

## **1.1 Document Purpose**

The California Environmental Quality Act (CEQA) (Public Resources Code, Section 2100 *et seq.*) requires a public agency to prepare an environmental impact report (EIR) for any project that it proposes to carry out or approve that may have a significant direct or indirect effect on the environment. The Sacramento Area Flood Control Agency (SAFCA) is proposing to implement bank protection measures at nine sites along the east (left) bank of the Sacramento River in order to control erosion that threatens the integrity of the flood control system protecting the Natomas Basin area of Sacramento and Sutter Counties. SAFCA has determined that the bank protection project may have significant effects on the environment. As the lead agency for complying with CEQA, SAFCA therefore has directed the preparation of an EIR to analyze these potentially significant effects.

An EIR is an informational document that is intended to inform public agency decision-makers and the general public of the significant adverse environmental effects of a project, identify feasible measures that would minimize those effects, and describe a reasonable range of alternatives to the project that would feasibly attain most of the basic project objectives but would avoid or substantially lessen the significant environmental effects of the project. The purpose of an EIR is not to recommend either approval or denial of a project. If all the significant effects of a proposed project cannot be mitigated to a less-than-significant level, CEQA requires decision-makers to balance the benefits of a project against its significant unavoidable environmental effects in deciding whether to carry out the project. As the lead agency, SAFCA will consider the information presented in the EIR, comments received on the EIR, and responses to those comments, along with other information, when determining whether to approve the proposed bank protection project. If the EIR identifies any environmental impacts as significant and unavoidable, SAFCA still may approve the project if it determines that the social, economic, legal, or other benefits outweigh the project's unavoidable adverse environmental effects.

Pursuant to Section 15126(d) of the State CEQA Guidelines, an EIR must describe and evaluate a reasonable range of alternatives that would feasibly attain most of the basic project objectives and would avoid or substantially lessen any of the significant impacts of the project as proposed. The guidelines state that the

range of alternatives required to be evaluated in an EIR is governed by the “rule of reason”: the EIR needs to describe and evaluate only those alternatives necessary to permit a reasoned choice and to foster informed decision-making and public participation.

This Draft EIR has been prepared in accordance with the requirements of CEQA and the State CEQA Guidelines (California Code of Regulations, Title 14, Section 15000 *et seq.*).

## 1.2 Type of Environmental Impact Report and Document Incorporation by Reference

CEQA allows for the preparation of environmental documents using a multilevel approach, whereby a broad-level EIR, termed a *program EIR*, analyzes significant effects on the environment at a general level (i.e., the impacts of an entire plan, program, or policy), and subsequent project-level EIRs or negative declarations analyze the project-specific effects of projects within the program (State CEQA Guidelines Section 15168). State CEQA Guidelines Section 15152 describes the process of tiering, in which CEQA documents that follow a program EIR incorporate by reference and rely on the general discussions, programwide analyses, and program-level mitigation measures from the broader EIR and focus on the site-specific impacts of the individual projects that implement the plan, program, or policy.

SAFCA’s *Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area* (EIR on Local Funding Mechanisms) (February 2007) broadly examined the significant environmental effects that could result from creating an assessment district and a development fee program. Specifically, the report examined the physical effects associated with the program of flood control improvements and related environmental mitigation and habitat enhancements that the local funding mechanisms would be used to finance. These improvements include the Natomas Levee Improvement Program (NLIP) (Sacramento Area Flood Control Agency 2006). This EIR analyzes the bank protection components of the NLIP that are proposed for construction in 2008 through 2010 and is tiered from the analysis in the EIR on Local Funding Mechanisms. Consistent with State CEQA Guidelines Section 15152, this second-tier EIR incorporates by reference general discussions from the EIR on Local Funding Mechanisms as appropriate, and focuses on the significant effects on the environment that were not adequately addressed in that EIR.

In accordance with the State CEQA Guidelines, the EIR on Local Funding Mechanisms is incorporated by reference in this EIR, and relevant portions are summarized in this document. The EIR on Local Funding Mechanisms is included in electronic format as an attachment to this EIR and is also available for inspection in printed form at the SAFCA offices at 1007 7<sup>th</sup> Street, 7<sup>th</sup> Floor, Sacramento, California, 95814, (916) 874-7606, during normal business hours.

## 1.3 Relationship to the Natomas Levee Improvement Program Landside Improvements Project Environmental Impact Report

At this time, SAFCA also is proposing to implement improvements to the Natomas levee system to address freeboard deficiencies, underseepage, and encroachment management. These landside components have been evaluated as a separate project in a separate EIR, *Environmental Impact Report on the Natomas Levee Improvement Program Landside Improvements Project* (Landside Project EIR), prepared concurrently with this EIR. Neither the levee improvements project analyzed in the Landside Project EIR nor the bank protection project analyzed in this EIR is dependent on the construction of the other project; each can be built without regard to the timing or scope of the other project. The cumulative impact analysis in Section 10 of this EIR considers the combined effects of the two projects, along with the effects of other past, present, and probable future projects within the project area.

## 1.4 Scope of the Analysis

CEQA (PRC Section 21002.1) and the State CEQA Guidelines (Section 15143) allow a lead agency to focus the discussion in the EIR on the potential environmental effects of a proposed project that the lead agency has determined may be significant. Lead agencies may limit discussion of other effects to a brief explanation as to why those effects would not be significant. During scoping activities with the public and governmental agencies for the EIR on Local Funding Mechanisms, and based on review of available information, it was determined that formation of the proposed funding mechanisms and subsequent implementation of the projects that receive local financing through these funding mechanisms (including the NLIP) would not result in significant environmental effects related to mineral resources or population and housing. For the following reasons stated in the EIR on Local Funding Mechanisms, these resource topics are not discussed further in this EIR:

- Mineral Resources—Analyses of effects on mineral resources under CEQA generally focus on whether a project would hinder the extraction and use of known mineral commodities. No known mineral resources were identified in the project area. Therefore, no potentially significant effects on known mineral resources are anticipated as a result of construction activities associated with the flood control improvement program or potential hydraulic changes within the flood conveyance system.
- Population and Housing—The flood control program would take place incrementally over several years and would not require the construction of new housing to accommodate workers, nor would it involve the displacement of a substantial number of people or residences.

The relationship of the potential program of flood control improvements, including the NLIP, to population growth was discussed in Section 6.1, “Growth-Inducing Effects,” of the EIR on Local Funding Mechanisms.

This EIR analyzes potential impacts on the following resource areas:

- Agriculture and Land Use,
- Geology and Soils,
- Hydraulics and Flood Safety,
- Water Quality,
- Fish and Aquatic Resources,
- Terrestrial Biological Resources (riparian vegetation and wildlife),
- Cultural Resources,
- Paleontological Resources,
- Transportation and Circulation,
- Air Quality,
- Noise,
- Recreation,
- Visual Resources,
- Utilities and Service Systems, and
- Hazards and Hazardous Materials.

## 1.5 Environmental Review and Consultation Requirements

Scoping of issues for the proposed project, according to provisions of CEQA, was conducted in June and July 2007. The results of the scoping process are described in Section 3 of this document and the Notice of Preparation (NOP) of this EIR, and copies of the scoping comments provided to SAFCA are included in Appendix C.

In accordance with CEQA review requirements, this Draft EIR is being distributed for public and agency review and comment for a 45-day period, which ends on October 29, 2007. This distribution ensures that interested parties have an opportunity to express their views regarding the significant environmental effects of the project, and ensures that information pertinent to permits and approvals is provided to the decision-makers for SAFCA and the CEQA responsible and trustee agencies. This document is available for review by the public during normal business hours at the SAFCA office at 1007 7<sup>th</sup> Street, 7<sup>th</sup> Floor, Sacramento.

SAFCA will hold a public meeting during the comment period, at which it will receive input from agencies and the public on the Draft EIR. The meeting will be

held on October 18 at 3 p.m. in the City of Sacramento Council Chambers, 915 I Street, Sacramento, California. In addition, written comments from the public and agencies will be accepted throughout the public comment period. Comments must be received by SAFCA by 5:00 p.m. on October 29, 2007, at the following address, fax number, or email address:

Attn: John Bassett / Draft EIR Bank Protection Comments  
Sacramento Area Flood Control Agency  
1007 7<sup>th</sup> Street, 7<sup>th</sup> Floor  
Sacramento, CA 95814  
Fax number: (916) 874-8289  
Email address: BassettJ@SacCounty.net

If comments are provided via e-mail, please *include the project title in the subject line, attach comments in MS Word format, and include the commenter's U.S. Postal Service mailing address.*

Following consideration of these comments, SAFCA will prepare written responses to comments on environmental issues, and prepare a final EIR (FEIR) that will describe the disposition of any significant environmental issues raised in the comments on the Draft EIR. Written responses must be provided to public agencies on comments made by those agencies at least 10 days before the EIR can be certified. Following this 10-day period, the SAFCA Board will consider certifying the FEIR if it is determined to be in compliance with CEQA and will rely on the certified FEIR when considering project approval.

In accordance with the requirements of CEQA, if the SAFCA Board decides to approve the proposed project analyzed in this EIR, it will make written findings with respect to each significant environmental effect identified in the EIR that explain that project changes or alterations are required to avoid or substantially lessen the effect; such changes or alterations are within the responsibility and jurisdiction of another public agency and have been adopted, or can and should be adopted, by such other agency; or specific economic, legal, social, technological, or other considerations render the mitigation measures or project alternatives identified in the FEIR infeasible. In addition, if the SAFCA Board decides to approve the project but determines that it would have unavoidable significant environmental effects, the Board may adopt a "Statement of Overriding Considerations" that explains why the benefits of the project outweigh its significant effects on the environment, based on information in the EIR and other information in the project record.

At the time of project approval, the SAFCA Board also must adopt a reporting or monitoring program for those measures that it has adopted and incorporated into the project to mitigate or avoid significant effects on the environment. The reporting or monitoring program must be designed to ensure compliance during project implementation.

Following project approval, a notice of determination documenting the decision would be issued.

## 1.6 Intended Uses of the Environmental Impact Report, Agency Roles and Responsibilities, and Required Approvals and Permits

SAFCA is the CEQA lead agency for the proposed bank protection project and has the primary authority for approval of this project. This EIR will be used by SAFCA and CEQA responsible agencies to fulfill the requirements of CEQA. It also may be used as an informational document by federal agencies that could have permitting or approval authority (including partial funding) for aspects of the projects, and by other local and state agencies, including CEQA trustee agencies, that may have an interest in resources that could be affected by the project.

A CEQA responsible agency is a state agency, board, or commission, or any local or regional agency other than the lead agency, that has discretionary approval power over a project. Responsible agencies must participate actively in the lead agency's CEQA process and review the lead agency's CEQA document. This EIR will be used by responsible agencies to ensure that they have met the requirements of CEQA before deciding whether to approve or permit project elements over which they have authority.

The bank protection project will require permits and authorizations from, or coordination with, numerous federal, state, and local agencies. Table 1-1 lists agencies that may have responsibility or jurisdiction over the implementation of the bank protection project and the permits or authorizations that may apply to the project. Required permits and approvals are described further in Section 8.

A trustee agency is a state agency that has jurisdiction by law over natural resources that are held in trust for the people of the State of California. Trustee agencies that have jurisdiction over resources potentially affected by bank protection project are DFG, for fish and wildlife resources, and the State Lands Commission for navigable waterways and submerged lands.

**Table 1-1. Regulatory Compliance Permits and Approvals**

Authority/Agency	Permit/Approval	Trigger
U.S. Army Corps of Engineers	Clean Water Act Section 404	Work within waters of the United States
U.S. Fish and Wildlife Service	Take Permit or Letter of No Effect	Potential effects on species protected under the ESA
National Marine Fisheries Service	Take Permit or Letter of No Effect	Potential effects on species protected under the ESA
California Department of Fish and Game	Take Permit or Letter of No Effect	Potential effects on species protected under the CESA
	Streambed Alteration Agreement	Construction activity within the bed, channel, or bank of the river
California Reclamation Board	Encroachment Permit	Modifications to a federal or state project levee or potential impacts to flooding
Central Valley Regional Water Quality Control Board	National Pollutant Discharge Elimination System	Earth disturbance greater than 1 acre
State Lands Commission	Section 401 Certification or Waiver	“
	Right-of-way permit or land lease	Activities in a bed, channel, or bank of a river; other sovereign lands
Sacramento Metropolitan Air Quality Management District	Guideline compliance and Emission Reduction Credit	Particulate and exhaust emission impacts beyond established thresholds
Feather River Air Quality Management District	Guideline compliance	Particulate and exhaust emission impacts beyond established thresholds
California State Office of Historic Preservation	Consultation with SHPO	Potential effects on cultural resources
CESA = California Endangered Species Act.		
ESA = federal Endangered Species Act.		

## 1.7 Document Organization

This document is organized as follows:

- Section 1—Introduction
- Section 2—Flood Risk and Need for Project
- Section 3—EIR Scoping
- Section 4—Project Purpose and Objectives
- Section 5—Project Description
- Section 6—Environmental Setting
- Section 7—Impacts of the Proposed Project
- Section 8—Compatibility with Land-Use and Environmental Plans, Policies, and Regulations
- Section 9—Growth-Inducing Impacts
- Section 10—Cumulative Impacts
- Section 11—Alternatives
- Section 12—Conclusions
- Section 13—References
- Appendices

## 2.1 Flood Risk Background

The Sacramento metropolitan area, including the Natomas Basin, is situated at the confluence of the American and Sacramento Rivers, and many portions of this area, including Natomas, are low-lying former flood basins now protected by levees. The Natomas Basin is the northern growth area of Sacramento metropolitan area and currently has both agricultural and, increasingly, urban uses. The Sacramento International Airport is in the Natomas basin. A substantial number of residents and damageable property, as well as, significant regional infrastructure in the basin are protected from flooding by an extensive system of levees jointly managed by federal, state, regional (SAFCA), and local agencies.

When the Sacramento River Flood Control Project (SRFCP) was conceived, river navigation was an important element of the Sacramento Valley's transportation infrastructure. Hydraulic mining debris had clogged river channels and added significant uncertainty and cost to navigation. The SRFCP was designed in part to address this problem. Thus, the mainstem river levees were placed close to the channel to confine river flows in flood stage and use the energy of the river to drive hydraulic mining sediments out of the system. This design also reduced the cost of levee construction by taking advantage of the high ground built up by the river over time along its banks and by making it possible for existing technology (the clam shell dredge and hydraulic suction dredge) to efficiently use the sediment in the channel as a borrow source for the levees.

The location of the mainstem river levees close to the edge of the river channel did succeed in driving hydraulic sediments from the system. This effort was in turn complemented by the construction of debris dams and, later, large multipurpose dams on the mainstem rivers that limited the downstream migration of new sources of sediment and introduced a new flood control and irrigation-based flow regime to the SRFCP.

These developments fueled a new pattern of erosion in the mainstem rivers characterized by the steady deepening and widening of the river channels below the dams. Widening occurs when the channel hits a stable bottom layer and begins to exert its energy against the banks and berms supporting the levees. Because the portion of these berms separating the levees from the river channel is

relatively narrow, this erosion threatens the stability of the levees. This sort of erosion, substantially exacerbated by persistent boat-wake activity, has become a long-term threat to the stability of the levee system.

The threat of erosion is addressed by armoring the affected portion of the channel bank, which deflects the river's energy and may lead to increased erosion elsewhere in the system. Over time, this process was clearly recognized by flood managers, and by the mid-1950s it was agreed that bank protection would be a permanent capital cost of operating the SRFCP.

For several decades, this erosion control program proceeded without significant complication. However, the enactment of a series of state and federal laws and regulations protecting the environment has created serious cost and regulatory impediments to the program. The mainstem rivers serve as critical migratory corridors for the anadromous fish that inhabit the Central Valley. These fish are a part of the ecosystem that the SRFCP and the mainstem dams have altered. Traditional bank protection methods have the potential to degrade the remnants of the ecosystem supporting the fish and aquatic species inhabiting the mainstem rivers by removing streamside vegetation, including irreplaceable old growth trees; clearing large woody debris from the channel bottom; and creating homogenous rock surfaces along river banks and the re-engineered berms. These methods are inconsistent with adopted environmental resource management policies, and flood managers have systematically redesigned the SRFCP bank protection program to address this inconsistency.

## 2.2 Level of Protection and Levee Certification

The east levee of the Sacramento River in the Natomas Basin is part of the SRFCP, first authorized by Congress in 1917. This project involved a federal-state partnership to assume jurisdiction over the existing network of locally constructed levees. These levees were of varying quality—typically constructed of erodible dredged river silts and sands, and, as noted above, typically built close to the top of riverbanks. The Natomas levee and other levees in the region have been improved and upgraded a number of times since the authorization of the SRFCP; however, reliability issues related to bank erosion, seepage, and overtopping have not been fully addressed.

The most recent review of the Natomas levees (SAFCA Sacramento Area Flood Control Agency 2006) indicated that the risk of levee failure during a 100-year flood (flood with 1% annual chance of occurrence) was greater than previously thought and that significant improvements were required to allow the Federal Emergency Management Agency (FEMA) to accredit the levees and to meet SAFCA's "200-year" urban standard. Levee upgrades were needed to address lack of freeboard, underseepage, and ongoing bank erosion.

Based on the *Natomas Levee Evaluation Study Final Report* (Sacramento Area Flood Control Agency 2006), SAFCA determined that erosion protection should address eroding sites identified in February 2006, provide on-site mitigation as a

goal and, to the extent practical, be capable of withstanding a “200-year” flood in the Sacramento River. These criteria should result in bank protection treatments that will exceed the minimum standard required for certification by FEMA, which is based on the 100-year flood.

Section 65.10 (3) of Title 44 of the *Code of Federal Regulations* describes the standards and analysis required for embankment protection as part of FEMA certification of a levee system. The basic standard is for “no appreciable erosion” of the levee embankment during the base flood, defined to include both direct failure of the levee through loss of foundation and indirect failure through shortened seepage paths. The regulation also provides a broad set of factors to be considered in evaluating the potential for erosion and the potential for erosion to affect the levee embankment, including velocities, wind waves, debris impact, duration of flooding, embankment and foundation materials, levee alignment, and levee side slopes.

## 2.3 Erosion Hazard Assessment

The following steps were undertaken by SAFCA to identify eroding sites that require retrofit to qualify for levee accreditation by FEMA and to meet SAFCA’s 200-year standard. More detailed information is found in *Natomas Levee Evaluation Report: Erosion Assessment* (Northwest Hydraulic Consultants 2006).

Review of prior reports and site inspections indicated that the key streambank characteristic for identifying sites where streambank erosion might affect the levee is the width of berm remaining between the top of the eroding bank and the levee toe (i.e., the berm surface width). A minimum berm width of 150 feet was selected by SAFCA as providing appropriate protection of the levee against bank erosion during the base flood. The protection so provided likely would be more than adequate, given the slow observed erosion and channel migration rates along this reach of the Sacramento River (Water Environment & Technology 1991).

Sites where berms widths are less than 150 feet based on existing topography were inspected by boat on the Sacramento River on March 17, 2005. Table 2-1 summarizes berm width for 15 sites identified for further evaluation, which generally corresponded to sites previously identified through three prior evaluations (see nhc 2006 for summaries and discussion of prior evaluations).

**Table 2-1. Eroding Sites Identified**

Site	Berm Width (feet)	Distance between Berm Slope and Levee Foundation at Design Cross Sections (feet)
A	40–45	4, 0, 6
B	25–45	10, 6, 26
C	17–50	--
D	50–100	9, 11, 12, 37
E	50	--
F	85–90	--
G	30–70	-5, 0, 6, 26
H	70–100	--
I	90–100	70, 60
J	30–70	7, 12, 12, 11
K	0–50 <sup>2</sup>	18, 20, 19, 25
L	30–70	32, 30
M	35–70	37, 11, 30, 22, 42, 48
N	70–75	--
O	70–75	--

<sup>1</sup> The levee foundation is assumed to be the earth landside of the downward projection of the levee slope (3:1) under the berm and river. The data in this column represent the distance between the eroding berm slope and the projected levee slope. A positive number indicates that erosion has not yet encroached into the levee slope, while a negative number indicates encroachment.

<sup>2</sup> The levee at Site K has been widened to the waterside up to 50 feet; as a result the levee has a wide levee top. Nonetheless, the distance from the centerline of the levee to top of bank is never less than 70 feet, even when the berm width is 0.

In August and September 2005, additional field inspections and research resulted in compilation of the characteristics of these individual sites (northwest hydraulic consultants 2006), including soils in the levee and on the underlying floodplain; historical information on flows, hydraulics, and historical channel planform and profile; flood control system construction; and channel maintenance practices. Based on these studies, the assessment of risk concentrated on erosion of the bank and potential undermining of the levee foundation through shortened seepage pathways (Erosion risks from velocities against the levee faces or from wind waves generated during the base flood were judged to be not significant.)

A critical factor for evaluating the risk of levee failure from erosion of the foundation is the degree of encroachment of the eroding bank/bed on the levee foundation, defined as a projection of a 3 horizontal to 1 vertical slope from the waterside hinge point of the levee crown (i.e., continuation of the waterside levee

slope downward through the berm and under the channel). Encroachment typically is observed either at the toe of the bank or near the low water elevation where bank retreat from wave and flow erosion has resulted in steepening that part of the bank profile. Potential slope failure and erosion at sites with encroachment at the toe of the bank (Table 2-1) were considered most likely to threaten the levee.

Other significant bank erosion risk factors are the steepness of the bank slope above and below the low-flow waterline (steeper slopes are more likely to result in a failure of the entire embankment and may indicate bed scour); the composition of the soils in the bank (clayey sediments erode slower than silts and sands); potential scour depth during floodflow (deepening of the bed, undermining banks); and physical bank erosion processes (particularly wave erosion during the low-flow season, density of vegetation, and presence of trees that may fall and induce local bank erosion).

The two most important erosional processes that need to be addressed at all of these sites are:

- bed or toe scour at the base of steep banks as a result of floodflows, particularly where the scour has progressed near, or into, the levee foundation (projected downward at a 3:1 slope from the levee toe); and
- wave erosion, particularly from waves generated by recreational boat traffic. The erosion from boat traffic occurs primarily during the summer and fall, when water levels are near their annual minima, and results in a wave cut bench; a steep, eroding bank; and slow but persistent bank retreat. Wave erosion (boat and wind) is ubiquitous at all sites, as evidenced by a sparsely vegetated bank scour zone about 3 feet above the average summer water surface (i.e., between the average summer and average spring water surface elevations).

## 2.4 Results of Erosion Hazard Assessment

The erosion hazard assessment has led SAFCA to assign risk priorities to the candidate sites listed in Table 2-1 above. Priority was determined based first on the apparent direct risk of slope failure from undermining, followed by adjustment based on the indirect risk of seepage failure. *High priorities* were initially assigned to those sites where:

- the toe of the bank lies inside or very near to the levee template and the slope below the waterline is reasonably steep, scour depths are below bed elevations at the toe, or the local bed has been observed to be lowering; or
- the toe of the bank lies outside the levee template but there is risk of cantilever failure based on the estimated stratigraphy of the bank; or
- the bank at the low water elevation (the contact between the floodbasin deposits and the alluvial deposits) lies near the levee template, and there is potential for a failure originating at the contact point to intersect the levee

prism. If the failure seems unlikely to intersect the levee prism, the site was ranked as moderate.

*Moderate priorities* were assigned to sites where:

- the toe of the bank lies reasonably close to the levee template, but the slope below the waterline is moderate and general scour elevations are not very far beneath the local bed level; or
- the bank at the low water elevation (the contact between the floodbasin deposits and the alluvial deposits) lies inside the levee template, but an individual failure is unlikely to intersect the levee prism; or
- the toe of the bank lies from 20 to 50 feet from the levee template and the risk of slope failure is low to moderate, but erosion appears to be very active or specific site factors, such as lack of vegetation, structures, or fallen trees, suggest that erosion might proceed very quickly during a large flood.

The results for the 15 erosion sites indicate that 10 qualify as either *high* (five sites) or *moderate* (five sites) risk sites. The remaining five sites were assigned a *low* priority.

The main indirect erosion risk factor is a shortening of seepage paths under the levee, increasing underseepage and potential failure of the overlying levee. At sites where seepage was identified as a concern by SAFCA's geotechnical engineer, the erosion risk priority was increased for sites where seepage pathways have been significantly shortened through bank erosion. One site was adjusted: Site G was raised from a *moderate* to *high* priority (Table 2-2).

**Table 2-2.** Risk Priorities for the Erosion Sites

Site	River Mile	Initially Estimated Site Length (feet)	Direct Erosion Risk	Adjustment for Indirect Risk
A	78.6	410	High	None
B	78.2	640	Moderate	None
C	78.0	980	High	None
D	77.3	520	High	None
E	75.8	560	Low	None
F	74.4	1,360	Low	None
G	73.5	1,430	Moderate	Raise to <i>high</i>
H	70.3	480	Low	None
I	70.0	400	Moderate	None
J	69.8	690	High	None
K	69.4	1,170	Moderate	None

Site	River Mile	Initially Estimated Site Length (feet)	Direct Erosion Risk	Adjustment for Indirect Risk
L	69.1	660	Moderate	None
M	68.8	2,490	High	None
N	68.5	1,390	Low	None
O	67.8	370	Low	None

## 2.5 Bank Retrofits Needed

Based on the foregoing analysis, SAFCA has determined that repair of both the *moderate* and *high* risk sites is needed to ensure FEMA levee accreditation and meet SAFCA's urban flood protection goals at the following sites:

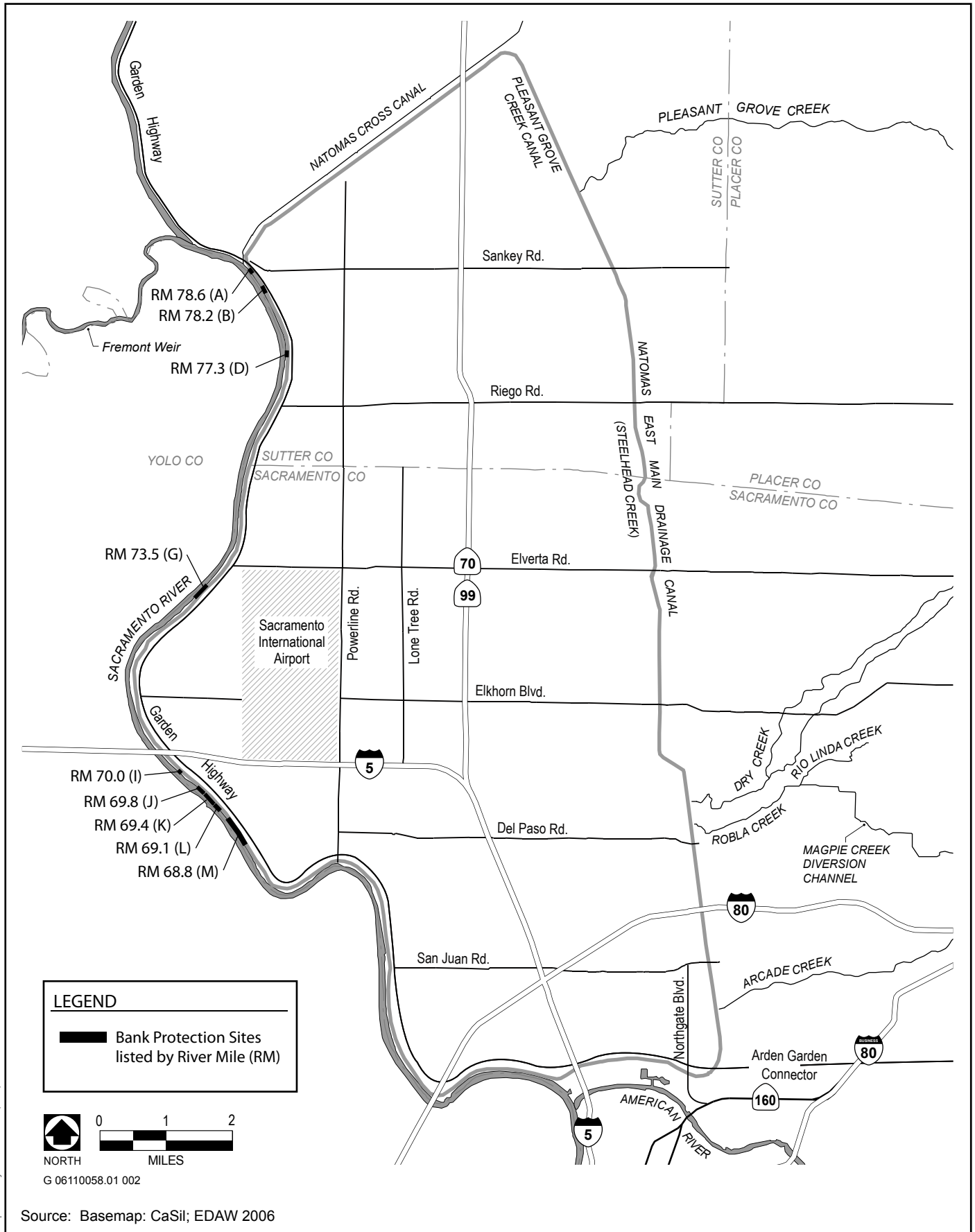
A, B, C, D, G, I, J, K, L, and M

The locations of these sites within the project reach (between Sacramento River Miles [RM] 69 and 79) are shown on Figure 2-1. While the *moderate* sites are likely to pass the base flood if it occurred in the next few years, continued erosion at these sites will result in *high* priority status within the next 25–50 years.

The California Department of Water Resources (DWR) and the U.S. Army Corps of Engineers (USACE) have designed and partly constructed bank protection works at Sites C and M under their Emergency Levee Repairs program. The repairs at Site C cover the entire site identified by SAFCA. As a result, SAFCA is proposing to implement bank protection at nine sites—the eight that have not yet been treated and the portion of Site M that was not part of the emergency treatment.

## 2.6 Long-Term Need

Over the long term, it is likely that additional bank protection will be needed in the region because the design of the SRFCP is expected to continue to induce erosion of unprotected banks and result in the loss of riparian vegetation. Because ongoing bank protection work is anticipated, project designs need to preserve riparian woodlands that are still present in the project reach and increase them nearer the low-flow banks, and replace bank habitat values important to aquatic life (e.g., salmon, steelhead) on site, in order to prevent a continued significant cumulative loss of riparian habitat and shaded riverine aquatic (SRA) cover along the Central Valley's lowland river systems.



Graphics\Projects\06677\_06 (9-07)

**LEGEND**  
 ■ Bank Protection Sites listed by River Mile (RM)

0 1 2  
 NORTH  
 MILES  
 G 06110058.01 002

Source: Basemap: CaSil; EDAW 2006

## **3.1 Public/Agency Scoping Process**

On June 4, 2007, SAFCA issued an NOP of a draft EIR and filed the NOP with the State Clearinghouse to solicit input on the scope of this EIR from interested agencies, individuals, and organizations. The public comment period on the NOP ended on July 3, 2007. A scoping meeting was held on June 19, 2007, to solicit input on the scope of the Draft EIR from interested agencies, individuals, and organizations. The NOP and copies of the scoping comments provided to SAFCA are included in Appendix C.

### **3.1.1 Issues Identified**

Following is a list of the key issues raised by the comment letters, all of which are addressed in this Draft EIR.

- DFG recommended that the Draft EIR address species and habitat issues, including mitigation and growth-inducing effects of the project.
- The Reclamation Board of the State of California recommended that the Draft EIR address levee certification, long-term levee stability, growth-inducing impacts, and construction processes and effects.
- The Sacramento Metropolitan Air Quality Management District recommended that an air quality analysis be conducted to determine whether the project exceeds maximum construction thresholds.
- Several individuals and organizations recommended that the Draft EIR address issues relating to drainage, eminent domain, rights of way, land use, and tribal impacts.

## Project Purpose and Objectives

As part of the NLIP, SAFCA proposes to implement bank protection measures along the Sacramento River to control erosion at nine sites along the east (left) bank between RM 69 and RM 79 (Figure 2-1).

### 4.1 Project Purpose

The purpose of this project is to stabilize bank conditions by controlling erosion to ensure the reliability of the flood control system protecting the Natomas Basin—which is a part of the SRFCP—while protecting environmental values and mitigating or compensating for impacts on environmental resources to the extent feasible.

### 4.2 Project Objectives

As described in the Local Funding EIR, from which this EIR is tiered, the project objectives of the NLIP are to (1) complete the projects necessary to provide 100-year flood protection for developed areas in Sacramento’s major floodplains as quickly as possible, (2) provide urban-standard (“200-year”) flood protection for developed areas in Sacramento’s major floodplains over time, and (3) ensure that new development in the undeveloped areas of Sacramento’s major floodplains does not substantially increase the expected damage of an uncontrolled flood.

Consistent with those objectives, the objectives of the proposed bank protection project are to:

- prevent erosion that could undermine or increase seepage through the existing levees by installing hardscape and vegetation to prevent further retreat of the existing riverbank as a result of floodflow scour and wave erosion;
- allow as much of the existing vegetation as possible to remain in areas where work will be performed;
- re-create riparian habitat and SRA cover in areas where bank protection work takes place;

- mitigate any loss of riparian habitat and SRA cover associated with the project at the project site; and
- provide net increases in riparian habitat that can offset future levee-tree removals for various sites throughout the project reach or adjacent reaches.

### 4.3 Project Authority

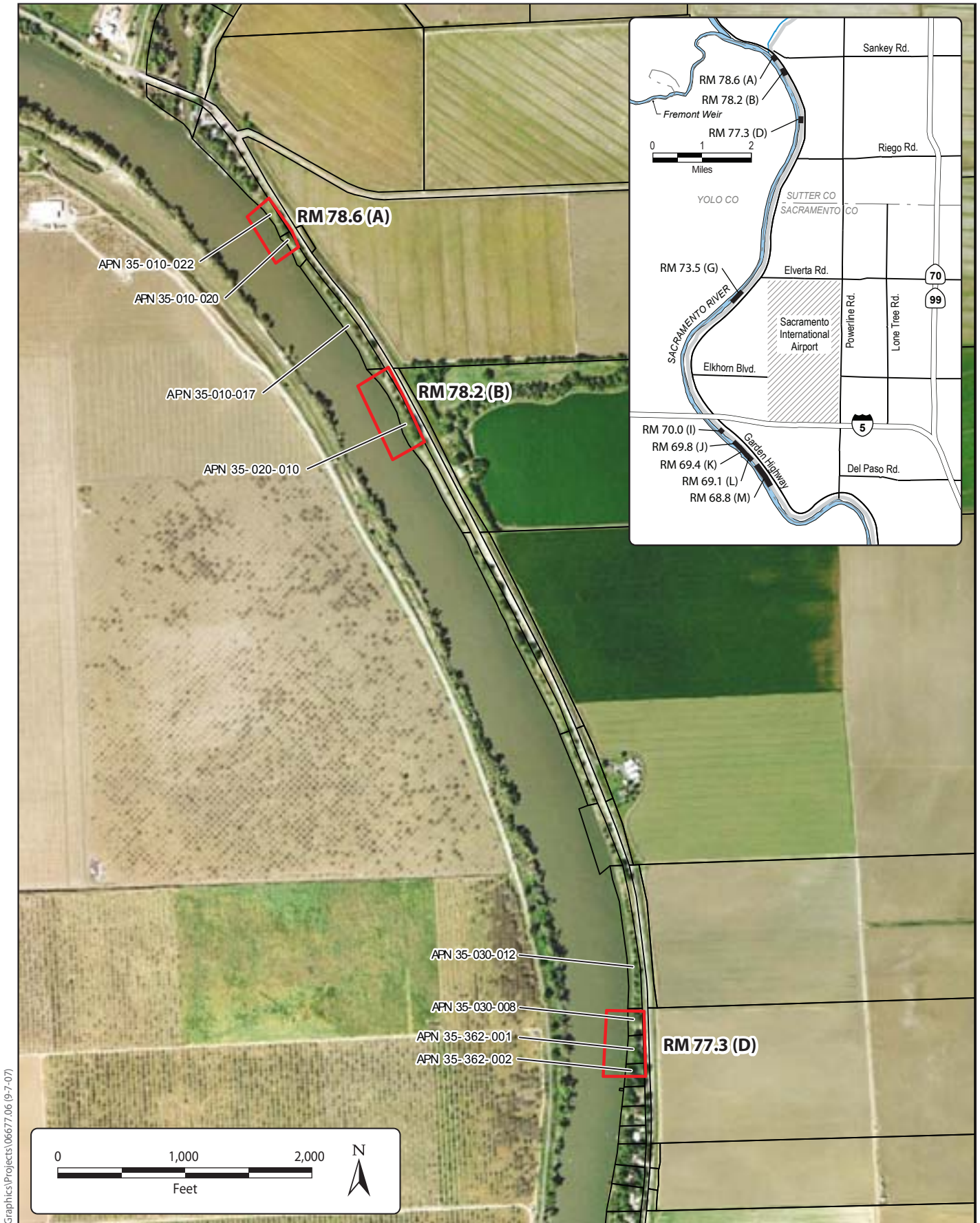
SAFCA is a Joint Powers Authority created to address the vulnerability of the Sacramento metropolitan area to catastrophic flooding. In 1990, the California Legislature enacted the Sacramento Area Flood Control Agency Act giving SAFCA broad authority to finance flood control projects and directing SAFCA to carry out its flood control responsibilities in ways that provide optimum protection to the natural environment. SAFCA's activities generally are funded from special benefit assessments paid by owners of benefiting properties, with the goals of providing at least 100-year flood protection as quickly as possible, and 200-year or a greater level of flood protection over time. As a part of implementing this goal, the NLIP (described in Section 1, Introduction) was formulated and presented to the public in 2006 (EIR on Local Funding Mechanisms, February 2007). One of several elements of this plan is bank protection where levees are threatened by bank erosion.

SAFCA has established a new funding mechanism for the local share of the cost of constructing and maintaining flood control improvements and related environmental mitigation and habitat enhancements in the Sacramento area through voter approval of a new assessment in April 2007.

### 4.4 Project Location and Extent

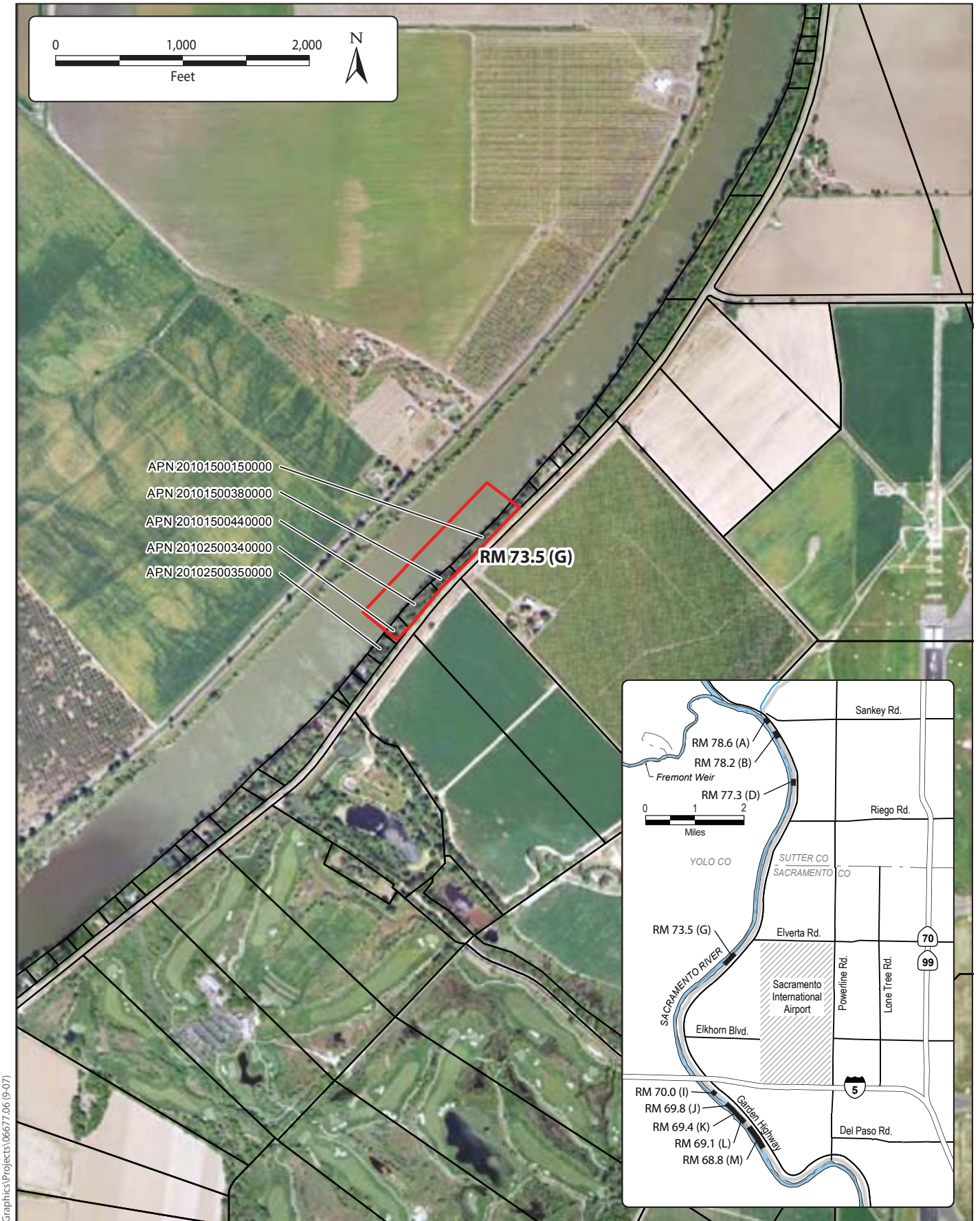
As shown on Figure 2-1, the nine proposed project sites are located on the east (left) bank of the Sacramento River between RM 69 (upstream of the confluence with the American River at approximately the Interstate 5 river crossing) and RM 79 (the confluence with the Natomas Cross Canal). Site conditions vary (see Section 6—Environmental Setting); most of the banks are composed of fine-grained native material; coarse or failing revetment is present at others. No pattern to the location of the project sites is evident, except all nine are locations where erosion is ubiquitous and has encroached or shortly will encroach on the levee foundation, as discussed in Section 2 above.

The lengths and widths of proposed bank protection at each site, according to draft (30% complete) plans, are listed in Table 4-1. The sites are also shown in Figures 4-1, 4-2 and 4-3. These dimensions may be modified as design proceeds through two more iterations to the final plans, but any future changes would be on the order of only tens of feet in length and a few feet in width. The table shows three lengths for each site—the primary structure length, additional length of transitions to existing banklines, and total length of the primary structure and the transitions. Transition lengths are the most likely to change through the

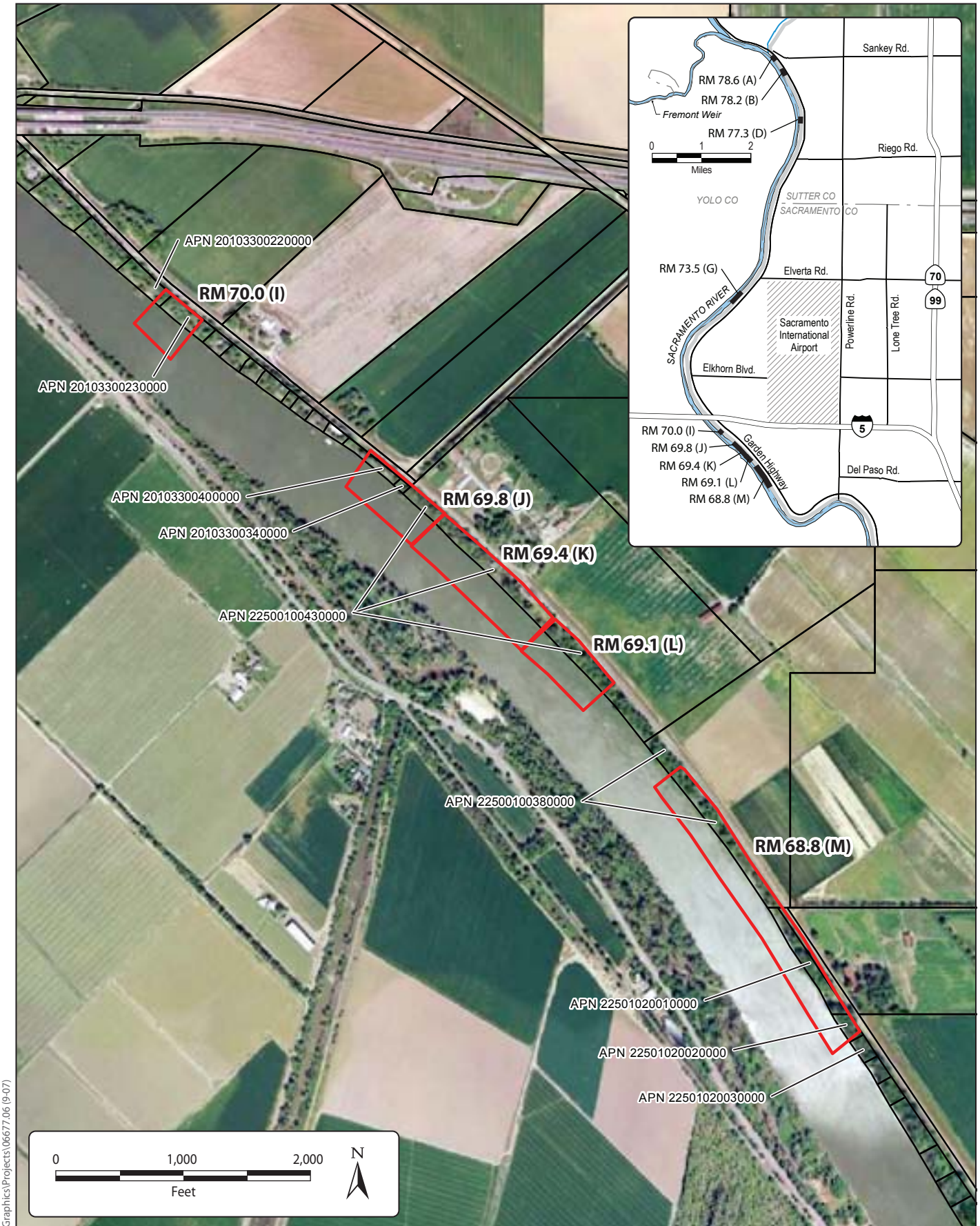


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**Figure 4-1**  
**Project Sites RM 78.6, RM 78.2, RM 77.3**



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**Figure 4-3**  
**Project Sites RM 70.0, RM 69.8, RM 69.4, RM 69.1, RM 68.8**

design process but will not affect the extent of the significant effects on the environment analyzed in this EIR because the transitions would be designed to avoid or minimize significant impacts on sensitive resources.

**Table 4-1.** Locations and Approximate Dimensions of Proposed Bank Protection (feet)

Site	Location (River Mile)	Primary Length	Transition Length	Total Length	Average Width
A	78.6	370	0	370	60
B	78.2	685	90	775	60
D	77.3	505	100	605	65
G	73.5	1,260	130	1,390	85
I	70.0	390	100	490	55
J	69.8	890	120	1,010	60
K	69.4	1,350	0	1,350	65
L	69.1	1,240	0	1,240	70
M	68.8	1,762	0	1,762	70
Total		8,447	540	8,987	Average 65

## 4.5 Project Construction Schedule

Preliminary bank protection designs for the nine proposed project sites were prepared by northwest hydraulic consultants and reviewed and approved by SAFCA's engineering staff for public consideration in early 2007. Following completion of the environmental review process and detailed project design, SAFCA's Board of Directors will consider approving the project at a meeting in November 2007. If the project is approved, construction would take place between April 1 and October 15 during one or all of the 2008, 2009, and 2010 construction seasons. Work outside of this period, during the winter months, may be pursued during low-flow periods with the appropriate agency approvals. The contractor selected to construct the projects would decide when each particular site would be constructed during the 3-year allowable construction period.

## 5.1 Proposed Bank Protection

The proposed improvements at the nine sites would stabilize the banks to ensure that the levees are not eroded during a large flood event. The primary focus of riprap employed for this purpose would be the submerged toe of the eroding bank (where it meets the channel bottom). Toe stabilization would arrest retreat of the emergent upper bank and stop the reduction in berm width, thereby reducing the potential for loss of extensive mature riparian vegetation, destabilization of the levee foundation, and shortening of seepage pathways.

The proposed improvements would minimize impacts on high-value SRA and riparian habitats that are present at all of these sites. The typical design specifies riprap from the submerged toe of the bank and up the bank, but only as high as the average summer water level. Above the average summer water level elevation, existing and planted vegetation, small-diameter cobbles, and buried riprap would provide protection against upper bank scour during floodflows and boat wake and wind stresses. Soil-filled riparian planting benches would be incorporated into the top of the riprap to provide near-stream riparian habitat, shading of the water's edge, instream vegetative cover for fish, and a support for placement of instream woody material (IWM). Although the bank protection designs for all of the various sites conform to these design purposes, site-specific conditions also have been accommodated in each site design.

The bank protection project consists of the following common elements at each repair site, as shown in the cross section on Figure 5-1 and Figure 5-2.

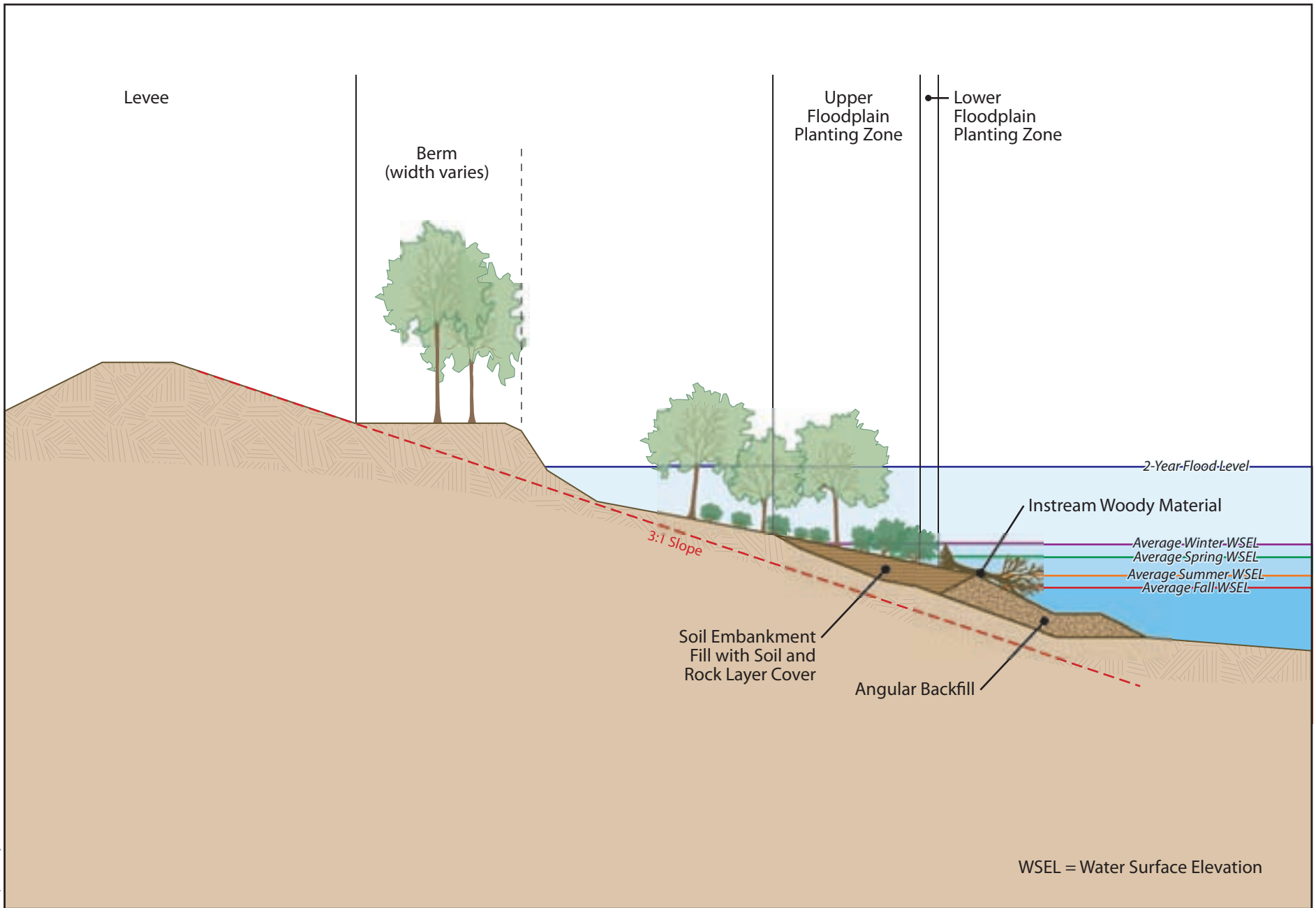
- Rock riprap placed on the existing or restored levee-foundation slope from the channel bed to about the average summer water level on the bank, with toe protection as required to resist and accommodate scour of the channel bed. This riprap would create and protect the waterside of a soil trench.
- Cobble-covered soil slope extending from the riprap up the slope to about the average winter water surface elevation. Among the sites, the maximum slope of the surface of the soil fill would be 3h:1v (ratio of horizontal to vertical distance), and the minimum would be 10h:1v. A layer of cobbles and filter material would be placed on the top of the soil to provide protection of the levee foundation from catastrophic scour and erosion protection of the soil

surface. Riparian vegetation would be planted through the cobbles, with species varying according to the elevation above the average summer water surface elevation (Table 5-1).

- Retention of existing riparian vegetation above the cobble slope (i.e., above the average winter water level) as a result of limiting the height of the structure up the bank. Providing construction access by barge rather than clearing vegetation on the berm to provide construction access from the Garden Highway will further limit the removal of riparian vegetation where this construction method is practical. Where larger-diameter trees are present near where the cobble slope joins the natural upper-bank slope, they will be marked and avoided during construction to the extent feasible. Where trees exist within the area of the proposed cobble slope and the thickness of the soil-cobble layers is less than 2 feet, the existing trees may be retained.
- A coir log where the cobble layer joins the existing slope above the structure.
- IWM structures for habitat mitigation. IWM structures would consist of whole-tree and/or rootwad clusters anchored into the revetment on the lower portion of the cobble-covered soil slope (Figure 5-2), such that portions of the IWM typically would be submerged even during the low-flow season.

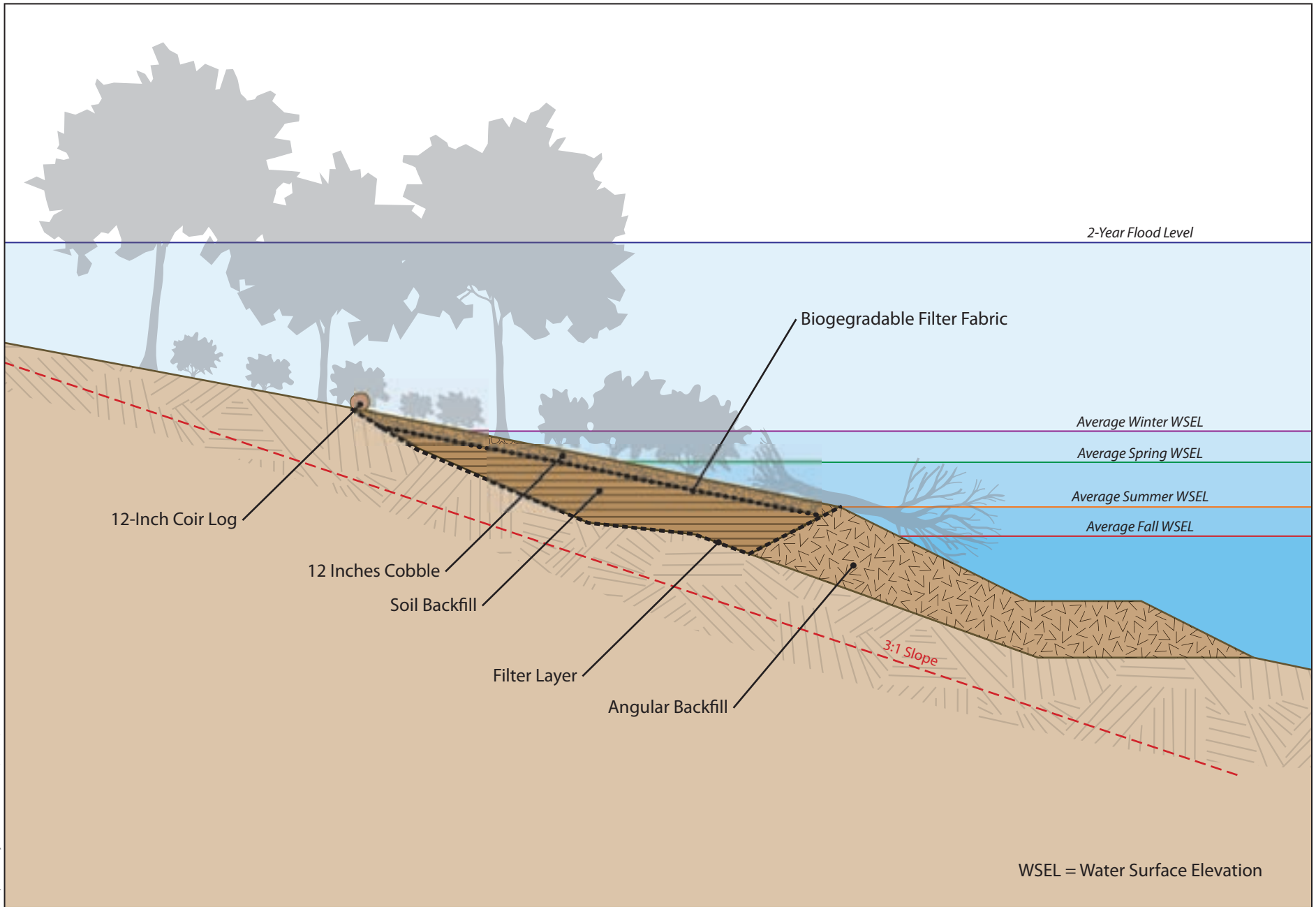
**Table 5-1.** Proposed Species for Vegetation Planting

Planting Zone	Botanical Name	Common Name	Average Plant Spacing (feet on-center)	Container Type
Lower (0–2 feet above average summer WSEL)	<i>Cephalanthus occidentalis</i>	Button bush	2.0	5-gallon
	<i>Salix laevigata</i>	Red willow	2.0	5-gallon/cutting
	<i>Salix exigua</i>	Narrow-leaved willow	2.0	5-gallon/cutting
	<i>Alnus rhombifolia</i>	White alder	1.5	Treepot 4
Upper (more than 2 feet above average summer WSEL)	<i>Carex barbarae</i>	Santa Barbara sedge	2.0	Tree band
	<i>Rosa californica</i>	California wild rose	1.5	Treepot 4
	<i>Rubus ursinus</i>	Wild blackberry	1.5	Treepot 4
	<i>Acer negundo</i>	Box elder	6	Treepot 4
	<i>Alnus rhombifolia</i>	White alder	6	Treepot 4
	<i>Baccharis salicifolia</i>	Mule fat	1.5	Treepot 4
	<i>Cephalanthus occidentalis</i>	Button bush	1.5	Treepot 4
	<i>Fraxinus latifolia</i>	Oregon ash	6	Treepot 4
	<i>Platanus racemosa</i>	Western sycamore	6	Treepot 4
	<i>Populus fremontii</i>	Fremont’s cottonwood	6.0	Treepot 4
<i>Quercus lobata</i>	Valley oak	6.0	Treepot 4	



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**Figure 5-1**  
**Typical Project Design Cross-Section**



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WSEL = Water Surface Elevation

Planting Zone	Botanical Name	Common Name	Average Plant Spacing (feet on-center)	Container Type
	<i>Salix exigua</i>	Narrow-leaved willow	6.0	Treepot 4
	<i>Salix gooddingii</i>	Goodding's willow	6.0	Treepot 4
	<i>Salix lasiolepis</i>	Arroyo willow	6.0	Treepot 4
	<i>Salix laevigata</i>	Red willow	6.0	Treepot 4
	<i>Salix lucida</i>	Shining willow	6.0	Treepot 4
WSEL = water surface elevation				

The upper elevations of the rock riprap and the elevations and slope of the soil trench surface were selected to maximize habitat values as defined in the USACE Standard Assessment Methodology (SAM) while maintaining adequate erosion protection. Figures 5-1 and 5-2 show typical seasonal average water levels in relation to a typical proposed design. Bottoms of soil trenches typically are just above minimum recorded water levels.

Proposed sizes and thicknesses of the rock used for bank protection were developed based on engineering criteria for flood scour, wind and boat wake energies, and the possibility of theft and vandalism. The proposed riprap would be composed of rocks having diameters ranging between 1 and 1.5 feet, with a mean diameter of 1 foot. This proposed riprap size is needed only from the average summer water level to a few feet below minimum water levels. Smaller rock that is sufficient to protect against flood shear forces may be placed at submerged lower elevations if this provides a cost or aquatic-habitat-value advantage.

The layer of cobbles proposed for protection of the top of the soil mass would have a thickness of about 1 foot, with mean cobble diameter of about 0.5 foot and maximum diameter of 1.0 foot. The median size was selected to maximize habitat benefits as valued by the SAM, and the thickness was selected to facilitate planting and volunteer recruitment of riparian vegetation.

## 5.2 Construction Options

Two construction options would be considered to implement the bank protection – water-based construction and land-based construction. Each individual site may be considered separately, resulting in the use of either option, or a combination of both, at any of the sites. To the extent the two construction options would cause different impacts, the impact of each option is analyzed in this document.

Water-based construction would be conducted by using a boat or barge on the Sacramento River. Tugboats would move construction equipment as well as rock

and soil materials and trees up the Sacramento River to the nine proposed treatment sites, and platforms would be provided to move the equipment and materials onto the sites. A large barge could navigate the river to the treatment sites; however, shoreline access could be limited at some sites with shallow water depths. Clearing of vegetation would have to take place along the berm at some of the treatment sites but would be minimal.

Land-based construction would be conducted by using trucks that travel along Garden Highway, which runs along the top of the levee adjacent to the proposed bank protection sites. Haul trucks would bring rocks, soil and trees to the sites, while other vehicles would transport equipment and personnel. Ramps composed of fill material would transport the equipment and materials from Garden Highway on top of the levee surface down to the berm. Many of the sites are highly vegetated along the Garden Highway. To access the treatment sites, some vegetation and trees would have to be removed, but access would be designed in a manner that avoids and minimizes the removal of vegetation to the maximum extent practicable.

### 5.3 On-Site Minimization and Mitigation of Habitat Impacts

To meet the project purpose and need, the structural aspects of needed bank protection were designed to protect and improve future habitat values at the project sites wherever engineering design criteria for stability could be met. Design engineers and habitat restoration specialists collaborated to produce the proposed bank protection designs.

Existing vegetation will be preserved to the maximum degree possible, consistent with emerging new USACE levee vegetation guidelines, so as to retain most of the existing riparian habitat values on the treatment sites. Due to the physical relationship between the location of the bank protection sites and the potential newly regulated areas within the 3:1 levee slope, it is likely that the existing vegetation immediately adjacent to the bank protection sites will not fall within the areas that the Corps may require to be cleared. Retained vegetation is expected to help maintain the bank stability at elevations above the top of the proposed work. The proposed low-rock designs would intrude only slightly into the existing lower bank vegetated zone; most of the rock work would be submerged or in the summer wavewash zone.

Riparian woodland habitat on the top of the berm typically is extensive in the project reach; the use of a barge for construction access would preclude the need for significant vegetation clearing on the berm. However, waterside construction from a barge may not always be practical; therefore, land-based construction methods are being considered as a separate alternative for each of the nine sites.

Rock riprap is prescribed to arrest scour at the toe of the slopes and to protect other surfaces that experience the greatest erosive stresses, which generally are at

lower elevations where vegetation is not now permanently established and is not expected to grow without protection of the soil surface. Cobbles over soil provide wave-erosion protection of slopes above the rock riprap and allow both planted and volunteer vegetation to establish and grow. Sediment is expected to be deposited over much of these surfaces. Proposed cobble sizes maximize substrate habitat values, according to the SAM valuation. These planting areas allow vegetation to be planted as close to the summer water level as possible to maximize SAM habitat value for overhanging shade. They provide additional SAM habitat value for aquatic vegetation during frequent inundation periods in the wet season. Vegetation on the cobble surface also would provide roughness, lower boundary velocities, induce deposition, and thereby help stabilize the proposed soil planting medium, although the cobble cover and an underlying buried riprap are relied on for erosion protection.

Extensive use of anchored woody material structures on the cobble and rock surfaces is proposed to re-create existing levels of instream structure and, at most sites, to exceed existing levels to mitigate small deficits in other habitat-value impacts. Habitat valuation according to the SAM guided the project design process, first through a preliminary SAM analysis described in Northwest Hydraulic Consultants (2006) and recently through a detailed SAM analysis, described in detail in the Environmental Impact section. The SAM analysis was conducted in a manner that allowed estimation of changes in habitat values at each site with and without placement of woody material structures. Although habitat deficits from bank protection can result from factors such as changes in bank slope, bank substrate size, aquatic (seasonally flooded) vegetation, and overhanging shade, as well as from changes in instream structure, SAFCA is proposing to provide more IWM than pre-project levels wherever deficits in total habitat value were calculated to result from the project. Instream structure is measured by the percentage of bankline where it is present at each of the average flows of the four seasons. The existing portions of each site's low-flow shoreline (summer season) for which IWM exists, and the proposed portions of each site's low-flow shoreline (summer season) for which IWM placement is proposed, are shown on Table 5-2. The proposed extent of IWM at any site is limited to 50% of shoreline, because SAM values are maximized at this percentage.

**Table 5-2.** Estimate of Extent of Instream Cover Needed for Full On-Site Mitigation

Site	Existing Seasonally— Minimum Extent (% existing bankline)	Estimated Threshold (% bankline needed) <sup>1</sup>	Selected Design Value (% bankline provided) <sup>2</sup>
A	13	13–20	15–20
B	0	0–20	15–20
D	2	2–20	15–20
G	1	1–20	15–20
I	2	2–20	15–20
J	0	0–20	15–20
K	1	1–20	15–20
L	20	20–35	35–40
M1	1	1–20	15–20
M2	0	0–20	15–20

<sup>1</sup> A range is given in lieu of the exact estimated amount, based on the % bankline of modeled scenarios that bracket conditions at each site.

<sup>2</sup> To be applied to all three seasonal water surface elevations (winter, spring, fall)

## 5.4 Compensating (Off-Site) Mitigation

The biological impacts of the proposed bank protection project are discussed in the Biological Resources section of this EIR. Changes in overall fish habitat value have been predicted using the SAM, and other biological issues are addressed as well. The Biological Resources section describes the potentially significant species and habitat impacts of the proposed project.

The SAM valuation process described above indicates that all fish habitat impacts, which have been minimized by site-specific designs, can be fully mitigated at each site by increasing existing levels of IWM a moderate amount. Hence, no off-site mitigation project components will be needed to compensate for the effect of the proposed project on aquatic and riparian resources.

## **6.1 Physical Setting**

### **6.1.1 Geophysical Conditions**

The proposed bank-protection project would be implemented at nine locations on the east (left) bank of the Sacramento River in the reach immediately north of the city of Sacramento. The Sacramento River is a large river, which, together with the San Joaquin River, drains the great Central Valley of California and the surrounding mountain ranges—the west side of the Sierra Nevada (a snowy range), the eastern Coast Ranges (a dry range), and the Siskiyou Mountains (rainy) to the north. The entire Sacramento River watershed is vast—approximately 27,000 square miles.

The climate of California produces rivers that experience a large variation of flow between the dry seasons of summer-fall and the wet seasons of winter-spring. Several months of dry weather from June through November (and in some years, December) result in flows that average only 10,000 cubic feet per second (cfs) (base flow), while wet-season flows, varying in response to storm events sweeping inland from the Pacific Ocean, reach discharges of up to 93,000-94,000 cfs (as in 1986 and 1997). (The currently estimated 200-year floodflow is 135,000 cfs.)

The project sites (between RM 68 and RM 79 as measured from the mouth of the river at Suisun Bay) are located in the lowland, low-gradient reach of the Sacramento River as it transitions from a meandering reach upstream to the tidally influenced, distributary (multiple channel) reach of the Delta. Channel migration in upstream meandering reaches has given way to channel widening in this slow-velocity, wide-channel reach. Boat wakes and wind waves may be at least as responsible as forces of floodflows for channel widening.

The project reach is downstream of the confluences of the Sacramento River with several major rivers draining the wet and snowy Sierra Nevada (including the Yuba, Feather, and Bear Rivers), but it is upstream of the confluence with the American River. Because the confluence is located only a short distance downstream, flows in the American River during periods of flood do influence flow in the Sacramento River in the project reach. The project reach in the

natural state was most affected by storm events and runoff conditions in the Feather River and Upper Sacramento River watersheds.

## 6.1.2 Human Influences

Over the past 150 years, the natural condition of the river system has been gradually changed to a system designed to manage floods (Section 2, Need for Project) and convey water supply. In the natural state, the Sacramento River flooded vast low-lying areas of the northern Central Valley (or Sacramento Valley) almost annually. As rain and/or snowmelt began to increase, flow exceeding channel capacity was conveyed by sloughs into wetlands in low-lying basins, from which water drained slowly for many months before reaching Suisun Bay. As flood stage increased during major floods, sediment-laden waters would overtop the riverbanks, helping to build and maintain natural low levees.

The gradual development of river-confining levees was accompanied by creation of a flood-bypass system that extensively used many of the natural flood basins. The bypass system is designed to convey about 80% of flow during the largest floods, leaving only 20% in the leveed river-channel.

Construction of major reservoirs of the upper Sacramento and on the Feather River for purposes of flood control and water supply changed the river's flow regime by reducing the number of small flood events and reducing the peak flows during major flood events. It also changed the river's typical hydrograph (temporal pattern of rate of flow), resulting in less gradual and simpler variation in streamflow.

Creation of the levee system purposefully eliminated most of the river's floodplains, both to reclaim high-potential agricultural land and to flush hydraulic mining sediments from the river system (discussed in Section 2). In the project reach, the width of the floodplain within the levees ranges from about 20 to 150 feet. In the natural state, riverside floodplains extended for miles, higher at the riverbank and gradually diminishing in elevation toward the flood basins.

## 6.2 Biological Setting

In pre-settlement times, the river's floodplain in the project reach was occupied by dense riparian forest, likely extending a few miles from the river until wetland and marsh communities of the Natomas Basin prevailed to the east and Yolo Basin to the west. The remnant riparian forest above the bank protection sites generally supports the same species as were present in the pre-settlement period. The riparian forest grows on both the berm (remnant floodplain) and the riverbank from the edge of the berm, down the steepened slope, to about 3 feet above the average summer water surface. The bank below this elevation is

subject to boat-wake and wind-wave energies in the dry season and supports little vegetation.

Because of clearing for agriculture, the riparian forest corridor along the Sacramento River is discontinuous and highly variable in width, species dominance, and ecological integrity. In reaches some distance upstream of the Fremont Weir (upstream of the project reach), as well as through Sacramento and downstream through the Delta, forest gaps dominate over patches, and long lengths of the riverbank are nearly devoid of woody vegetation. Above Colusa (RM 145, well upstream of the project reach) a vast, dynamic riparian forest generally dominates the riverine landscape, although it is fragmented from place to place by agriculture.

The riparian corridor at and between the project sites is generally continuous, narrow—but sufficiently wide to be considered a *corridor* rather than a *strand*—and dominated by diverse native woody species. Although narrow, it provides functional riparian habitat and undoubtedly serves as reproduction and foraging habitat and as a corridor for dispersal and migration for several species. This native riparian vegetation patch extends from the urban Sacramento limits to upstream riparian corridors along both the Sacramento and Feather Rivers at and above their confluence and the Fremont Weir overflow to the Yolo Basin. The riparian corridor in the project reach provides extensive nesting habitat for Swainson's hawk, a threatened species, and other special-status raptor species.

The river serves as an important migration and juvenile rearing corridor for anadromous fish species, which have been the focus of many restoration programs for the Sacramento River system. Anadromous steelhead and Chinook salmon, as well as resident green sturgeon, are endangered fish species known to use the project reach. Habitat suitability for juveniles of these species is characterized by several variables, assessed for flow levels during seasons when juvenile salmonids pass through the sites: amount of nearshore shallow-water zones, presence of instream vegetation and IWM in these zones, amount of shading bank vegetation over these zones, substrate type, and amount of adjacent floodplain during frequent floodflows (i.e., 1.5 to 3-year return period).

At the project sites, except for small width of adjacent floodplain, the condition of the nearshore aquatic habitat as measured by these variables is generally good. Although bank erosion, streamflow, and wave energies limit the stature and continuity of bank vegetation, inundated vegetated cover and bank shading levels are extensive. Substrate is mostly natural (although some rock and broken-concrete bank revetment is present). IWM from upstream sources, although present at most sites and throughout the project reach, is likely substantially diminished relative to the pre-historical condition, as the sources of IWM (vegetated floodplains) have been reduced substantially throughout the upstream river system.

## 6.3 Cultural Setting

The development of the flood-control system was part of the early Americans' efforts to reclaim the extensive bottomland of the Sacramento River for agriculture. An associated need was to maintain navigability of the river for transporting agricultural products to market and people and equipment to the gold fields. Industrial agriculture is now the primary land use along the river in the Sacramento Valley, including adjacent to the project sites. In this reach, all of the agriculture occurs on the landside of the levee, and therefore would not be directly affected by the proposed bank protection.

Infrastructure for irrigation water withdrawals is present at some of the project sites. Several rural residences are present on the riverside of the levee near some of the project sites, generally existing in the riparian forest corridor context. A short distance downstream of the project reach, agricultural uses give way to urban uses in the Sacramento metropolitan area.

The levee at the project sites is part of the first federal-state cost-shared project: the SRFCP. As such, the levee provides protection not only of immediately adjacent agricultural lands, but also of new development that is gradually supplanting agriculture in the Natomas Basin. In complex ways, its integrity affects flood safety of persons and property throughout the Sacramento metropolitan areas. The levee also is considered to have historical significance.

The river itself supports extensive recreational boating, predominantly power boating for fishing and water-skiing. Commercial transportation of products and people via the waterway is limited. I-5 crosses the river in the project reach, and four operable bridges cross the river between construction rock sources downstream and the project sites.

## 6.4 Additional Information

In Section 7, "Impacts of the Proposed Project," potential impacts are assessed according to 15 resource topic areas. Each resource section includes a detailed description of existing environmental conditions that characterize that resource. These sections are thus an extension of this description of the project's environmental setting.