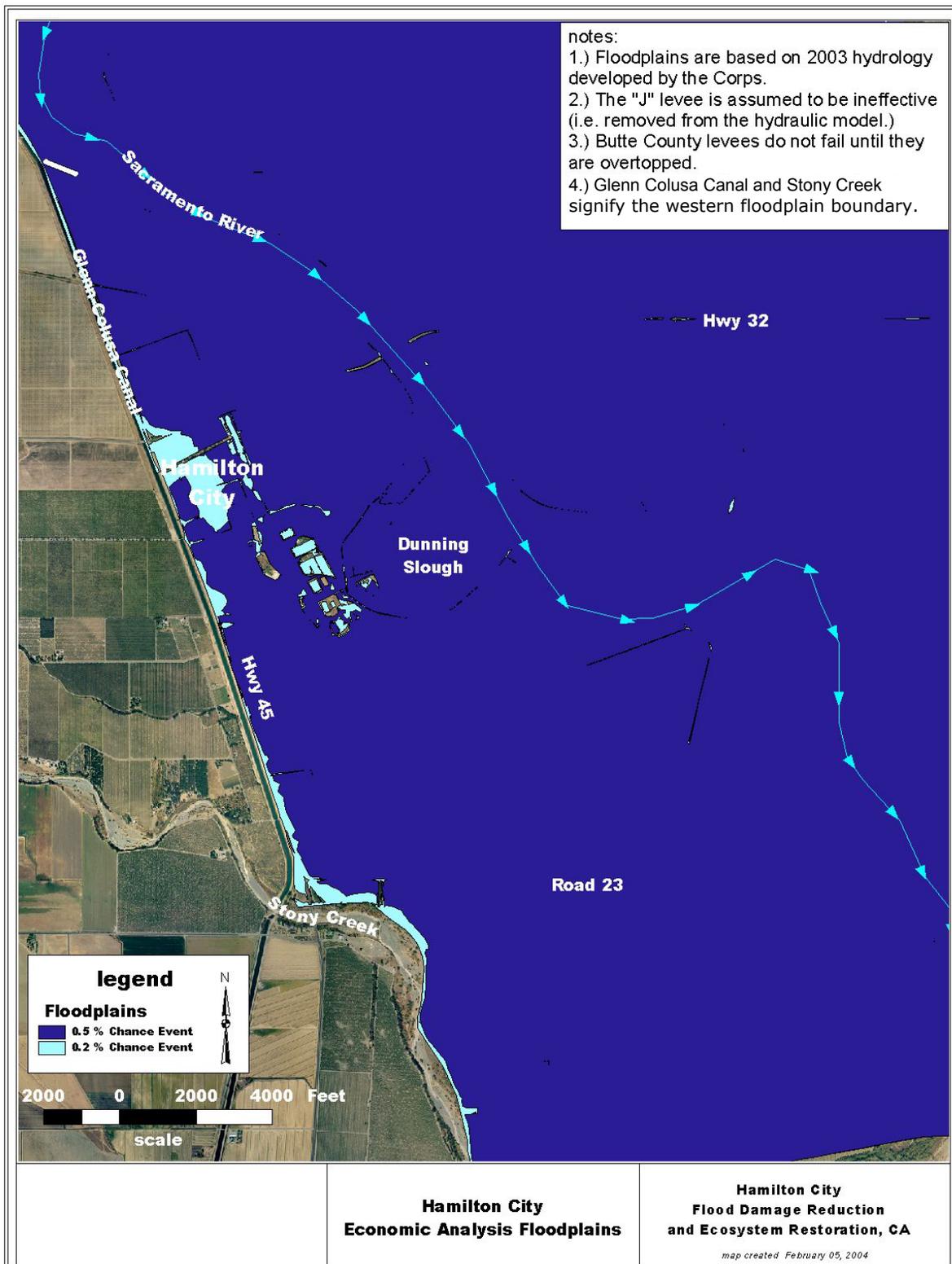


Figure 2-6: Hamilton City Economic Analysis Floodplains, 0.5% to 0.2% Chance Events

is overtopped). Floodplains provide a representative view of the areas at risk from flooding and are useful for economic analysis of expected flood damages.

The floodplains illustrate that flooding would be most frequent in the eastern portions of the town and on agricultural lands. In town, flood depths up to 10 feet, depending on the ground elevations and magnitude of the flood. To the north and south of town, the river could flood agricultural lands at depths up to 15 feet.

Property subject to damages in the various floodplains was inventoried and analyzed for expected annual damages. Damages considered in the analysis include flood damages to both structures and contents of residential, commercial, industrial, and public facilities; flood damages to crops; flood damages to automobiles and roads, emergency response costs, and clean up costs. Using the estimated damages for each floodplain and considering the risk of the "J" levee failing or being overtopped, the expected annual flood damages were estimated for the study area. The expected annual damages for the future without-project condition⁵ are about \$750,000.

PROBLEM: The Sacramento River is prevented from meandering.



Figure 2-7: The Gianella Bridge (Highway 32) over the Sacramento River

A primary problem of the riverine ecosystem in the study area is the loss of the river's natural function to erode its banks and migrate through its floodplain. In the region, the Chico Landing to Red Bluff Project placed bank protection at 29 sites totaling approximately 86,915 feet (16.5 miles). Sites are situated primarily at outer bends of meanders in the river. In the study area, confinement of the river by levees (about 42,200 linear feet (lf) on the west bank, 31,700 lf on the east bank), bank protection⁶ (about 7,000 lf remaining on the west bank and 6,500 lf remaining on the east bank), and channel stabilization at Gianella Bridge have limited erosion and deposition of

sediment and the formation of essential riverine and riparian habitats (see Figure 2-2 for levee and bank protection locations; Figure 2-7 shows Gianella Bridge). Bank revetment protection and channel stabilization have prevented the development of large cutbanks, shaded riverine aquatic (SRA) cover and mid-channel gravel bars. Bank swallow, a State listed threatened species, are dependent on vertical cutbanks for colony establishment. Stabilization of the banks has reduced or eliminated the supply or sediment, causing the channel to typically narrow or deepen.

Meander processes contribute to the development of diverse riparian ecosystems along the river. The high diversity of riparian plants is thought to be related to, among other

⁵ The expected future condition if no project is implemented to address the problems and opportunities.

⁶ Bank protection in the study area includes rock riprap placed by the Corps of Engineers' Chico Landing to Red Bluff Project, emergency rock riprap placed by the PL 84-99 program and privately dumped rubble.

factors, the intensity and frequency of floods and small-scale variations in topography and soils as a result of lateral migration of river channels (Corps 2001). The migration capacity of plants along riparian corridors is also an important factor in explaining the high biodiversity observed along stream/river channels (Corps 2001).

The Sacramento River within the study area experiences small movement and sinuosity changes. Riprap was installed between 1974 and 1980 along an approximate 1-mile stretch of the right bank of the river south of Dunning Slough as part of the Sacramento River, Chico Landing to Red Bluff Project.

PROBLEM: The Sacramento River floodplain is not allowed to flood.

In the Hamilton City area, private levees protecting agricultural lands and the community have severed the Sacramento River from its historic floodplain. Figure 2-8 shows the existing "J" levee. While this area is not as severely constrained as downstream (where the Sacramento River Flood Control Project levees and bank protection constrain the river), levees in the Hamilton City area do greatly reduce the area subject to relatively frequent, ecologically-significant flooding which reduces the establishment of riparian vegetation and associated components resulting in a reduction in the (1) colonization of woody plants such as cottonwoods and willows, (2) establishment of shaded riverine aquatic (SRA) cover, (3) establishment of large woody debris, and (4) establishment of natural banks, all of which results in a reduction in a variety of aquatic and terrestrial species.

The lack of the disturbance pattern from flooding in riparian areas has resulted in a reduction in the natural mosaic of vegetation patterns. River channel dynamics interact closely with the vegetation structure. The hydrologic regime and energy in the riparian corridor mainly determine the early stages of riparian plant development (Corps 2001). Cutting off flooding from the floodplain eliminates habitat complexity created by vegetative layers including various woody species, and reduces wildlife diversity.



Figure 2-8: The "J" levee and the Sacramento River near north end of the study area

Only a small fraction of the unique SRA habitat remains along the Sacramento River. SRA exists in areas along riverbanks where the bank, composed of natural material and riparian vegetation, overhangs or protrudes into the water. These attributes provide a highly productive and complex land-water interface to support an array of fish and wildlife species adapted to this habitat. The USFWS designated SRA cover as a Resource Category 1 under its Mitigation Policy as applied to the Sacramento River Bank Protection Project, which identifies SRA habitat as unique and irreplaceable on a national basis or in the ecoregion of the Central Valley and warrants no existing habitat value loss (USFWS 1981).”

Disconnecting flooding from the historic floodplain eliminates a source of large woody debris. A lack of large woody debris reduces the ability of the river to store inorganic sediment and organic matter, and reduces in-water cover for fish (USFWS 2000). Large pieces of debris generally store more sediment and organic material and smaller woody debris, such as branches, sticks, and twigs which create sieve-like accumulations and efficiently retain leaves (Gregory et al. 1989; Murphy and Meehan 1991 in USFWS 2000). From a biological perspective, large woody debris is required to gain the structural complexity for a functional riverine ecosystem.

Severing the river from its floodplain eliminates the river's ability to create natural banks. Natural banks create a unique zone that provides constant contact between the aquatic and terrestrial portions of the riparian corridor. Elimination of natural banks reduces species diversity and abundance that tend to be greatest at the aquatic and terrestrial habitat interface (USACE 2001).

PROBLEM: The quantity and quality of riparian and related floodplain habitat and dependent species has been diminished.

Riparian and related floodplain habitats were once widespread throughout the Sacramento Valley. Lands subject to regular flooding or occasional overflow covered about one-third of the Sacramento Valley in 1880, or about 1 million acres (Thompson, 1961). It is believed that most of these lands supported a mosaic of floodplain habitats in various stages of succession.

Riparian vegetation was widespread throughout the Sacramento River floodplain; dense bands up to 5 miles wide existed along the main stem of the river. Some 1,300,000 acres of riparian forest historically fringed the entire length of the mainstream Sacramento and San Joaquin River channel. Today, less than five percent of the mainstream riparian forest remains. Along most of the Sacramento River and its tributaries, remnants of riparian communities are all that remain of once very productive and extensive riparian areas. However, along the upper reaches of the Sacramento River, more riparian vegetation is still intact. Along the Sacramento River from Keswick (just downstream of Shasta Dam) to Verona (just north of the City of Sacramento) there are approximately 23,000 acres of riparian vegetation. In the reach from Red Bluff to Chico Landing where the study area is located, there are approximately 6,900 acres of riparian vegetation. (SRCAF, 2000)

Narrow and frequently degraded stands of riparian forest remain along levees and old oxbow lakes. There is a lack of habitat continuity along the river. Large reaches of little or low-value habitat separate patches of high-value habitat. This lack of a habitat "corridor" reduces wildlife movement among habitat patches, which reduces dispersal, migration, emigration and immigration of species. Many species have reduced numbers of individuals as well as population viability, both within habitat patches and regionally.

Within the study area, just as throughout the Sacramento River Valley, native habitats have been lost or degraded, negatively affecting those species dependent on the habitat. The floodplain is intensively farmed with walnut, almond, and prune orchards, as well as some row crops. Conversion to agriculture and river confinement

have caused a decline in the health of the riverine ecosystem over the last 150 years to the point that today, the system is no longer able to support sustainable populations of many species. Native species populations have declined and continue to decline throughout the Sacramento River basin. Most species, including threatened and endangered fisheries, passerine bird species, and numerous small mammals depend on the Sacramento River either for the entire, or for part, of their life cycle.

2.3.2 Opportunities

OPPORTUNITY: Increase Valley Elderberry Longhorn Beetle habitat (VELB).

Restoring riparian and savannah habitats could include planting of elderberry shrubs, habitat for the Federally-threatened Valley Elderberry Longhorn Beetle.

OPPORTUNITY: Restore the Ecosystem

There is an opportunity to accomplish ecosystem restoration in the Hamilton City area because there is less infrastructure near the river than in other, more developed areas, and much of the land adjacent to the Sacramento River is owned by a non-governmental organization, TNC, interested in ecosystem restoration.

OPPORTUNITY: Reduce risk to public safety and damages due to flooding

There is an opportunity to reduce the risk to public safety and damages due to flooding in the Hamilton City area.

2.4 PLANNING OBJECTIVES

The planning objectives are statements of the study purpose. Planning objectives are more specific than the Federal and non-Federal objectives and reflect the problems and opportunities in the Hamilton City area; an objective is developed to address each of the identified problems and opportunities. Planning objectives represent desired positive changes in the without-project future conditions. The planning objectives for Hamilton City would be attained within the period of analysis for the study, a 50-year timeframe beginning in 2007. All of the objectives focus on activity within the study area.

The planning objectives are:

- Reduce the risk to public safety in the Hamilton City community from flooding.
- Reduce damages due to flooding in Hamilton City and the surrounding area.
- Increase the opportunity for the Sacramento River to meander.
- Increase the extent of overbank and recurrent flooding in the floodplain.
- Increase the quantity and quality of riparian and related floodplain habitat.
- Increase the availability of VELB habitat along the Sacramento River.

In most cases, planning objectives are consistent with one another. In some cases, however, the objectives may seem to conflict, for example, allowing the floodplain to flood and reducing flood damages. There is no actual conflict because in every situation where the floodplain is allowed to flood, damageable property would be removed from the flooded area or flood easements would be purchased to compensate the landowner. The goal of the feasibility study is to develop a range of alternative plans that balance the objectives and avoid conflicts or, where necessary, demonstrate the tradeoffs between conflicting objectives, enabling decisions to be made.

The Federal objective is to maximize net benefits. Because of this, it is not appropriate to identify targets within objectives. For example, no quality target flood frequency, minimum acreage of habitat, or minimum habitat value was ever identified for the project. Rather, the planning process includes formulation of alternative plans to maximize NED and NER benefits relative to costs. The Federal objective to maximize net benefits would supercede any project-specific target output.

2.5 PLANNING CONSTRAINTS

A constraint is a restriction that limits the extent of the planning process. It is a statement of things the alternative plans should avoid. Constraints are designed to avoid undesirable changes between without and with-project future conditions. The planning constraints are:

- Comply with all Federal, State, and local laws, regulations and policies.
- Avoid adverse hydraulic effects where they could result in economic damage to others.
- Because future flood events will expand the hydrologic record, there exists a high probability that the level of performance of a project will change. The Reclamation Board staff has required that a project's performance not be greater than a 90 percent chance of passing the 75-year event or less than a 90 percent chance of passing the 125-year event. This will avoid implementing a project that just meets FEMA-level criteria for flood insurance, only to later be redefined as not providing that level of performance, potentially necessitating implementation of further flood control measures to regain the FEMA-level criteria.

There are no other physical, ecological, cultural or social constraints associated with this project.

2.6 OTHER PLANNING CONSIDERATIONS

2.6.1 Williamson Act, Farmland Security Zone - Contracted Lands

The Williamson Act is a tool that the State of California uses to protect agricultural land by creating an arrangement whereby private landowners contract with counties and cities to voluntarily restrict land to agricultural and open-space uses in exchange for lower property taxes. A Farmland Security Zone is an option within the Williamson Act that is a more restrictive contract than the Williamson Act but offers greater tax savings to landowners. The arrangement is a 10-year contract under the Williamson

Act and a 20-year contract under the Farmland Security Zone designation during which time the restricted parcels are assessed at a lower tax rate. The State of California reimburses the counties for the lost tax revenue. The contract renews automatically each year. In order to terminate the contract, a landowner must file a notice of non-renewal that starts a 9-year process for contract termination for the Williamson Act and a 19-year process for contract termination for land within the Farmland Security Zone.

This contract may be canceled to avoid the 9-year or 19-year termination process, but is subject to a 12-½ percent fee (Williamson Act) or 25 percent fee (Farmland Security zone) based on the assessed value of the property. Cancellations are allowed when the public interest is no longer best served by the contractual restrictions placed on agricultural land, and if there is no other land suitable for the proposed alternative use. (Department of Conservation, 2001)

In the study area, there are currently 6 parcels under Williamson Act contracts totaling 1,577.87 acres. Two of these parcels are owned by TNC, two of these parcels are owned by the USFWS, and two parcels are privately owned. Also in the study area, there are two parcels under Farmland Security Zone Contracts totaling 612.62 acres. Both properties are privately owned.

Lands under Williamson Act and the Farmland Security Zone Act contracts are included as a planning consideration because coordination is necessary in developing planning assumptions, particularly regarding planning constraints, pertaining to timing implementation of restoration and projected benefits and costs.

2.6.2 Guiding Principles

A set of basic principles, called Guiding Principles, was developed as part of the Comprehensive Study to ensure that changes to the flood management system integrate flood damage reduction and ecosystem restoration, while considering system-wide implications of those changes. The Guiding Principles were designed in response to the need to (1) promote coordination and partnerships for the public good, (2) reduce or eliminate conflicts, and (3) serve as a guide for modifications to the flood management system. These principles were established and refined through agency coordination and public outreach during the Comprehensive Study to address the wide range of stakeholder concerns to integrate flood damage reduction and ecosystem restoration, and to ensure a system-wide approach in evaluating proposed changes.

Each of the Guiding Principles supports a system-wide approach for project planning. The Sacramento River functions as a hydrologic system, and ecosystem needs are tied to hydrologic processes. Accordingly, one must approach the river as a complete system when considering flood damage reduction and ecosystem restoration objectives. The fact that the river has not been consistently treated as comprehensive system in the past has led to some of the problems that are experienced today. Focusing on flood management within limited reaches without full consideration of hydraulic effects in reaches both upstream and downstream has resulted in modifications to the system that have shifted local problems to other

reaches. Likewise, the cumulative effects of modifications to the system have contributed to a general decline in the health of the ecosystem. The cumulative effects of habitat restoration projects can also reduce flood conveyance. It is important to ensure that the integrity and continuity of the system is maintained and enhanced to allow the river system to function in a manner where flood management and the ecosystem are compatible.

The following Guiding Principles are integral to achieving a system-wide approach to flood damage reduction and ecosystem restoration along the Sacramento River. An expanded description of the Guiding Principles can be found in Appendix A - Supplemental Plan Formulation.

- Recognize that public safety is the primary purpose of the flood management system.
- Promote effective floodplain management.
- Recognize the value of agriculture.
- Avoid hydraulic and hydrologic effects.⁷
- Plan system conveyance capacity that is compatible with all intended uses.
- Provide for sediment continuity.
- Use an ecosystem approach to restore and sustain the health, productivity, and diversity of the floodplain corridors.
- Optimize use of existing facilities.
- Integrate with the CALFED Bay-Delta Program and other programs.
- Promote multi-purpose projects to improve flood management and ecosystem restoration.
- Protect infrastructure.

The Guiding Principles were considered in the formulation, evaluation, and comparison of alternative plans.

2.6.3 Environmental Operating Principles

The Corps has reaffirmed its commitment to the environment by formalizing a set of "Environmental Operating Principles" applicable to all its decision-making and programs. These principles foster unity of purpose on environmental issues, reflect a new tone and direction for dialogue on environmental matters, and ensure that employees consider conservation, environmental preservation and restoration in all Corps activities. By implementing these principles, the Corps will continue its efforts to develop the scientific, economic, and sociological measures to judge the effects of its projects on the environment and to seek better ways of achieving environmentally sustainable solutions.

⁷ This Guiding Principle refers to avoiding *adverse* hydraulic and hydrologic effects within the study area as well as upstream and downstream.

- **Achieve Environmental Sustainability.** An environment maintained in a healthy, diverse, and sustainable condition is necessary to support life.
- **Consider Environmental Consequences.** Recognize the interdependence of life and the physical environment. Proactively consider environmental consequences of Corps programs and act accordingly in all appropriate circumstances.
- **Seek Balance and Synergy.** Seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.
- **Accept Responsibility.** Continue to accept corporate responsibility and accountability under the law for activities and decisions under our control that effect human health and welfare and the continued viability of natural systems.
- **Mitigate Effects.** Seek ways and means to assess and mitigate cumulative effects to the environment; bring systems approaches to the full life cycle of our processes and work.
- **Understand the Environment.** Build and share an integrated scientific, economic, and social knowledge base that supports a greater understanding of the environment and effects of our work.
- **Respect Other Views.** Respect views of individuals and groups interested in Corps activities, actively listen, and learn from their perspective in the search to find innovative win-win solutions to the nation's problems, solutions that also protect and enhance the environment.

2.6.4 CalFed Bay Delta Authority Record of Decision

The Record of Decision (ROD) for the CALFED Bay-Delta Final Programmatic Environmental Impact Statement and Report represents the culmination of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) processes for the CALFED programmatic effort. The ROD reflects a final selection of a long-term preferred program alternative, which includes specific actions to fix the Bay-Delta, describes a strategy for implementing the plan, and identifies complementary actions the CALFED agencies will pursue. The ROD highlights the Corps and The Reclamation Board's Sacramento and San Joaquin River Basins Comprehensive Study that was concurrently investigating integrated flood management and ecosystem restoration for those basins. The CALFED ROD indicates that CALFED intends that final development and implementation of actions under the Comprehensive Study would be coordinated and consistent with the CALFED Bay-Delta Program. This feasibility study for Hamilton City has been developed to be consistent with the CALFED ROD.

2.6.5 Memorandum of Understanding between the Corps and TNC

The Corps and TNC developed a Memorandum of Understanding (MOU) in December 2000, to facilitate effective and efficient management of important biological resources within the context of the Corps' civil works and regulatory missions. This MOU focuses on the need to protect, restore, study and manage natural ecosystems

while meeting human needs. The goal of the MOU is to develop a partnership between the Corps and TNC which can avoid unnecessary duplication of effort, provide for the pooling of scarce resources, and promote coordinated, focused and consistent mutual efforts to resolve common problems and missions in a united effort that best benefits all concerned.